TOXICS, HAZARDS AND RISK MANAGEMENT

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INTRODUCTION

One of the most important public policy issues facing our country today concerns the protection of the environment and the role that our courts and legal processes are playing in safeguarding our health and quality of life.

All of us, and in particular, toxicologists and scientists across this country, understand how urgent and timely this subject is. Each one of us holds strong views on the issues. As the head of an Ontario Crown Corporation trying to establish a world-class facility for the destruction of hazardous industrial waste, I have come to appreciate over the past few years how complex and important the legal process is in this effort.

This paper will explore the general subject of toxics in our environment, the hazards they pose and the difficult questions they raise for the legal community in particular. I will discuss the issue of pollution and what this means to the general consumer as well as to the legal expert. I will describe for you the difficulties and challenges facing me as a scientist and a toxicologist in measuring risk and hazards and coming to grips with comprehensive environmental protection policies. Finally, I will take the liberty of offering some of my own views on how the legal system can play a more active role in dealing with the issues of environmental risk and responsibility.

The problems we all face in attempting to deal effectively with toxic substances in our environment, whether we are scientists, judges, law-makers, or simply members of the general public are:

- How small is small?
- What does it all mean in terms of human impacts?
- Can a chain of evidence be established between the sources of toxic contaminants and the receptors, so that blame and compensation can be determined?

I. TOXICS AND POLLUTION

We are bombarded daily with stories about real and impending environmental disasters. We read and hear about everything from wells being contaminated by leaking dumps to threats that the ozone layer will collapse and the whole world will be exposed to skin cancer. Tests on human tissues and mother's milk tell us that we are all carrying a measurable load of toxic chemicals, the legacy of life in an industrial society. And we appear to be feeding it to the next generation.

In fact there is no place on the Earth's surface, seas or atmosphere that remains uncontaminated by humans. The Arctic snow pack contains agricultural and industrial chemicals such as lindane, dieldrin, heptachlor epoxide, chlordane, DDE, PCBs and Endosulfan. There are chemicals in polar bears at one end of the world and penguins at the other. Seals are dying in the

Baltic, while beluga whales in the St. Lawrence are so polluted that their bodies are classified as hazardous waste.

This contamination did not begin a few years or decades ago. For millennia, people have realized that metals wrested from the ground could be hazardous. Ancient ironmakers were crippled by pollution. Romans suffered from lead in their wine and drinking vessels and the term "ad as a hatter" comes from the neurological effects of mercury used by makers of felt hats in centuries past.

In more recent times we have also had to worry about poisonous smogs, acid rain, toxic chemical spills and dumps and the effects of pesticides and herbicides sprayed on our fields, forests and lawns.

In our evolution as a species we have moved from a time when all we had to worry about were natural toxins—a poisonous berry, a spider's bite, a rotten piece of fish—to the early days of industrial pollution when the threats were from unnatural concentrations of natural poisons—mercury, lead, zinc, antimony, and so on. Today we are faced not only with these two threats but with a host of new, man-made, synthetic toxins, completely unknown in nature: thousands of new, completely artificial chemicals from PCBs and pesticides to food additives and colouring agents. Human beings have not experienced generations of human exposure to these substances during which we would have developed immunity. We have no defenses against them.

For decades we have used chlorofluorocarbons in our refrigerators, air conditioners, spray cans and in making foam plastics, based on the assurance they were non-toxic. But now we realize that, once released from their containers, they float high into the stratosphere where the sun's rays break them down into chemicals which destroy the ozone layer.

High overhead, the ozone layer screens out most of the sun's ultra-violet radiation permitting life on earth as we know it. If the ozone layer continues to be depleted we will get more skin cancer and eye diseases and our immune systems will be suppressed. The effects on wildlife and plants, including crops, could be catastrophic.

We learned in high school that carbon dioxide is virtually non-toxic. But our industrial society has pumped billions of tonnes into the sky, creating the greenhouse effect. As a consequence, the Earth's climate will gradually warm. If left unchecked, the greenhouse effect eventually will cause droughts in many of the world's great food producing areas, like the Prairies, and make the seas rise, flooding cities like Charlottetown and Saint John.

