THE WEB OF LIFE

Foreword

This Working Paper is one of six case studies on the scenarios for global and regional integration now being released by the Institute of Intergovernmental Relations. The Institute embarked in 1999 on a multi-year research program on the effects of and challenges for Canadian federalism of global and regional integration. This project proceeded from an assumption of continuing and possibly accelerating international integration and governance, and that policy matters within provincial government jurisdiction will increasingly be the subject of international negotiation. The broader objective of the project has been to examine whether the institutions and dynamics of the Canadian federal system can continue to effectively manage this change. The central issue we have been investigating is under what circumstances continued *ad hoc* adjustment to the processes and institutions of the federation would remain the appropriate course of action; and under what conditions more systemic reform would be the preferred or even the essential course to take. For more information of the research output and findings of the project overall, please consult the Institute's website at www.iigr.ca.

Our research program has consisted of several components: the development of a set of scenarios for the world in 2015; a baseline study of Canadian federalism and international relations; a set of papers applying the scenarios and comparing integration challenges in other federal systems; and these six case studies. The case studies cover the following policy sectors: Biodiversity, Climate Change, Health and Health Care, Agriculture and Agri-foods, Aboriginal Governance, and Financial Services. They were initially prepared for discussion with the policy sector communities. Most of these discussions were sponsored by the Government of Canada through the relevant departments.

The Institute wishes to acknowledge the following agencies for their financial support of this research program: Agriculture and Agri-Foods Canada, the Government of Alberta, the Canadian Council of CEOs, the Climate Change Secretariat, Environment Canada, Health Canada, Industry Canada, Indian and Northern Affairs Canada, the Policy Research Initiative, the Privy Council Office and the Social Sciences and Humanities Research Council of Canada.

Finally, as Director I wish to acknowledge the role that Douglas Brown, Institute fellow, has played in the overall coordination of these case study papers and in our Global and Regional Integration project as a whole.

Harvey Lazar
Director
March 2003

An ecosystem is a complex community of exquisitely interconnected, diverse organisms that are finely tuned to live in balance with the physical supports of the air, water, soil and climate of the area. Honed by billions of years of evolution, nature has the resilience to survive the vast environmental upheavals that have occurred throughout time. Nature works. We don't know how. But if we continue to treat it with so little respect, we will lose any opportunity to find out its secrets. David Suzuki

1.0 INTRODUCTION

The web of life has been a persistent image conveying the intricate and interconnected nature of life on earth. Genes, species and their habitats are all components of a system that creates and sustains an environment in which human beings can live. Biodiversity is the web of life. We take it for granted, yet the web's integrity is being challenged daily. What issue could be more fundamental to Canadians than to preserve the integrity of this complex web upon which we depend for survival?

Biological diversity is essential for human well-being. Its components provide

environmental services maintaining the clean air, productive oceans, fresh water and fertile soils that support life. As well as having intrinsic value, unique ecological systems provide a rich source of genetic material for pharmaceuticals and agriculture. Variety in ecosystems improves our resilience and adaptability to environmental stresses such as climate change and nature's inevitable surprises.

In the natural course of things species emerge and disappear. Yet since the era of industrialization the number of species, the genetic variations within them and the range of habitats have been reduced at unprecedented rates. Expanding human population, conversion of habitats for human settlements and use, greater consumption and over-harvesting of resources from fish to forests and ubiquitous pollution have led to the destruction of ecosystems and an alarming loss of genetic resources and innumerable species. Cumulatively these losses diminish the capacity of the global environment to respond to change. Everything is connected to everything else and while there is much to learn about the detailed interactions among species and their habitats, we know that it is the diversity of life itself that must be conserved.

As we enter a new century, we are in transition to a biotech age. The introduction of biotechnology promises agricultural, pharmaceutical and environmental advances. Following the successful splicing of the gene in the early 1970's, policy makers around the world started to speculate on the revolutionary implications of biotechnology for economic transformation. Extensive public debate on the role of science and technology continues. Some question the editing and recombining of the genetic components of life and are distinctly uncomfortable with the rapidity of scientific and technological developments. Others believe that although it is difficult to place an economic value on the many products and services which derive from biological resources, conservation makes economic as well as ecological sense.

The world's biological resources have been considered to be the common heritage of humankind, but it is a global resource with uneven distribution. Priority attention has been given to tropical areas with exceptional levels of biodiversity, but other important habitats such as wetlands, old growth forests and oceans exist throughout the world. Biological resources have also been seen as the sovereign property of nations. But international cooperation is clearly needed to bring the monetary and technical wealth of the industrialized world into partnership with the vast biotic wealth in the developing world. Most of the Earth's species have not even been named, much less studied. As Canadians our welfare is tied up in continuing to live in a diverse ecosystem. We cannot ensure diversity on our own.

The international regime for the management of natural resources of global concern has recently expanded to include a treaty concerned exclusively with the fate of the world's biological resources. It is a framework with many yet unanswered questions: How does one implement the precautionary principle? What is sustainable use? How much weight does one give to indigenous or traditional knowledge in contrast to scientific knowledge? Who owns the rights to intellectual property? Does the state own biodiversity? How can the costs and benefits be shared?

The Convention on Biological Diversity requires national implementation. Just as there are unanswered governance questions internationally, governance poses challenges domestically. In Canada, effective implementation does not rest exclusively with the federal government. Constitutionally the division of powers accords significant responsibility in matters of natural resource management to the provinces and territories. Much is to be learned from indigenous peoples. The policies and actions of corporations need to be harnessed and individuals need to be engaged. Safeguarding Canada's biological diversity requires multisectoral and multigovernmental collaboration.

The Canadian federation must respond to the policy challenge of conserving biological diversity. Preservation of biodiversity is an issue that should be of compelling interest to Canadians, for we cannot accept a diminished future. Furthermore it is a global issue that has recently generated an international governance mechanism requiring national implementation. Effective implementation within Canada will depend upon answering the question of constitutional jurisdiction and the inherent interest of indigenous cultures. Although not a new issue, the pace of scientific and technical development has heightened the urgency of developing an effective management regime. Through the lens of biodiversity we can develop insights into the capacity of the Canadian federation to respond to one of the examples of global integration.

The purpose of this paper is to speculate about the impact of four possible scenarios of global change in 2015 on international and Canadian responses to the conservation of biological diversity. The scene is set by reviewing the status of the issue in 2000. What follows is a glimpse into the future - four stories that could be told in 2015 - first from a global and then from a Canadian perspective. The paper then considers the implications for governance arrangements in Canada in order to respond to global developments.

Biodiversity is more than endangered species and spaces, more than the creation of products and services through biotechnology. Yet the breadth of all living resources and their management pose a challenge for this conversation. It is not intended to develop a comprehensive compendium of knowledge about biological diversity. Neither is it intended to explore in detail various sectoral implications and responses, such as agriculture or health, but rather to use them as examples. The value of this case study lies in our understanding of the need to develop appropriate domestic responses to humankind's disruption of the natural systems crucial for our existence in a time of profound change and economic globalization. Fifteen years is a short time in the scheme of things but long enough to experience the impact of rapid scientific and technological developments and long enough to measure the results of responses.

2.0 ON THE EVE OF A NEW MILLENNIUM

2.1 Understanding biodiversity

Biodiversity is a term not well understood by the public. When pressed, examples of endangered and exotic species - tigers and elephants come to mind. For others, it is the memory of a vacation spent in the lush tropical forest of Costa Rica or the exhilaration of a safari in Africa. Perhaps for Canadians it is Arctic wilderness and prairie spaces. It is often an aesthetic and romantic concept incomplete in its recognition of our total dependence on the critical interactions between genes, species and habitats for life.

The term biodiversity embraces the variety of all life on earth. In the Convention on Biological Diversity governments adopted a definition of biodiversity as the variability among living organisms from all sources and the ecological complexes of which they are part, including diversity within and between species and ecosystems. Simply put it is the variety of the world's organisms, including their genetic makeup and the communities they form.

There are still significant gaps in scientific knowledge regarding biological diversity. Estimates of the total number of species range from 7 to 20 million. A recent assessment of global biodiversity suggests that a good working estimate is between 13 and 14 million species, of which only about 1.75 million have been scientifically described. Viruses, bacteria, insects and species in the marine environment are especially poorly known. In Canada it is estimated that although 70,000 species of wild plants and animals have been recorded, at least another 68,000 have yet to be discovered. And, of those identified, some 97% have not been studied in depth. This lack of scientific

knowledge presents some serious constraints to the effective conservation of biological diversity. Most importantly, the scientific community lacks knowledge of the full extent of the impact of all indigenous species to the overall sustainability and health of ecosystems and human populations. With such vast numbers of undiscovered organisms and species, greater attention must be given to the protection of ecosystems as these may hold clues to important advances in science, medicine, and other benefits to society. Internationally the Convention on Biological Diversity promotes and facilitates scientific and technical cooperation through transfer of technology, strengthening of institutional capacity and establishment of joint research programs and ventures. In Canada, a number of federal government agencies are trying to resolve problems relating to accessing biological data in various collections and holdings in institutions across the country in order to improve biological inventories.