I could recite many other examples of environmental pollution, and the consequences that likely await us if nothing is done. But let me turn to the far more difficult subject of toxic chemicals, what they are and what damage they can cause. Frankly, our lack of understanding of these chemicals is posing problems not only for the legal system but for scientists, politicians and the public at large. As our instruments of detection become more sensitive we are now finding small amounts of toxic chemicals almost anywhere we look. It is a bit like the development of the

microscope and the discovery of bacteria in the past century. In both cases we found these tiny things but it took time to figure out what they do to us.

The numbers involved in chemical detection are becoming so minuscule that it is hard to explain them in a way that is understandable. For example, the environmental community now commonly talks of chemicals being found in parts per billion level. To make a comparison, if we found five parts per billion of a substance in a glass of water, it would be as if someone in a spacecraft circling overhead could pick out five of you among the five billion people on this planet. In fact parts per trillion is now a frequently used measure when we find super-toxic chemicals like dioxins. Some of the acceptable exposure levels are being set in parts per quadrillion.

To give a specific example of the problems with which we must cope, let me use pesticides. Most modern pesticides are synthetic and we use them in enormous quantities. Last year, in the United States, more than $9 billion was spent on pesticides; in Canada, about $900 million. In the United States, over 200 deaths and 45,000 poisonings were directly attributed to pesticides. In Canada, we do not seem to have a registry to document such statistics. We tend to think that we took care of the DDT problem when it was banned in Canada and the U.S. in 1970. But the sad truth is that more than 15 tonnes of DDT were manufactured in the United States last year for export to the third world for mosquito control—where its use contaminates the global atmosphere, the world's fresh water and oceans, and the songbirds you enjoy here in the summer but who winter in sprayed areas in the tropics. Such pesticides, no matter where in the world they are used, eventually get into the bodies of every life form—*my* body and *yours* included. From whom do we seek redress?

We know that toxic chemicals are in the environment and that they have the potential to be dangerous, but how do you in the legal profession assign responsibility and determine exactly what damage they have caused? One of the first problems that you, and everyone else faces, is tracking these chemicals as they move through the environment so that you can assign responsibility. In our society we sometimes talk about chemical bullets but in fact we lack a good ballistics or fingerprinting test to tell where this molecule of dioxin or that molecule of DDT came from. This can have serious implications, not only for individuals but for whole nations. Consider the acid rain case and Canadian attempts to set more pollution controls on U.S. power plants. After many years Canada has satisfied most Americans that acid rain exists and that it is doing damage. However, some of the owners of those American power plants are now saying you have to identify *my* emissions here destroying *your* lake there, perhaps hundreds of miles away, before *I* will consider reducing my pollution. So we have the smoking chimneys but it is hard to turn them into smoking guns in the legal sense.

Technically it is possible to trace the pollution from the smokestack to a lake by injecting special marker gases into the air. In several experiments American scientists found that chemicals released in the United States blew into Canada. But it cost tens of thousands of dollars and required flights by special aircraft to track a couple of releases of gas - a prohibitively expensive procedure on a case by case basis.

In an attempt to cope with the question of where the acid rain is coming from, scientists use computer simulations of wind movements to estimate how much acid rain comes from city A to lake or river B. In this way they calculate that four million tonnes of the gas which forms sulphuric acid rain flows from the United States to Canada each year.

Computer models were used within Canada to carve up responsibility for reducing acidic air pollution from smelters and power plants. They helped pave the way for agreements among the federal and seven provincial governments to reduce sulphur air pollution by half by 1994. But this took willing players at the negotiating table, not adversaries who demanded ironclad proof of whose acid rain is doing what in whose lake or salmon river.

So the question of responsibility and the chain of evidence can pose a serious problem for the legal system. But there is another difficulty we face and that lies in telling what pollution is doing to us. What do toxic chemical experts rely on when they provide advice to governments, industry, the public and courts on this question?