Many developing countries are the stewards of some of the world's most important ecosystems, but are ill-equipped to ensure their conservation and sustainability. In fact, a study recently published in *Nature* states that more than a third of plant and animal species exist solely on 1.4 percent of the world's land surface. The study points to 25 species-rich "hot spots" which sustain 44 percent of the world's plant species and 35 percent of its non-fish vertebrate animal species. Most of these areas are in developing countries such as Madagascar, Brazil, the tropical Andes and the Caribbean and islands in Southeast Asia. Despite efforts to legislate "protected areas", logging, mining and grazing are rampant in many of these areas. Worldwide natural resources are under tremendous pressure from deforestation, soil erosion, pollution and over-harvesting. Biodiversity is being destroyed at unprecedented rates, the equivalent of 1,000 to 10,000 times greater than expected natural extinction. For some groups of vertebrates and plants, between 5 and 20 percent of identified species are already threatened with extinction.

The benefits of biodiversity include the provision of food, fuel, clothes, shelter and natural medicines. For years farmers have conserved genetic diversity through cultivation of hundreds of varieties of potatoes and rice, helping to protect their crops from pests, diseases and drought. Today we harvest genetic material from wild plants and animals to combat disease - products worth some $40 billion each year. More recently the notion of environmental services has been developed to acknowledge the role of biodiversity in helping to control and stabilize the Earth's climate or the prevention of water and soil run-off through the sponge-like action of wetlands. With recognition of business opportunities and the desire of the world community to share benefits fairly and equitably, increased attention is being given to the development of social and economic analytical tools.

2.2 The global response - the Convention on Biological Diversity

The landscape is littered with national, regional and international agreements and treaties designed to protect certain biological resources. But in the 1980's international experts began promoting the idea of a truly global convention that would encompass the totality of biodiversity. With world attention focused on the environment In preparation for the Rio Summit activity intensified.

The international community's concern over the accelerated loss of biodiversity led to negotiations to formulate a legally binding instrument to help reverse this trend. In 1989, the United Nations Environment Programme (UNEP) established an Ad Hoc Working Group of Technical and Legal Experts to draft a legal instrument to address biological diversity and conservation. The text of the Convention on Biological Diversity was adopted by the Intergovernmental Negotiating Committee for a Convention on Biological Diversity, during its fifth session, held in Nairobi in May 1992. It opened for signature on June 5, 1992 at the United Nations Conference on the Environment and Development in Rio de Janeiro. It entered

into force on 29 December 1993, a short 18 months later. On December 4, 1992, Canada became the first industrialized country to ratify the Convention. As of 14 August 2000, 178 countries have become Parties to the Convention, with the United States being a notable exception.

The treaty is significant. It places the conservation of biodiversity within the context of sustainable development, recognizing simultaneously wise management of global biodiversity and development objectives. The three goals of the Convention are: to promote the **conservation** of biodiversity; the **sustainable use** of its components; and, the **fair and equitable sharing** of benefits arising out of the utilization of genetic resources. Economic and social development and poverty eradication are acknowledged as the first priorities of developing countries. The framers of the Convention recognized that support must be given to developing countries who hold a wealth of biodiversity without placing undue burden on their development.

The treaty is significant also because it takes a comprehensive rather than sectoral approach, recognizing the intrinsic value of biological diversity as well as the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic values. It adopts the precautionary principle, whereby, lack of full scientific certainty should not be used as a reason to postpone measures to avoid or minimize the threat of loss of biodiversity.

The Convention is a carefully balanced deal with far-reaching commitments for all Parties. Every participating nation undertakes to provide the support and incentives needed to achieve the objectives of the Convention within its boundaries, including the development of national action plans. The developed country parties undertake to provide financial resources to assist developing country parties implement their action plans. All Parties undertake to engage in international technical cooperation to accelerate the transfer of knowledge about how to conserve and use in a sustainable way our living resources. This will require a sharing of knowledge in all directions: North-South, South-North and South-South, with the knowledge base of indigenous communities playing a particularly important role.

It may be too early to assess the impact of the Convention, but implementation appears to have suffered from absence of a sense of urgency and concerted political attention and will. Since the late days of negotiation, comparisons have been made with its sister Convention on Climate Change (lack of pre-negotiation scientific assessment; lack of specific focus, plethora of program areas; lack of definable targets and schedules; perceived lack of commitment and interest in developed countries.)

The lack of political discipline is evidenced in the fact that the post-adoption phase has not been used effectively to establish the normative basis for implementation, in the form of standards, rules and guidelines. This job was to have been done by the scientific organs of the Convention. The requisite transition from negotiations to technical work has not yet taken place. Instead there have been attempts to renegotiate the Convention through decisions of the Conference of the Parties . Furthermore, in the absence of agreement about the focus, negotiations attract delegations with a variety of trade, environment, science and agricultural experts and professional negotiators resulting in frequent science vs. politics debate. Thus far, the Convention has not appeared to focus on areas where it could make a difference, and by attempting to cover all possible issues the potential for conflict with other bodies is inevitable. Evidence on regime formation suggests that successful regimes spend about 10 years building the technical basis for action and do not show any real results before that. It is nonetheless telling that at this point no concrete decisions have been taken on conservation. The Convention may have squandered its convening power and lost the opportunity to rally experiences and develop normative standards for conservation and sustainable use. Perhaps the most significant impact has been seen in national

legislation and rule-making for access to genetic resources.

To date discussion of appropriate and pragmatic means of implementing the Convention have been overshadowed by procedural and political considerations. (One expert refers to "judicial inflation" - too many decisions addressing the same few ideas.) What is meant by sustainable use? How is traditional knowledge reflected? Does a global biodiversity framework require a common taxonomy, monitoring and assessment system? How is economic valuation of biodiversity undertaken? How is access to genetic resources and benefit sharing guaranteed? What is the state of the science of drylands biodiversity and coral reefs and by what means can stronger scientific analysis be brought to bear? By what means can a static legal instrument deal with the complexity and rapid advances of biotechnology? Bridging the gap between science and politics continues to be a challenge. The formative period has failed to clarify such issues. In the absence of demonstrable progress soon, the Convention will lose credibility and usefulness.

The Convention is a framework agreement, expressing overall goals and policies, leaving decisions about how to implement its provisions up to national governments. Biodiversity loss is a result of complex social, economic and political issues related to land degradation that cannot be easily dealt with through an international treaty body. Responses will be national and local in character. In addition to the questions posed above, unresolved issues range from national concerns about the impact of economic globalization to technical and scientific questions of taxonomies and indicators and the ecosystem approach. Experts continue to discuss alien species, in-land water ecosystems, marine and coastal biodiversity and forests. In addition there continues to be some strong debate about the nature of competing functions served by agricultural ecosystems; whether these should be strictly considered production systems or also include larger socio-cultural considerations.

2.3 The Biosafety Protocol

Without doubt the greatest preoccupation has been about biosafety. Modern biotechnology has enabled the genetic and biochemical modification of plants, animals and micro-organisms to create living modified organisms. Precautionary practices to ensure the safe transfer, handling, use and disposal of these organisms and their products are enshrined in domestic legislation in some countries.

Manipulation at the genetic level has provoked differing reactions. Some European countries have seen a strong public outcry regarding genetically-modified food, resulting in calls for national import bans and a moratorium on genetically-modified crops. Their emphasis on precaution, however valid, masks a desire to protect existing agro-industrial values and structures. In North America there is a concern about possible trade restrictions on agricultural exports and industry counter arguments about health and safety concerns. Domestic pressures and special interests fuel the debate - portrayed in the media as a clash between the interests of US multinationals and European consumers. Developing countries want to be assured of food security and a return for the use and export of their natural resources and biodiversity. There are fears and suspicions about the power and presence of multinational firms in trade policy. Debates reflect moral and economic concerns as well as uncertainties about long-term health and environmental impacts. The issue is a classic case study in technology risk management.

Article 19.3 of the Convention provides for consideration of the need for and modalities of a protocol setting out procedures in the field of the safe transfer, handling and use of living modified organisms that may have an adverse effect on biodiversity and its components. In 1996, the Parties to the Convention entered into negotiations to craft an international agreement on biosafety with a deadline of late 1998 (later extended to February 1999). An Extraordinary meeting of the Conference of Parties held in Cartagena de Indias, Columbia in February 1999 failed to reach agreement. The meeting was

suspended and resumed in January 2000 in Montreal. On January 29, 2000 the final text of the Cartagena Biosafety Protocol was agreed. It was opened for signature at the fifth Conference of Parties to the CBD to be held in Nairobi from May 15-26, 2000. The Protocol will enter into force when it has been ratified by 50 countries.

The drawn out negotiations were due to polarized positions related to trade, issues (precedence and privilege to certain international agreements, protectionism); treatment of commodities (pharmaceuticals, fabrics, food, detergents, etc.); the precautionary principle and liability. There did not appear to be a clear scientific consensus or public knowledge and understanding of the ecological, economic and social risks and implications This could and should have been provided through a scientific process.

During the negotiations, new alliances emerged: The Miami Group, of which Canada is a part, consists of the major exporters of genetically modified seeds and crops. (Argentina, Australia Chile, the United States and Uruguay); the Like-Minded group of the majority of developing countries; the European Union; the Compromise Group (Japan, Mexico, Norway, Singapore, South Korea, Switzerland and New Zealand); and the Central and Eastern European bloc of countries. The Protocol is an international agreement to regulate the transborder movement of living modified organisms in order to protect the environment and biological diversity. Living genetically modified organisms can reproduce and pass on genetic characteristics (e.g. pest-resistant potatoes or herbicide tolerant crops, such as canola or soy). As the impact of living genetically modified organisms on biodiversity are uncertain, the Protocol includes an Advanced Informed Agreement Procedure to enable importing countries to know if the products they are importing contain these organisms. This allows them to decide if they will accept the product. The Protocol also contains a provision relating to the precautionary principle.

But one of the most significant outcomes of the Protocol is the fact that the Parties agreed that the Protocol would not be subservient to the World Trade Organization while at the same time maintaining the rights of the Parties under the World Trade Organization - an important step forward in the trade-environment relationship. The Biosafety Protocol sets new standards of integration between environment and trade issues in Multilateral Environmental Agreements. However, disputes under this Protocol may not be settled easily. Conflict may arise between the two sets of rules over how Parties implement the Protocol's provisions. For instance, banning imports of living genetically modified organisms based on a small amount of scientific evidence under the precautionary provision in Article 11, the exporter could argue the importer was violating World Trade Organization rules and a serious trade-related dispute triggered by a multilateral environmental agreement could end up being adjudicated in the World Trade Organization

Another legitimate approach would have been to start with the important area of scientific assessments of the impact of living genetically modified organisms on the environment (not on health because this belongs to other regimes). By now we would have a series of guidelines of gene flow, buffer zones, refugia, etc. inspired by technical assessments akin to those of the Intergovernmental Panel on Climate Change. .Maybe at some stage a protocol would have been desirable to codify the technical guidelines. But concealing trade issues behind legitimate environmental and health concerns cannot meet the requirements of good faith.

2.4 Other regimes

The overlapping treaties, agreements and institutions provoked an early identity crisis and it will take time and practical experience with the Convention in order to maximize the potential synergy and reduce confusion and duplication. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Ramsar Convention on Wetlands of International Importance, the Bonn Convention

on Migratory Species and their Habitats, the Convention to Combat Desertification are key biodiversity-related legal instruments. The Intergovernmental Panel on Forests, the Commission on Plant Genetic Resources of the Food and Agriculture Organization, the World Trade Organization, UNESCO and the United Nations Environment Programme all have mandates that could be seen as complementary and supportive, or competitive. At best the result could be potential duplication of energy and effort; at worst competing objectives working at cross purposes.

One of the basic principles of ecology is interdependence, the mutual dependence of all life processes on one another. All members are interconnected in a vast and intricate network of relationships so that the behaviour of each depends on the behaviour of many others. This principle can be applied equally to implementation of various biodiversity-related conventions. For example, climate change will have impacts on all natural resources. In the Arctic, we have already noticed the shortening of the period of the polar bear hunt for seals with the melting of ice. Many species are highly sensitive to their environment. Although some will adapt to changes in climate and changes in the amount and timing of precipitation, others will not, and new species of pests and weeds may multiply.

There are also potential feedback loops in the climate-biodiversity-water-forest interactions. Climate change which results in dieback of forests and acceleration of decomposition processes will itself result in large amounts of carbon being released into the atmosphere. This excess carbon dioxide will have the result of further accelerating the greenhouse effect, thereby increasing climate change.

Furthermore, and this is paradoxical, actions to mitigate or adapt to one of the global issues may have collateral benefits or even disadvantages for other issues. For example, actions taken to ensure sustainable forest management may well have the effect of increasing sequestration of carbon in both plant tissue and in soils. This in turn will favour the preservation of diversity and increase the ability of the landscape to retain water from precipitation. Realizing that our environmental problems are systemic should result in more coherent implementation of related conventions.

2.5 Meanwhile, in Canada

The Canadian Constitution does not formally assign exclusive responsibility for environmental protection to one order of government. Jurisdiction for environmental matters is shared.

The provinces, under section 92 of the Constitution, are responsible primarily for matters of local interest, including the exploration, development and management of natural resources, local works and undertakings, property and civil rights, taxation, and provincially-owned lands. In 1982 additional revenue raising and resource management responsibilities relating to non-renewable resources, forestry resources and facilities for hydroelectric energy generation were granted to the provinces. In the event of contradictory federal and provincial legislation, federal legislation is paramount.

Federal jurisdiction derives from section 91 with direct constitutional authority for federally-owned property, extra-provincial undertakings, works and undertakings declared to be for the general advantage of Canada, navigation and shipping, Indians and land reserved for Indians, seacoast and inland fisheries, trade and commerce, taxation and spending powers. From section 132 are derived additional powers related to migratory birds and international boundary waters. Furthermore, the federal powers for Peace, Order and Good Government give Parliament jurisdiction over distinct subject matters which do not fall within any of the enumerated heads of power under section 92 of the Constitution Act and which by nature are a national concern. Parliament also has temporary jurisdiction over all subject matters when needed to deal with an emergency. The criminal law power is also a basis for some federal

environmental interventions in cases where a direct link to the protection of human health, life or safety can be established.

As a result of the shared authority and the nature of most environmental issues, cooperative federal-provincial arrangements and actions have developed. The Canadian Council of Ministers of the Environment (CCME) brings together 14 environment ministers from the federal, provincial and territorial governments as partners in discussion and joint action on environmental issues of national and intergovernmental concern. It is essentially a policy forum, funded 1/3 by the federal government and 2/3 by other jurisdictions, prorated to population. CCME's core business is information exchange, coordinated jurisdictional input on national and international environmental issues and problems, and, harmonization of standards, guidelines and approaches. The Council operates by consensus and has no authority to implement or enforce legislation. The decision to adopt a CCME proposal rests with each jurisdiction.

In 1998, the Council - with the exception of Quebec - signed a harmonization accord designed to improve cooperation and develop a more effective and efficient system of environmental management. Under the accord, each government retains its existing authorities but commits to use them in a complementary and coordinated way and to assume clearly defined responsibility for environmental performance. Sub-agreements dealing with environmental assessment, inspection activities and development of standards have or are being developed. Quebec indicated that it required certain conditions to be met before signing. The involvement of Aboriginal peoples is being further elaborated and the accord and its sub-agreements are to be reviewed in 2000.

Although the federal government is responsible for negotiating and ratifying international legal instruments, it must rely on intergovernmental cooperation to ensure the implementation of commitments deriving from these treaties as it shares jurisdictions with the provinces and territories for the management of biological resources and terrestrial, marine and freshwater environments. For example, wildlife management boards established under Aboriginal land claims agreements have certain relevant responsibilities. Biodiversity covers a wide range of issues which touch various sectors such as agriculture, fisheries, forestry, wildlife and parks. All levels - federal, provincial, territorial, municipal - share jurisdiction in these sectors. Coherence among programs, policies and legislation is essential.

Canada has a long history of addressing biodiversity issues through a myriad of international treaties, conventions and declarations it has ratified and implemented through federal and provincial legislation, programs and policies in addition to grassroots and private sector initiatives. International instruments to which Canada is a Party include the 1971 (Ramsar) Convention on Wetlands of International Importance Especially as Waterfowl Habitat, the 1972 UNESCO Convention for the Protection of the World Cultural and Natural Heritage, the 1973 Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Migratory Birds Convention, the 1982 World Charter for Nature, the 1982 United Nations Convention on the Law of the Sea (which was signed but not ratified) and the 1983 International Tropical Timber Agreement. Canada's commitment to biodiversity is highlighted by the fact that it hosts the Secretariat for the Convention, situated in Montreal.

Canada is also participating in regional efforts to protect biodiversity such as the Arctic Environmental Protection Strategy and the North American Agreement for Environmental Cooperation under the North American Free Trade Agreement. It participates in capacity building initiatives in developing countries through financial contributions to the Global Environment Facility and the Official Development Assistance Program, sharing technical knowledge and expertise.

In addition, Canada has a number of national regulatory and legislative instruments dealing with biodiversity issues. These include: the Canadian Wildlife Act and provincial and territorial wildlife acts; provincial endangered species acts; federal and provincial environmental acts; the Fisheries Act; the Wild Animal and Plant Protection and Regulation of International Trade Act; the Oceans Act; the provincial forest acts; and the provincial land use planning acts. In addition the federal government has just tabled the long-awaited, albeit controversial, Species at Risk Act. This proposed legislation would enshrine a science-based species assessment and listing process, use prohibitions and emergency orders for immediate species protection, develop recovery strategies and management plans recognizing stewardship, critical habitat protection and compensation to protect threatened or endangered species and their habitats.