Environmental scientists like me see some very disturbing signs. We can link high concentrations of certain organic toxics in Lake Ontario with tumours on the skin, gills and gonads of lake trout and salmon and with cancers on the lips of suckers and whitefish. These have increased from background levels of 5-10% 40 years ago to 80-90% today. We can link toxics with reproductive failure in a number of bird and fish species. We can even link behaviourial disturbances in children with lead levels near a smelter in Toronto. But generally speaking the science of toxicology is just beginning to move from its 19th century origins into an era when it must give us answers to very pressing questions about the impacts of toxic chemicals on us and other forms of life. Given this situation, what is a scientist supposed to do?

Some rely on intuition. It is only common sense that adding hazardous chemicals to our bodies is bad for our health. A friend of mine, Ross Hume Hall of MacMaster University, once put it this way: "Adding foreign chemicals to our bodies is like dropping nuts and bolts into a moving engine." But in our Cartesian world, common sense is often not enough to carry the day. So we look for proof in the scientific sense of the word.

Fortunately, in the case of toxic chemicals, so far we have only a few human cases to rely on for evidence of toxic effects and they are the result of accidents. In Japan and Iraq, people poisoned with mercury in their food showed the neurological effects of this heavy metal. In Japan and Taiwan, PCBs in food produced effects such as birth defects and other illnesses. Cadmium in the food chain produced brittle bones and extreme pain. Vinyl chloride monomer used in the rubber industry produced a rare liver cancer.

These effects were the result of relatively high doses of a limited number of substances. Most people have much lower levels of toxic chemicals in their body and do not keel over immediately. The effects are far more subtle. Let me give you an example.

For many years lead was used in gasoline, paints and other products which released thousand of tonnes a year of this heavy metal into our environment. Now, increasingly precise medical tests show that lead can cause learning deficiencies and a number of illnesses in children at much lower levels than we realized before. Many doctors now say the acceptable level for lead in our bodies is only one-half to one-fifth of what was considered safe just a few years ago.

Toxins can disturb the central nervous system, attack a large number of organs and provoke psychological effects including depression, emotional sensitivity and failure to understand one's own behaviour. This is not surprising because many pesticides are neurotoxins. And one of the most disturbing aspects is suppression of the immune system. There is increasing evidence that while some chemicals may not have direct toxic effects, they reduce our ability to fight off other illnesses. The analogy is obviously with AIDS, which, though not an environmental toxin, works by immune suppression.

We have enough trouble defining the effects of single substances but when it comes to chemical combinations the problems are horrendous. One substance may not be a strong carcinogen by itself but may promote the formation of tumours by another chemical. To make matters worse, when a large number of chemicals are dumped into the environment we know that they can and sometimes do combine to form new and more dangerous compounds. In fact this happens every day in our drinking water. The chlorine our cities use to kill bacteria also reacts with natural substances in the water to form compounds like chloroform, which is a carcinogen. As a result, the operators of water treatment plants are doing a constant balancing act to keep the levels of these compounds below target levels set by health authorities.

Attempting to estimate the risk from the uncontrolled mixing of chemicals in the environment defies our abilities. A few years ago the National Research Council said that it was too difficult a job to accurately calculate the risks of even two compounds mixed together. Today, we must consider more than 60,000 chemicals in commercial usage and about 1,000 new ones are added every year.

Despite all these limitations we still have to try to estimate the risk to humans of hazardous substances in our environment and many workplaces. Since we cannot feed people test doses to find out if there is a "safe" level, we have to feed the chemicals to animals and try to draw inferences for our own bodies. We know for example that about 16 substances cause cancer in humans and that all these substances also cause cancer in test animals. But we do not know if the many more substances which cause cancer in animals also cause cancer in humans. In the absence of proof we have to assume that they do. That is why you periodically read of suspected carcinogens.

The way that science traditionally tries to find out if something is harmful is through a process called risk analysis. Batches of animals are given decreasing doses of a suspected poison in search of a dose below which no adverse effects are seen over a period of several weeks or even several months. But the guardians of our health are left with two difficult questions. How accurately do tests on animals translate to humans, who have different metabolisms? And how do

you deal with the fact that effects too subtle to show up in a few months could produce cancers or other effects over a period of decades?