Environment Canada established the Biodiversity Convention Office in 1991 to coordinate Canada's involvement in the negotiations leading up to the Convention on Biological Diversity. Once the Convention was ratified, in order to meet its commitments, the Canadian Biodiversity Strategy was developed by a federal-provincial-territorial working group. Following two years of wide consultations within the different levels of government and other key stakeholders such as non-governmental organizations, advocacy groups, citizens, industry, the Strategy was released at the end of 1995. The main aims of the Strategy are as follows:

- To conserve biodiversity and use biological resources in a sustainable manner;
- To improve our understanding of ecosystems and increase our resource management capability;
- To promote an understanding of the need to conserve biodiversity and use biological resources in a sustainable manner;
- To maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources; and
- To work with other countries in a sustainable manner and share equitably the benefits that arise from the utilization of genetic resources.

To underline their commitment to the aims of the Strategy, Canada's federal, provincial and territorial Ministers of the Environment signed a Statement of Commitment in 1995 to implement policies, programs and any legislation necessary to meet the goals of the Canadian Biodiversity Strategy.

This Strategy serves as a guide for all jurisdictions in implementing the Convention, while understanding that implementation mechanisms will vary among jurisdictions and will require coordination between all orders of government. Most will be implemented through existing policies and strategies although some new mechanisms may need to be established. Sectoral strategies for wildlife, agriculture, firestry and education have also been developed.

In September of 1996 the federal, provincial and territorial ministers responsible for wildlife supported an accord in which they committed themselves to a national approach for the protection of species at risk. This is to be achieved through participation in a new Canadian Endangered Species Conservation Council (involving the federal ministers of Environment, Fisheries and Oceans, and Heritage as well as provincial and territorial wildlife ministers), recognition of the Committee on the Status of Endangered Wildlife in Canada as a source of independent advice, and the establishment of complementary legislation and programs.

At the federal level responsible Ministries and Agencies include Environment Canada, Agriculture and AgriFoods, Fisheries and Oceans, Natural Resources Canada, Heritage Canada, the Canadian Wildlife Service, the Canadian Forest Service, Parks Canada Agency, the Department of Indian and Northern Affairs, the Canadian International Development Agency

and the Department of Foreign Affairs and International Trade.

Four provinces have developed their own biodiversity strategies to implement Canada's commitments under the Convention: Alberta, Saskatchewan, Quebec and British Columbia. Each provincial strategy reflects the particular needs and concerns of the province, such as the Prairie ecosystem in Saskatchewan and wildlife and forestry in Quebec.

Canada's vast expanse has a wide range of important and diverse ecosystems. As biodiversity is a multi-faceted issue, it necessitates multi-disciplinary action. The Biodiversity Strategy acknowledges that responsibility for conserving and sustaining biodiversity lies within all sectors of society - all levels of government, local and indigenous communities, businesses and industries, conservation groups, research and educational institutions, and individuals. Increasingly there are strategies being developed at the local and regional levels and in the private sector. The First National report to the Conference of the Parties to the Convention on Biological Diversity "Caring for Canada's Biodiversity" prepared in 1998, highlighted actions undertaken. For example, other multi-stakeholder fora ensure the wider participation of citizens and non-governmental organizations, such as the Canadian Biodiversity Forum and the National Roundtable on the Environment and the Economy, co-management boards, local watershed management initiatives, local and provincial roundtables. The North American Waterfowl Management Plan is a successful joint venture of all levels of government and non-governmental organizations which could provide useful lessons.

As is the case in many countries, in Canada understanding of the concept of biodiversity, its relevance, and the role of the Biodiversity Convention itself is weak. Consequently, public support for implementation is not evident, nor is there any sense of urgency. However, media coverage of the ethics and economics of biotechnology in recent months would suggest that these questions resonate with Canadians. Public interest could be stimulated with the provision of information and could mobilize public policy development.

Unlike the situation with respect to climate change, the primary debate in Canada has not yet been one of constitutional authority and responsibility of action by the provinces. There is however intense interest in the agricultural and biotechnology industry sectors and their related federal government departments. Trade rather than scientific issues has shaped the international negotiations in the past months.

We can expect to see the following key questions on the agenda of Canadian negotiators. How does one balance the precautionary principle, which must be informed by evolving scientific knowledge and fast-paced biotechnology development with the desire to achieve immediate health and economic benefits by aggressively developing and using biodiversity? Advances in biotechnology require changes in regulatory practices because of the higher level of uncertainty in biological processes. This calls for more science, not less. An admission that biotechnology requires adjustment in existing practices does not mean that it is therefore unsafe. Uncertainty is being used today as a political tool in the technological catch-up game.

Will the world now return to the broader objectives of the convention - conservation, sustainable use and fair and equitable sharing of benefits? And when it does, will Canada's traditional alliances with the aspirations of developing countries in their search for sustainable development be maintained? Will new political alliances based on the perceived economic and trade benefits that best serve Canada's interests - and the interest of the global commons be created? This is one of the least explored ideas and requires a lot of new thinking. The general approach has been to think in terms of funds. But what is in short supply in development cooperation is not funds, but ideas.

3.0 A GLIMPSE INTO THE FUTURE

Once upon a time stories, retelling the past, are more likely to be accurate than once upon a future stories posing alternative views of the coming unknown. Yet, understanding how the world might unfold in the 21st century benefits from both. We can learn from an analysis of how past civilizations coped or collapsed. Hypothetical scenarios allow us to look beyond the present, shedding attitudes and biases, being open to possibilities.

Through the lens of biodiversity - a long-term phenomenon difficult to reverse - the following stories pose alternative futures. The stories are not meant to be comprehensive. They are speculative and suggestive hoping to enrich the public debate in preparing an adaptive strategy. They are based on several assumptions.

The first is that all the signs point to a period of increasing instability. The widening gap between rich and poor, overcrowded cities, the increasing frequency of extreme weather events, a rise in fundamentalism, resurgence of infectious diseases, pressures of human migration and cultural, social and political upheavals form a short list. Independently, each of these conditions is important, but when they nourish each other we should expect profound effects. While society may cope with these strains, aided by technological breakthroughs, transitions will surely be difficult.

The second is that we have lessons to learn from the study of ecosystems. The basic principles of ecology which lead to sustainable communities - interdependence, diversity, and resilience - apply equally to modern human societies. Homeostasis keeps the system in balance, seeking stability in the face of disturbance and recovery from shocks. Maintaining the balance of our civilization's ecology is very much bound up with discovering and living within the tolerance limits of the biophysical world.

The third is that the year 2015 is really just around the corner. Incremental change seems the most likely course with people's lives looking remarkably familiar. It would take a surprise to knock us off course - unpredictable people and events. Surprises cannot be ruled out: witness the fall of the Berlin Wall. In fact, surprises may be the norm. Perhaps a crisis resulting from the ever-increasing strain on freshwater resources will trigger a global transformation. What we do know is that tampering with the earth's life - support systems is a dangerous game.

Finally, the ending of the stories will be determined by individuals and their institutions. There is much that people and nations can do to moderate the impact of trends, but the creation of a shared vision of a sustainable, equitable society for this and future generations will demand purposeful and sustained social learning and behavioural change. If there is no shared vision we will need governance systems that involve greater mutual understanding and tolerance.

3.1 Global Club

The personal reflections of an observer of social behaviour in 2015 raise an intriguing question. How did biodiversity conservation become one of the world's urgent priorities? After all, in the year 2000, governments mostly paid lip-service to the issue, negotiating an international agreement that said all the right things, but lacking in implementation tools and political will. Wildlife and wilderness were objects of delight for tourists and urban dwellers. Occasionally the discovery of a potential cure for cancer from an exotic plant in the rainforest made the headlines. After the fact, the ruinous impact of flooding in the interior of one of the provinces was linked to extensive harvesting of timber. Only developments in gene technology seemed to generate widespread attention - out of fear of the unknown future impacts on health, ethical implications, or potential disruption to the intellectual property regime.

Fifteen short years later a small group of powerful and wealthy governments and multinational corporations have single-handedly

done what 200 countries in the United Nations could not. They have actually intervened in the development decisions of nations, for the greater good of humanity. To be sure, their motives have not been totally altruistic nor their methods democratic, but the potential results have, for the moment, conferred upon them legitimacy and silenced their critics.

But, to return to the question of why. There appears not to have been a single crisis event. Rather, a number of seemingly independent concerns arose around the globe, sufficient in their intensity and impact to cause some of the best minds to ponder whether there was really something fundamental at work. Order, stability and growth were to be preserved at all costs.