Risk experts usually build in a safety factor. They take the lowest dosage which produced visible effects on animals and divide it by 100 or even 1,000 to come up with what they think will be an acceptable dose for human beings. That does not mean the tiny amount is inert and therefore completely safe but that it is calculated to cause not more than, say, one more cancer in every one million people exposed to that amount over their lifetimes.

Even this computation poses almost insuperable difficulties for our society. One in every four Canadians will have some cancerous condition during their life time, not necessarily leading to death. Is it acceptable to increase this background risk of 250,000 per million to 250,001 because of some specific impact or proposal? In Winnipeg each year they analyze mosquitos for encephalitis virus. If the risk is of one infection in the whole city of Winnipeg, a spray program costing $4 million is implemented. No one has even calculated the risk of the spray program in terms of other human ailments.

But the whole issue of risk raises the obvious question of "acceptable to whom?." Social scientists are still uncertain how to tackle this one. People climb mountains, canoe wild rivers, smoke cigarettes, drink too much and drive too fast, voluntarily exposing themselves to high risks of death or serious injury. But if someone puts even 1 part per million of a toxic substance in their air or drinking water, they immediately react.

People clearly draw the line between voluntary and involuntary risks and environmental contaminants are very much involuntary risks. This became quite obvious during the aftermath of the St-Basile-le-Grand PCB fire in August 1988. When the Quebec government issued the all clear to return, some of the evacuated citizens demanded that they be guaranteed absolutely zero risk. There is no such thing.

The fire pointed up another problem that we face every day in communicating risk. During a radio interview one resident wondered aloud why people were being told that it was safe to play on the grass but not safe to eat the vegetables growing right beside the grass. The fact is governments and other experts often fail to understand and to communicate even what they do know about risk.

St-Basile showed another type of damage from chemicals: psychological harm. Studies have shown that people living around toxic dumps suffer real harm. The stress of not knowing what is happening to their health leads to violence and marital breakdown and can affect their relationships with other people. In St-Basile, as in the case of Love Canal, some people were even told not to come to work in case they "contaminated" other people. Scientifically this was silly but it shows how much ignorance there is about toxic chemical issues and what harm this can do.

Statistically, one in four people from that town always faced the risk of cancer in their lifetimes just by living in Canada. But after the fire I am certain that virtually anyone who develops

cancer or other ailments will blame the PCBs, whether or not they were implicated. The tragedy is that it will be almost impossible to tell.

To compound the matter, cancer can have a latency period of decades, so how are we going to deal with victims long into the future? If I develop cancer now and show that I have DDT in my fat tissues, can I sue the makers of DDT from the 1950s? Each year that I live with the DDT in my body is a brand new experiment. DDT first entered my body in 1950 in British Columbia. I probably have 10-20 ppm in my body fat—as does every one of you, ladies and gentlemen. We humans have yet to live through even a generation with this suspected carcinogen. So far, after 40 years I'm okay. But what about next year, after 41 years? What about my children in another 40 years? Who will the people of St-Basile sue in 2010 or 2020?

Let us consider an even broader case. Scientists have concluded that chlorofluorocarbons are destroying the ozone layer, which protects us from too much ultra-violet light. If I get skin cancer can I sue anyone who used a spray can powered by these chemicals? Or do I sue the government for failing to have regulated the chemicals sooner? How is the legal system supposed to deal with such uncertainty? And how does this fit into an adversarial system where lawyers are supposed to strongly test if not outright attack the credibility of evidence?

In criminal cases the courts demand proof of guilt beyond a reasonable doubt and in civil cases liability must be established at least on the balance of probabilities.

In environmental issues the potential for damage is easy to show but the evidence of harm is sometimes elusive for years. Often the best scientists can only say that they suspect or believe or are reasonably certain that something bad will happen if a chemical keeps going into the environment. The proof may not be seen for years. This makes it difficult for courts to apply precisely the same kind of tests of evidence in environmental cases as they would in, say, a case of drinking and driving where chains of evidence are usually short and clear.

There may be an analogy in comparing environmental evidence with psychiatric evidence. Evidence about the state of mind is qualitative and hard to measure precisely and it can often boil down to a question of judging which psychiatrist you trust. So too with toxic chemical experts. It leaves the legal system in the unenviable position of trying to sort out credibility at a period in history when the evidence is often still being collected but the stakes are very high if a mistake is made.