Biodiversity prospectors working for one of the largest life-science companies came upon a curious plant that produced a powerful insect-repellent to protect itself. This single plant, growing in an area yet undisturbed by urbanization and agricultural development, held out the promise of millions of dollars worth of new agricultural products. The mind could only imagine what other surprises were yet to be found to enhance the profits of pharmaceutical giants, to improve the competitiveness of Western agricultural producers and to feed and protect from illness a growing world population. In fact, based on early bioprospecting in the 1990's, new drugs appear almost daily, vaccines are available for major diseases and some children have been genetically-modified to eliminate some disease propensities.

In the far North, the combination of changing climatic conditions and pollution borne by global air currents, was causing significant disruption. Although banned in most industrialized countries, the pesticide DDT continued to be used in developing countries. Carried by prevailing air currents, the contaminants condense, fall with snow, go into the tundra with spring melt and are taken up by plants, animals and people. The bodies of some whales were found to contain concentrations of toxins equivalent to a hazardous-waste site. Animals and humans had large concentrations of mercury and carcinogens in fat, hair and mother's milk. Yet, how could the vast North, spanning several countries, protect itself from the actions of other jurisdictions far removed?

Evidence of the results of a changing climate emerged also in the North. The dominant polar bear lives on sea ice much of the year, each week killing animals the size of a seal in order to survive. With dramatic melting of the ice, polar bears were stranded on land, denied access to their regular diet becoming a mere shadow of themselves and endangering other mammals and human populations. Again, although humans found some means of protection in the short term, what would happen in coming decades to animal populations and dislocated ecosystems if collective action to reduce greenhouse gas emissions was not taken?

Europe found itself inundated with refugees from Africa - the result of multiple, continuous years of drought. Tighter immigration laws were being demanded. The Middle East continued to fight over scarce water resources. Neighbours in South-east Asia were on the verge of violence as millions of hectares of forest fires caused life-threatening air pollution. Yet conversion of immense tracts of forest into agricultural land seemed to be the only viable economic approach. A menacing hemorrhagic fever was traced to a missionary in the mid-West United States, newly returned from a stay in the Congo. A race against time by researchers from disease control agencies managed to identify and antidote in time to protect hundreds who were unwittingly exposed. Discussions in the United Nations commenced on the control of global movements of people to curb the spread of disease.

Policy analysts finally realized that there was a common thread connecting these and many more problems and global disputes. Environment is commonly considered a national security issue. Threats and opportunities lay in the wise use of natural resources, and in particular the conservation of biological resources. There were signs that the limits of the biosphere were being

reached, although no one was sure why and to what extent. Furthermore, it was increasingly obvious that actions taken, or not taken, locally were now of direct concern to the global community. Global interdependence was a fact of life and any threat to global security required decisive leadership.

Working together efficiently and with purpose, the core of the Global Club mobilized around this issue as they had come together on global economic reforms a few years before. Although their motivations differed, each player was bound to the other by the knowledge that together they had exclusive power and influence. The United States had interests in seeing further promotion of the biotech industry and, of course, protecting its agricultural sector. The European Union recognized the suspicious and wide-spread public reaction against genetic modification and wanted to protect its regulatory regime. Brazil saw economic opportunity in exploitation of its natural resources. China would not sacrifice economic growth just to protect its biodiversity, but it was simply too important to be left out. Life science companies had emerged as the darlings of the new millennium, but energy companies still had vast economic clout, particularly as they diversified their traditional oil and gas holdings. One representative of each was present as was an internationally recognized financier.

Not fully understanding how an ecosystem works and faced with the daunting requirement for global action, this elite club chose to target its actions. A "dream team" of scientific elites drawn from the best universities and research institute, employing their on-the-ground networks and state-of-the-art remote sensing, identified a few biodiversity "hot spots". These strategic areas - the eastern slopes of the Andes, the island of Madagascar and the Philippines - although covering less than 3 percent of the globe's landmass probably held more than 50 percent of the earth's biota and high concentrations of unique species. They were the focus of the Club's protection efforts and strategic investments.

With the increased power of computers, better models predicting species loss were developed. An investment was made in identifying and cataloguing species. Much more became known about microbial biodiversity, but the knowledge remained diffuse. Modelling came to be used to fill the gaps. Teams of biodiversity prospectors and medical researchers were dispatched to identify likely candidates for pharmaceutical and agricultural products. Innovators and entrepreneurs were encouraged.

Driven by economic interests and supported by the World Bank, multinational corporations negotiated bilateral agreements with the targeted countries, enriching the local economy, creating local employment for indigenous people and building necessary scientific and technical infrastructure. Selectively, privatization of the management of certain natural resources, in certain countries, was explored. Governments in the Club enforced global conservation standards and controlled trade with those specific areas. Although trade liberalization was the regime of choice, it was recognized that for a transition period these "hot spots" were to be protected, even if that meant restricting trade. The World Trade Organization developed new tariffs relating to the management of natural resources and strict provisions for the protection of intellectual property and enforced sanctions rigorously. Foreign aid to countries was tied to the acceptance of stringent rules regarding protection of forests that might include species with potential medicinal purposes. Sophisticated surveillance methods were used to combat smuggling of endangered species.

Additionally, financial investment in bringing about a biotech revolution in agriculture was encouraged. By 2010, a new "super rice" incorporating forms of Vitamin A that the body could absorb had been developed, alleviating a common deficiency in poor countries. Most of the beef consumed in Japan comes from cloned cows. Biotechnology techniques resulted in crops with greater tolerance to various soils and ecosystems. Intensive work is continuing on the

promise of genetically engineering a species that would require significantly less water. Iran was growing many salt-tolerant crops. Recognizing that availability of freshwater is the most significant constraint, efforts continue to design economically-viable methods of desalinization of soils and water. Agricultural extension workers actively promoted the genetic diversity of crops.

Today, the Club recognizes that it has only taken the first steps. There remain significant stresses on species and ecosystem conservation. Projections indicate that population levels will continue growing and remain high for several decades, although the rate of growth has slowed. Evidence of significant climate change and continuing unpredictability in weather patterns mounts. It is not clear how nations can adapt. Social scientists and ethicists have been recruited to search for ways in which biotechnology can achieve greater levels of public and social acceptability.

The original objectives of the Biodiversity Convention are now being partially met. Certain species and their ecosystems are being actively conserved. In those areas, the wisdom of learning from indigenous peoples and sharing the benefits with the people and their governments has been recognized. Sustainable use of biodiversity is the priority, not conservation in general. The intrinsic value of nature and biodiversity has been ignored. It has no merit, unless it is perceived to have value in economic or security terms. Erosion of biodiversity in many parts of the world continues as economic development remains paramount.

While certain elements of the Convention have survived, its governance structure has not. The United Nations and the Biodiversity Secretariat were deemed to be incapable of taking clear decisions in a timely way, and of enforcing those decisions effectively. Only the World Trade Organization and the World Bank retained any meaningful role due to their ability to provide finances and police the trading system. Democratic institutions gave way to an authoritarian regime of enlightened self-interest with little accountability. Multilateralism was replaced by bilateralism. Non-transparent deals were made in back rooms, with favoured nations.

The rest of the world, including Canada, is watching this intense activity with interest and speculating about what they have to offer the Club that will gain them influence and competitive advantage. Canada is poised to provide global leadership, particularly through sharing safe biotechnology with the rest of the world.. Small developing countries that have not benefited directly from the Club's significant investments are eagerly courting the Club members, jealous of the advances made by their neighbouring countries. Certain frustrated countries who do not belong to the Club have developed or protected their own biological resources, turning inward or seeking alliances with other non-members in order to assert their particular ideology or sovereignty.

Citizens at large have not played a significant role. There is an emerging feeling that their governments have broken faith and what was a central value - democracy - has been compromised. In the extreme some have turned away from an economy they view as illegitimate to develop an underground economy which meets their individual needs. But overall, people are living longer, with access to food and medicine. Stable economic global growth has seen incomes rise, even in the poorest of countries. Dissent is muted.

Within the highly managed Club, members set aside any differences as they see the synergistic benefits of being able to use and control significant resources. Multinational corporations have benefited from an orderly regime and clear market signals. They have awakened to the connection between the prosperity of the economic system and the health of natural systems. The question just below the surface has to do with the staying power of this issue. How much longer can we expect conservation of biological diversity to remain a priority?

In 2015 the world is a better place to live - but for how long?

3.2 Shared Governance

The State of the World Forum 2015 has just received a most optimistic outlook. Finally there are signs that the a sustainable world is possible. Population growth rates have stabilized. The assault on the earth's life support system by wastes, poisons and pollution has been tempered. Less than 10 percent of the planet's people now lack access to safe drinking water, a reduction of 10 percent since 2000. Land fertility is increasing. Clearing tropical forests for agricultural purposes has to a significant degree been replaced by biodiversity prospecting. Commitment to action to reduce greenhouse gas emissions is now measurable. Clean, efficient technologies have come to market at reasonable prices and are being transferred to developing countries. The wealth of the planet is being shared more equitably and millions of the poor are moving out of absolute poverty. Wishful thinking?