The courts, cabinet ministers and members of the public are forced to make judgements all the time. Should I regulate this chemical out of existence because it may cause cancer? Should I buy these apples although they may contain chemical residues? Should I find this party guilty of destroying the environment?

We have had lots of case histories, a number of them involving dioxin, a highly toxic chemical which turns up in several herbicides. One of the greatest environmental legal battles in

Canada was fought in this province in 1983.[i] Nova Scotia Forest Industries Ltd. was trying to spray herbicides likely to be contaminated with dioxin on Cape Breton forests. Citizens mortgaged their homes to take the company to court in an attempt to stop the spraying. After a protracted legal battle the judge ruled against the residents, saying there was no clear proof that the spray would harm people. In fact the company did not end up spraying one of the most controversial chemicals, a substance that had been banned in many parts of the world, including some Canadian provinces, because it contains traces of dioxin.

Two months after the court case Dow Chemical Co. stopped production of the chemical 2,4,5-T, and days later the United States Environmental Protection Agency said it would be made illegal for sale. It is interesting to note that a year after the Nova Scotia case, seven U.S. chemical companies paid $180 million into a trust fund in an out of court settlement with Vietnam war veterans over the hazards of the same herbicides. A mixture of these herbicides, 2,4,5-T and 2,4-D was called Agent Orange during the Vietnam War. This was sprayed over large tracts of Southeast Asia, mainly from aircraft, to deprive the enemy of crops and cover. Veterans later blamed a number of illnesses on the chemicals and sued the manufacturers. By this summer, 250,000 people had filed preliminary claims for compensation in the U.S. court case and one lawyer in the case estimated that only 40,000 to 60,000 may be eligible for payments. Despite making the huge payment, the companies say there is no proof linking dioxin exposure to human illness and the settlement does not include an admission of fault.

Despite the many difficulties of establishing clear legal proof that a particular molecule gave someone cancer, the public is clearly identifying chemicals as hazards. Public opinion polls show that over 90 per cent of Canadians believe that toxic chemicals in the environment are harming their health. This makes life hard not only for our industries but for people who want to clean up hazardous chemicals. At times our society seems nearly paralysed over what to do with the situation it has created.

I am very familiar with this syndrome, commonly called the “NIMBY” or “Not in My Backyard” reaction. It is understandable on a personal level but as a society we must find solutions soon, before irreparable damage occurs.

For more than nine years I have been trying to build in Ontario one of the world’s most sophisticated industrial waste treatment centres. One component will be an incinerator, called a rotary kiln, which burns chemicals at 1000 - 1200 degrees Celsius and can destroy more than 99.99 percent of the serious pollutants. The Ontario Waste Management Corporation estimates that we would burn 30,000 tonnes of organic chemical waste, including PCBs, every year. Another 120,000 tonnes of acid, alkali, metal and chemical wastes would be physically or chemically neutralized and solidified into a concrete-like material which will be buried on deep, impermeable clay on site.

In an effort to show that the risk from burning chemicals is less than that of leaving them in use or stored in the environment we have hired experts to calculate the effects of incineration. The result is a three volume report which is nearly as thick as the Canadian Encyclopedia. The

consultants calculated the risk for someone who spent their whole life at the point of maximum fallout from the incinerator smokestack, some two and one-half kilometres away. They said that if this person ate only food grown around the house and drank only water from the area they would have no more than a one in one million chance of getting cancer from the pollution. But such assurances do not seem to open the door easily for projects such as ours. And as a result we will have more St-Basile incidents as we dither and procrastinate about implementing solutions that already are available to us and in widespread use in Europe.

What does the evolution in thinking about the environment mean for the legal system? In the past, I believe many courts reflected the general lack of public concern about the state of environment. Pollution was seen as a normal and even necessary byproduct of doing business. I remember a case in Prince Rupert nearly 20 years ago in which people who complained about the smell of a local herring plant were told that was the smell of money. And there is an old case in the United States in which a judge threw out pollution charges saying that was not smoke coming out of those stacks, that was money.