In 1992 at the Earth Summit literally hundreds of speeches were given by the most powerful politicians on the planet, illuminating the relationships between a healthy environment and a higher quality of life for more of the world's people. They endorsed the concept of sustainable development. Linking environmental, economic and social considerations promised much improved decisions. It was the politics of hope. A comprehensive and far-reaching action plan was approved - Agenda 21. Treaties on climate change and biodiversity were signed. If ever there was hope that the world would change in some very positive ways, surely this was it.

Astonishingly, even this event failed to alter the course of humanity sufficiently to put us on a sustainable trajectory. By the time of the 10th anniversary of the Earth Summit in 2002, governments could not point to significant improvements in the health of the environment, a more equitable sharing of the earth's resources between countries of the North and South, or a much improved quality of life for more people. In fact, action on the climate change and biodiversity treaties seemed limited to procedural decisions, not reductions in greenhouse gas emissions or loss of biodiversity. In many parts of the world, water scarcity crises loomed. AIDS was decimating the African continent and flu-like epidemics spread around the globe like wildfire. The gap between rich and poor had widened with the majority of humankind living in poverty and a minority consuming an increased share of the world's resources. The symptoms all pointed to a world in disequilibrium. At best, sustainable development was a "work in progress". Compared to the scope of change that was needed, governments were largely tinkering in the margins.

Faced with such a dismal record, one might have expected governments to despair or be in a state of paralysis. But there was another phenomenon at work - globalization. In a world of blurring sovereignty, blinding technological change and integrated economies, there was a growing alienation between political processes and the things about which citizens really cared. Early in 2000, mass public demonstrations at meetings of the World Trade Organization and the World Bank in Seattle and Washington respectively, signaled that change was not only necessary, but inevitable. Conversations about economic efficiency, trade liberalization, market reverence, intensification of competition and the pace of technological change were henceforth going to include environmentalists and citizens. Shaping globalization so that it would meet social and environmental objectives in concert with economic objectives, became the new goal around which governments rallied. Just as nature instinctively struggles to survive, so did the community of nations.

Evidence documenting the loss of biological diversity and the unraveling of the environmental web that sustains all life motivated governments to negotiate the Biodiversity Convention. In 2002 governments could no longer disregard the rapidity with which biological capital was being depleted. A reinvestment was needed and they recommitted themselves to the Convention's

implementation. All 3 of the objectives: conservation, sustainable use and equitable sharing of benefits would be pursued simultaneously.

In hindsight, the most significant activity was not an initiative of governments. The World Bank and Stanford University convened a meeting of prominent economists and conservation biologists with the objective of developing rough estimates of the worth of "ecosystem services". The quantification of the replacement cost of such services as flood control, watershed protection, prevention of erosion, waste recycling, pollination and nutrient cycling was attempted. The number turned out to be several times the annual financial transactions of the global economy.

Assigning an economic cost to forms of environmental degradation such as pollution, deforestation and desertification further altered the traditional cost-benefit analysis. A report commissioned by the Earth Council estimated that at least 700 billion dollars was being spent by governments each year to subsidize practices which undermined sustainability in 4 sectors (water, energy, agriculture and transport) at immense cost to taxpayers, consumers and the environment.

Even before assigning a value to pharmaceutical and agricultural products based on biological diversity, a compelling case was emerging. To governments and corporations the logic of biodiversity conservation and sustainable use was unassailable. A strong economic awareness could now inform environmental policy just as environmental understanding could influence economic decision-making. Countries like Costa Rica and Mexico moved immediately to protect their natural wealth by making investments in ecotourism and organic farming respectively. Others began systematic review of their systems of incentives in order to motivate economic behaviour to make better and more sustainable use of resources. A conservation partnership between a business and a non-governmental organization has set up a Marine Stewardship Council to create market incentives for sustainable fishing. The prevailing economic myth of the late 20th century has been challenged.

This collaboration between economists and scientists had an ancillary benefit. Although the importance of an interdisciplinary approach to environmental problems had been acknowledged for many years, it had never been fully implemented. While scientists could design complex computer models to predict likely trends in global climate change, under many scenarios, delegates to biodiversity negotiations did not factor this information into their guidelines for conservation. By the first decade of the millennium the symptoms of ecosystem upheaval were so obviously interrelated that a true synergy developed among experts. Climate change clearly threatened to exacerbate the loss of biodiversity and together climate change and biodiversity could introduce destabilizing geographic movement of people and shifts in economic activity.

Governments and their experts continued to design sectoral plans and fragmented pieces of policy and law. The need for a better understanding of the link among science, technology and policy became abundantly clear with advances in biotechnology. Technology was out ahead of government policy. While many public concerns were technical in nature, more fundamental issues of control, equity, ethics and choice challenged policy makers.

It became obvious that a new institution was needed. The existing consensus-based system for global decision making, however well-intentioned, was cumbersome and slow to act. Global paralysis had set in. Dozens of meetings had been convened, processes negotiated and guidelines developed, but biodiversity loss continued. to accelerate. Attempts at requiring accountability through the provision of national reports did not produce an inventory of actions that inspired confidence.

A plethora of multilateral environmental agreements and agencies with ambiguous

mandates had evolved over the years. In the field of biodiversity there were at least 3 major treaties dealing with similar issues and relevant provisions in agreements that were originally negotiated for other purposes such as health, agriculture and trade purposes. Several United Nations agencies claimed a proprietary interest in biodiversity matters and sibling rivalries existed among convention secretariats. A coherent system was required to integrate these efforts and energies, to avoid fragmentation and duplication and to make better use of scarce resources.

Although it took 10 years, a Global Ecosystem Organization with the over-arching mandate of promoting sustainable development, was created. From the model of the World Trade Organization a dispute-settlement procedure and compliance mechanisms were designed. From the International Union for the Conservation of Nature and the International Labour Organization, a model of genuine power-sharing involving major environmental groups, industry and civil society evolved. It is too early to rush to judgment about GEO's effectiveness. Political will and discipline will continue to be required in large doses if the organization is to become truly results oriented. National sovereignty remains a stubborn obstacle.

The most positive signals come from the fact that shared responsibility has become the norm. The opening phrase in the United Nations Charter - We the Peoples - has been brought to life. The involvement of civil society has helped GEO develop social consensus and credibility in a time of public fatigue. Industry has contributed ideas and innovation and financial resources. And both will ultimately strengthen the national capacity to act. Decision-making is no less difficult, but the results are more satisfactory. Broader participation has resulted in broader sharing of responsibility.

Hundreds of successful conservation projects have been implemented. Specifically, the intent of the Biodiversity Convention to access the knowledge of indigenous peoples is being realized. And why not? In 25,000 years of subsistence hunting and foraging in the high Arctic, the Inuit people have never driven a single species to extinction. This in one of the most fragile ecosystems on Earth.

Business and non-governmental organizational initiatives abound: In Japan, a wetland monitoring program was designed to follow annual migrations of wild cranes; the Business Council for Sustainable Development for the Gulf of Mexico, in collaboration with more than 20 groups is trying to slow the rate of deforestation by examining whether hardwood reforestation could be competitive with soybean production; a chemical company has made protection of the environment a condition of employment at its production plants in Spain; a petroleum company has a policy of minimal interference and impact in a site of unusual ecological conditions and in China a joint project of a multinational firm and an international environmental organization is assisting in the assessment of the trade in rhino and tiger parts for use in traditional medicines; a pharmaceutical company and a government set up a joint biological diversity exploration and development institution. Private investors have passed shareholder resolutions directing companies to act in environmentally-friendly ways resulting in commitments from a building supply firm to stop selling wood from old-growth forests. Some 10,000 companies have achieved certification under the International Standards Organization voluntary environmental management guidelines.

The third objective of the convention, equitable sharing of benefits, has been influenced by the adoption of the Earth Charter early in the first decade of the millennium. Long before the Earth Summit process, spiritual and religious leaders, ethicists and grassroots organizations began to create a set of principles that could help people, communities and governments adopt new standards of behaviour. The Earth Charter is that code of conduct.

Equity is not guaranteed by the United Nations. Countries of the OECD, those with economies in transition and those developing, or

just surviving have very different needs and very different degrees of influence. By 2020 the World Bank predicts that 9 of the 15 largest economies will be developing countries. In terms of aggregate size of their economies, they will be displacing some of the more mature industrialized countries, while still lagging well behind them in per capita terms. They will account for more than half the world's GNP and constitute a majority of the world's population (some 75% and still growing). It was clear that a transition to a new global partnership in which all shared equitably was inevitable.