But the burden of proof is obviously shifting with blinding speed. More and more chemicals are being taken off the market. In the United States nuclear power plants are being shut down before they go into production. And there are some clear signs of changes in environmental law.

There is growing pressure for a Safe Drinking Water Act in Canada. At present, the standards for our drinking water, with the exception of Quebec, are simply guidelines and there is no real penalty for breaking them. And people want laws under which they can easily sue polluters who contaminate sources of drinking water.

The Canadian Law Reform Commission has recommended creating a new class of lawlessness, called crimes against the environment. This is based on the realization that the environment is not something "out there". We depend upon it for our survival. As a result, crimes against the security of the environment are crimes against the public at large. They are, in fact, crimes against humanity if you take it to the scale of destroying the ozone layer.

There is growing pressure to make pollution a crime under the *Criminal Code* of Canada. Mr. Ed Broadbent, the former leader of the New Democratic Party, has added his voice to that concept, saying that people convicted of serious environmental offenses should have criminal records.

As public pressure mounts in Canada we may even see environmental strike forces such as the type being used in the United States, particularly in Los Angeles. There, large teams of police, chemical and legal experts undertake to do sophisticated investigations and then swoop down to nail polluters in the act. There are numerous cases of chief executive officers being convicted and jailed for environmental offenses in California.

Turning to the legislative side, I believe there is a move amongst government, business and

environmentalists to find common ground. Phrases like environment-economy linkages and sustainable development are signs of this new direction for environmental debates. The new agenda started to take shape over the past decade but gained real momentum with the 1987 *Report of the World Commission on Environment and Development*.[ii] The group was known as the Brundtland Commission after its chair, Gro Harlem Brundtland, Prime Minister of Norway. Those 22 business, political, academic and environmental experts from 21 nations around the globe issued a warning that we have to change the way we do business or the earth will change it for us. Brundtland used the phrase "sustainable development" to describe the goal of business and lifestyles in the future. It is as good as any term to describe what we are all aiming for. It means doing business in a way which does not destroy our environmental base.

When I was born 62 years ago the world's population had just topped the two billion mark. Now it is over five billion. It has more than doubled in my lifetime. And it is growing at a staggering rate. The equivalent of more than three Canadas is being added to the planet every year. By the end of the century there will be more than six billion humans and 20 years later there will be eight billion and by the middle of the next century there will likely be ten billion.

A common myth in this country is that somehow Canada does not have a population problem; rather it is limited to third world countries where we see pictures of starving children and newly created deserts. In some ways this is true—we are the world's second largest country with only 0.5% of the world's population. However, in terms of environmental impact and toxic contaminants this is not true. Each Canadian has the environmental impact of 100 people in, say, India, in terms of energy consumption, resource exploitation, and environmental contamination through industry, agriculture and forestry. We are, then, a country not of 28 million but of 2.8 billion people in terms of impact. This is almost four times the impact of the entire Indian subcontinent, which we regard as having a population crisis. In environmental terms who has the crisis?

The Brundtland report says there will be a five to ten fold increase in industrial development as the population doubles. It is obvious that if the rest of the world develops the way Canadians have, the biosphere will not be able to support the results. Despite this grim situation, we are trying to change the course of events. Even before the UN-sponsored Brundtland commission finished its report, Canada created the National Task Force on Environment and Economy. I had the honour of serving on that team of 17 environment ministers, business and environment leaders. As a task force we held meetings in different parts of the country. We submitted our final report to the group which created us, the Canadian Council of Resource and Environment Ministers.[iii]

It may seem surprising that we would all sit at the same table and even more amazing that in September 1988, we would sign a joint report calling for major changes in this country. But the reality is that once people are forced to confront environmental issues in a forum where they cannot just dismiss them with rhetoric they will come to the same conclusions. If the task force recommendations are adopted they could set the scene for fundamental changes in economic planning in Canada in the future.

We called on the Prime Minister and premiers to appoint round tables to advise government on future development. These would be high level groups of cabinet ministers, business leaders, environmentalists, native, farm, labour and other leaders. It is my personal feeling that the legal community should be represented at the round tables since law gives so much shape to our society. If industrialists, finance ministers, consumer advocates and judges can meet and come to terms over these difficult issues—and I think they can—then we can avoid a lot of long and costly legal battles. In the final analysis common sense is the best judgement of all.