The Biodiversity Convention recognizes that developing countries cannot be denied their right to develop, yet development along the same path as industrialized countries could be devastating. It promotes the concepts of "intergenerational equity" and "common but differentiated" responsibilities. Developing countries are custodians of much of the world's biological resources. In return, it is the responsibility of industrialized countries to ensure access to capital and technologies required by developing countries. To date, developing countries have rarely shared in the profits companies reap from patenting animals and plants within their borders. There is genuine fear that proprietary science can confer monopolistic control over issue of food security and health. Work continues on the design of innovative mechanisms for benefit-sharing, such as a tradable emissions regime which links actions to conserve biological diversity with those to reduce greenhouse gas emissions.

Canada has become a prominent player, harnessing its not insignificant expertise in science and technology. In the development of new models of institutional governance, Canada's long-standing experience with participatory decision-making structures and processes is sought.

Sustainable development has many challenges in implementation. It is intrinsically holistic and interdisciplinary. It embodies complexity and value judgments about equity. It is very long term in character. Multilateralism remains the best hope in ensuring that environment- the quintessential global issue - is considered with the interests of all countries in mind and with the urgency and importance accorded to other political, economic and social issues. A viable system of world governance has emerged. Although the focus has been on institutional reform, slow but steady progress is being made in implementation of the Biodiversity Convention. The key question is whether or not the pace is fast enough.

3.3 Cyberwave

Never have the lines of public discourse been so clearly drawn. The technological optimists on one hand and the skeptics on the other. Competing headlines tell the story: The Beginning of the End; Let's Stop Cloning Around; God in a Labcoat; Tomorrow's Body Shop. For many, genetic manipulation has become the most important economic, political and ethical issue facing mankind.

The ability to design and build at the molecular level, to manage genetic information by computer and to read and alter the genes of individuals has coincided with globalization of trade and commerce allowing a global life-science market. Jeremy Rifkin's predictions of the 1980's of transgenic species, test tube babies, the rental of surrogate wombs, the fabrication of human organs and human gene surgery have all come to pass. Screening for genetic diseases is widespread. Increasingly the Earth's gene pool has been commercialized. The marriage between computer technology and genetic engineering has been consummated.

Surprisingly, it is only now that genuine debate among concerned scientists, citizens, religious leaders and politicians is taking place. There is wide-spread suspicion that with the number of breakthroughs that have captured public attention, at least a few worrying incidents are being kept out of view. Fear of the unknown and of the level of risk to health and the environment are paramount, but there is also questioning of the very purposes to which this

new technology is being put. But the science is complex and answers to the questions difficult to grasp. Will the creation and release of genetically engineered life forms into the environment cause irreversible damage to the environment? What are the consequences of a few multinational corporations controlling the essence of life? Are we interrupting evolutionary development? What will a world of genetically designed people mean? But all of this is largely being ignored by the heroes of the day - the entrepreneurial molecular biologists, technologists and financiers.

The promise of a better life and great benefits to mankind is seductive. Who could not applaud bioremediation - the use of microorganisms to remove or render harmless dangerous pollutants and hazardous waste including the absorption of large amounts of radioactivity. Would environmentalists not encourage the development of crops that could take nitrogen directly from the air, rather than relying on polluting fertilizers, or the development of biodegradable plastic from plants rather than petroleum? Would they not join forest companies in their excitement about engineering species of trees that were faster growing, resistant to disease, heat, cold and drought?

Who will feed a populous world becomes less of a challenge with crops that can be grown under almost any condition and with the productivity of animals increased. Healthier food with enhanced vitamin content and meat with lower fat-to-lean ratios can be targeted for certain populations with nutrient deficiencies. Perhaps we can help species adapt to climate change, such as creating fish species able to survive in warmer waters. Who would deny the developments that would allow more of the planet's people to live healthy lives: genetically engineered "super animals" that produce drugs, medicines and become organ donors for human transplant; genetically engineered drugs to treat heart disease, cancer and AIDS - and diseases long untreatable; tissue engineering, fabrication of human organs, and artificial chromosomes.

And, by the way, tremendous wealth has been generated for hundreds of growth industries from bioengineering firms to life-science companies. Health-care, insurance and pharmaceutical industries have undergone massive restructuring. The energy, chemical, petrochemical and defense sectors are next. The new wave of enterprises are those that integrate informatics and genetics bringing nanotechnological products to market. Companies retain monopoly on their inventions and gouge the public with high prices. The market reigns supreme. But only those with technological capability could prosper in the competitive world of globalization and market liberalization.

In 2015, as part of the public discussion, Harvard University organized a conference analyzing the death of the Biodiversity Convention, and its Protocol on Biosafety. Experts at Harvard have been following the biotechnology revolution since it gathered momentum in the late 20th century. The overall conclusion was that the infrastructure supporting and guiding the Convention, including national governments, had not been able to cope with the speed and significance of biotechnology. The focus on process rather than decision-making and on seeking consensus left governments always playing catch-up. The private sector simply moved at its own pace and regulatory systems were out-of-date before they could be operational.

With respect to the objectives of the Convention, biodiversity conservation was happening only in an incidental way and limited to those sites with microbes, plants and animals with rare genetic traits that might have future market potential. Once having found this raw material, biotech companies have modified it, sought patent protection and left the sites once again in the hands of indigenous peoples. Bioprospecting has only taken - not transferring pharmacological expertise, research or development. Conservation was left in local hands. Overconfident industrialists actually believed that technological advances have

rendered the need for natural diversity obsolete. Species and their habitats continue the perilous slide of extinction. Sustainable use has become an outdated concept .

Benefit-sharing has not happened as a matter of right, but rather as a matter of negotiating skills. Scientific laboratories and corporate boardrooms of the North have the sophisticated technical expertise to manipulate genes, the resources on which this manipulation is based lie in the tropical ecosystems of the South. The lack of any effective international regulatory regime and a commercial culture that sees no particular obligation to compensate, has resulted in charges of biopiracy. The intellectual property rights systems essential to support the years of research and development and financial risk required to bring products to market makes no allowance for indigenous knowledge.

In the early days of the Convention most attention was diverted from the basic objectives to the issue of biosafety. Ecologists were unsure of the impacts of transgenic crops which bypassed natural species boundaries - fish genes in tomatoes and chicken genes in potatoes. The fundamental rules of biological development were being redefined by the marketplace. Evidence pointed to the likelihood of creating "superbugs" resistant to new pesticide-producing genetic crops. Transgenic crops could themselves become weeds or alien species - novel organisms being introduced into an ecosystem. The potential for genetic pollution led to an agreement to inform in advance if legally modified organisms were to be exported. However, the agreement was limited to a small percentage of traded seeds and microorganisms. A less restrictive procedure for commodities used as food or feed, or for processing was designed recognizing the impracticalities and costs of a labelling and segregation system. Powerful commercial forces were at work.

Some national governments tried to extend ownership to biological innovations. In fact, some developing countries enacted laws that conferred national control over genetic material. A regime to protect the resource rights in developing countries was sought unsuccessfully and international harmonization of intellectual property protection laws did not happen.

The intense dispute about primacy of the rules of the trading system or the rules of the environmental system was settled in typical consensus fashion. The rules were to be seen as mutually supportive and not conflicting. Needless to say it did not take very long until a case of the use of scientific evidence and the precautionary principle exercised under the Biosafety Protocol was deemed to violate the rules of the World Trade Organization. The trading system prevailed. Multilateral environmental agreements were left with no teeth, but the credibility of the trading system was also shaken because it did not seem able to take into account legitimate societal concerns.

Trade between Europe and the United States was initially affected by Europe's attempts to protect its agricultural sector, while the United States supported the competitive aggressiveness of the biotechnology industry. Fearing that activists would succeed in turning other publics against genetic engineering, the biotech industry launched a preemptive strike, committing millions of dollars for a massive advertising campaign. By 2015 however this was largely irrelevant as the clout of transnational companies and the desire of citizens for access to the products that would guarantee a better life overtook cumbersome and ideological government negotiations and ineffective bureaucracies. Although the United States remained the dominant player, technology-accepting Asian countries were developing rapidly and parts of Europe had decided that their future lay in harnessing technology rather than harvesting natural resources. Canada continued to pursue biotechnology interests, particularly in agriculture.

There were several significant recommendations arising from the Harvard conference. These must form the agenda of the next decade.

First, it was recognized that continued progress and profitability of the biotech industry would depend on a continuing supply of nature's germplasm. Yet, the intensification of monoculture agricultural practices and collective inattention to biodiversity conservation has depleted the gene pool. Urgent attention needs to be paid to reversing the trend.

Secondly, the current public hysteria points to a gap between expert knowledge and public information. Information is compartmentalized and controlled by various technical elites who don't communicate with each other. The result is contradictory, inconsistent and volatile opinions. A consolidated scientific and technical assessment of the environmental and health impacts would provide a fair basis for dialogue. Fora and processes need to be established to resolve these inconsistencies and promote consultation. Best practices should be shared and technological cooperation facilitated. Biotechnological developments are testing the very values that individuals cherish. Demands to be heard will only grow louder. Social adjustments to emerging technologies takes time.