II. THE ROLE OF THE LEGAL SYSTEM IN RESOLVING ENVIRONMENTAL DISPUTES

This leads to the final issue I want to discuss with you—the role of the judiciary and legal system in resolving environmental disputes. I have a number of specific observations and suggestions I would like to leave with you which I hope you do not find too irreverent.

First, I believe we must do everything we can to avoid the little guy/big guy dilemma in environmental cases. I have been both a little guy and a big guy, and I know the frustrations and limitations of both roles. Environmental cases coming before our courts and tribunals have now become so complex, so technical, and so lengthy that even the most resourceful and intelligent individual can barely cope. We cannot expect citizens, communities or organized groups of citizens to play a constructive role in such cases if they do not have technical resources to assist them.

Either governments or the courts must intercede as third parties with the appropriate technical resources, or those seeking redress of environmental offenses must be provided with their own resources. We are already moving in this direction, through intervenor funding programs now being made available in environmental hearings. It is time we addressed the same need in our courts.

Second, I have already mentioned the issue of an environmental bill of rights. Let us not dismiss this idea quickly. It warrants careful consideration. In my view, it would open the door to class actions on environmental issues, as can be done in the United States. Why should an individual not be able to sue on behalf of the environment, whether or not all people are suffering exactly the same damage? The courts long ago learned how to protect themselves against frivolous actions in civil litigation matters. They could easily do the same on environmental matters.

Third, I believe it is important that we begin to shift the burden of proof in the entire system away from legislation and regulation and towards jurisprudence. At present, the burden of proof on someone concerned about a new pesticide rests with that individual: he or she must prove that the pesticide is harmful and, moreover, harmful to that person directly. Some feel that the industry producing the pesticide should be required to prove that it is harmless, thus shifting the burden more in the direction of the proponent. At the Ontario Waste Management Corporation, for example, as a

proponent before the Environmental Assessment Board, we must demonstrate to the Board that our proposal is safe. The onus is on us to make that demonstration, not on the intervenors to prove otherwise.

Fourth, I believe our courts must make the punishment fit the crime. Trivial fines for serious environmental destruction or harmful impacts on human health are an insult and an injustice to us all.

Fifth, we see many cases before our courts today where the law is being interpreted too strictly. Often these interpretations are narrow, thus favouring the proponent. I believe it is time for our jurists to consider a more fundamental question: What is in the best interest of the public at large? Had that question been asked in the case of *Nova Scotia Forest Industries Ltd.* which I cited earlier,[iv] I believe the outcome would have been different. I realize the courts can only interpret the law as it stands today. Admittedly, this is a matter of judgement. I believe our courts should place more emphasis on the interests of the general public, and interpret the law as broadly as possible.

Finally, I believe the time has come for our judiciary to develop within itself a better understanding of environmental issues and a greater competence in dealing with environmental offenses. Many of the concepts involved are not yet part of judges' daily lexicon. We all understand what a gun is and what it can do. If a police officer introduces a revolver as evidence during a trial, the lawyers, judge and jury do not need a lecture on gun powder, primers, triggers, cylinders and ballistics.

But when it comes to food chains, risk-benefit analyses, ecosystems, synergism and parts per billion, the legal system, like most of society, is trying to learn on the fly. I believe this must be corrected, on an urgent basis. Short courses specifically designed for the administrators of justice would be a step in this direction. The use of *amicus curiae* with special expertise in environmental issues, and an independence from either of the parties before the bar, would be an additional answer to this problem. This approach was used in a number of legal hearings in the U.S. District Court in Buffalo over the fate of toxic chemical dumps along the Niagara River. I believe adopting this approach in our own courts would be a major step in the right direction.

ENDNOTES

i. *Palmer* v. *Nova Scotia Forest Industries* Ltd., (1983) 60 N.S.R. (2d) 271 (S.C.T.D.).
ii. (New York: Oxford University Press, 1987).
iii. *Report of the National Task Force on Environment and Economy* (Ottawa: The Task Force, 1987).
iv. *Supra* note 1.