Finally, institutional reform is essential. Maximizing the benefits of biotechnology while minimizing its risks requires an adjustment in those organizations, laws, regulations and administrative practices around the globe. Institutions have to be competent. The system needs to be coherent, integrating trade, agricultural, environmental and health regimes at a minimum. Regulatory processes need to be flexible adapting to new circumstances. Effective risk analysis and management processes that build on science, economic and societal values need to be sought. The desire for efficiency through international harmonization needs to be balanced with means to address political concerns at the national level. The biotechnology revolution has confirmed that governance issues are much more difficult than those of science and technology. Canada is one of those voices quietly urging reform.

In many ways the world is a better place. Technological progress has solved many social problems and brought considerable wealth to the economic system, but at what cost? A world of inequities, lacking in institutions of governance may be ill-equipped to handle the unknowns that technology will surely uncover. Will all options for future generations remain? This new technology is not neutral. Simply because we can do something, does not mean that we should. Will we passively submit or will we try to shape the technologies to meet more than short-term economic goals?

Can technology be used to solve problems of the global commons or will it create new ones? Imagine the impact of gene technology on national security. As biological weapons become easy to disperse, and have specific and limited time effects, some nations may be tempted to develop them as strategic weapons. If gene research can target medicines to particular individuals, can it not also target weapons to specific ethnic groups?

3.4 Regional Dominators

In September of 2015, news of a bioengineered microbe out of control, attacking wheat fields and food sources in the United Kingdom, portends the end of agriculture there - at least in the short term. The understandable concern of farmers and consumers is dwarfed by the quieter but mounting anxiety among geneticists that the very ecological chain is at risk. Can the microbe cross species lines jumping from plants to animals to humans? The powerful European Union swings into action protecting countries within the Union by prohibiting all agricultural and food exports from the Island.

As the Union contemplates how this incident will be used by its competitors in North America and Asia, the world's attention is redirected to a curious death in Chicago. A native of that city, recently returned from a holiday in Africa, was admitted to hospital with flu-like symptoms. Within 24 hours he was dead, having suffered incredibly as each of his major organs went into shock. As events unfold, fear and trauma mount.

It appears that an Ebola-like virus has mutated into an air-borne predator. With horror, we learn that the virus was engineered to possess codes to attack specifically the human immune system. It was traced to a laboratory operated by rogue scientists from the Middle East, operating under cover of a rain forest. Bioterrorism was born.

Sadly, incidents similar to these are becoming widespread. It is a time of shrinking niches. Regional views clash on a daily basis, creating friction and turbulence. Within each bloc, the first instinct is to turn inward and protect one's own. That's fine for those rich countries and blocs with intellectual and financial resources to survive, but not so good for the weak and disorganized. The "in" are protected; the "outs" have to fend for themselves. It is the law of the jungle. Within the bloc strong-armed edicts ensure compliance and coherence of policy. Power and exploitation are acceptable means of protection.

The second reaction within the bloc is to strategize about how the event can be used to strengthen one's competitive position vis-a-vis other regions. Powerful elites have a great deal to lose of material value. As governments determine that advances in science and technology are instrumental in achieving competitive advantage, the market swings into action, using, exploiting and rewarding such advances. And the public acquiesces, knowing that their security and well-being rests with being smarter, faster or bigger than other regions. Cultural differences and historic grudges reappear in the hostile battle to succeed.

No one seems to be speaking in the global interest. Multilateralism is replaced by bilateral deals. Cooperation is no longer prized. First, second and third-world differences are accentuated and the gap between rich and poor widens. National sovereignty and regional interests have fought and won the battle of the global commons. Protection of the atmosphere, the oceans and biodiversity is only compelling when it is perceived to be in the short-term economic interest of a country or region. Science and research are diverted to new opportunities they bring to commercialization. Collaborative global research has been disbanded and significant discoveries are guarded as state secrets. International institutions are ineffective and largely ignored. The United Nations Environment Programme and the secretariats that managed the many multilateral environmental agreements of the 1980's and 90's struggle to survive with limited resources and no credibility.

The United Nations itself was unable to exercise any moral authority as the nature of democracy changed. Even the previously powerful international instruments of economics and trade were unable to articulate a case for global management of affairs. Resource issues escalate, quickly becoming trade issues and ultimately broad political tension. Scarcity of water has forced shared water management of large bodies of water within regions, but has generated interregional tensions and migration of environmental refugees. Yet, there is no international mediator or process to resolve disputes, no holder of commonly-shared information, no court of international public opinion. Time and again we come dangerously close to the brink of violence.

It is hard to have any optimism for the future of biological diversity. Nature no longer has intrinsic value. The original global objectives of biodiversity conservation and sustainable use simply cannot be measured at a world level. We no longer have any shared inventories or programs. To the extent that species and their habitats are being conserved, it is a result of isolation or national concern for economic opportunity. But more often fast growing monocultures are encouraged and diversity is lost. Each resource sector competes for scarce water and soils rich in nutrients while habitats are destroyed. The third objective of the Convention - equitable sharing of benefits - has suffered from a value shift that does not recognize a moral or ethical responsibility for those with whom we live or the environment in which we live. The United States has doggedly pursued the path of unilateralism, refusing to

sign or ratify the Convention, and there is certainly no incentive for further negotiations. The fewer the rules the better.

In parts of South and Central America and Asia, genetic seedbeds are being protected because they are seen as a potential source of economic wealth. The huge biotech industries of North America and Europe will continue to need unique species as the basis for their future products. Negotiations are intense. Hoarding is a common behaviour. Broad bioprospecting is prohibited. Only individual species, the darling of the moment, are for sale, and at very high prices. Habitats are endangered and many species ignored. Indigenous peoples do not see the rewards. In fact, the revenues are often not seen by the national government. More often they are appropriated by strong intra-regional corporations.

In Africa identity and ethnicity define survival. Tribal wars have been fought over resources and that has not changed. Resources continue to be the battleground, and the environment is the loser. If biological diversity survives, it is only be accident, not by design. Poaching of large game-animals is big business, often aided by local farmers who see the majestic elephant only as a nuisance. Africa has slipped further down the slope of development. Digital apartheid meant that the computer and telecommunication age never flourished. Education, particularly in science and technology is practically non-existent. No indigenous research has developed and very little is known about existing biodiversity and its potential for bringing economic wealth. The biotech revolution is unknown.

The United States has been the brain of biotechnology. Early investments in computer technology and genetic engineering allowed it to leap ahead of any other nation. Very early on companies recognized the wisdom of developing strategic alliances with countries rich in biodiversity. Those agreements are now being called into question by the developing countries as they come up for renegotiation. Nevertheless the decisions of far-sighted corporate leaders of the 80's have ensured that US firms have significant advantage. Some anxiety is being expressed by citizens in adjacent countries. Although NAFTA is the organizing framework of this bloc, the reality is that the US position prevails. Canada, with its considerable natural resource wealth is a potential site for a new form of bioprospecting and its track record in standing up to the United States does not engender confidence.

The aesthetic and moral values of Europeans have protected nature and promoted their traditional agricultural life style in selected countries. The common agricultural policy of the European Union was remarkably durable. The long-held support for environmental protection in the Scandinavian countries held sway with other members of the Union, as long as it did not compete with employment. The trade wars over genetically modified foods at the early part of the first decade of the millennium were fueled by public anxiety over health and safety, but fundamentally reflected a protectionist stance that only grew in the following decade. Nevertheless, the Union has now come to the conclusion that it is falling behind in the technological era. Partnerships between governments of the region and their major corporate players are starting to result in new investment in science and technology to mobilize commercially viable innovation. The shift away from interest in conservation of natural resources is underway.

Thirty years ago dozens of the world's leading transnational corporations invested in biotechnical research. Today, hundreds of new bioengineering firms have followed their lead, competing with each other trying to be the first to introduce new forms of genetic commerce into the economy. Pressure is exerted on developing countries to sign over rights to genetic material and private deals negotiated. Agreements have been signed with educational institutions to ensure that a company has access to the best and brightest researchers. Quietly, the benefits of products under development are explained to

politicians and bureaucrats, all in the interest of forestalling any cumbersome or inconvenient legislation, such as labeling. Annual revenues have soared as have the value of technology stocks. Economically those countries housing biotechnology industries are doing very well indeed. And to some degree, everyone is better off. Industry's self-proclaimed motivation is to harness science and technology to provide a better quality of life for people, and there is adequate evidence that people agree. The health and agricultural sectors have been the big beneficiaries. Meanwhile, civil society has been ignored. There is no such thing as science in the interest of the public good. Those who can afford the wonders of science will have them; those who cannot, will not.

If one is to measure progress in terms of innovation and economic prosperity, this competitive, technological environment has been a success. But when trade-offs have to be made between the market and social good, no one is there to speak for the public. Everyone, including government has been co-opted by big business. The world has become a collection of isolated fiefdoms. But surprises happen, particularly in a technological age, that may well require intellectual, financial and logistical resources beyond what any one company or country can afford. And just when we need it, we may discover that the international regime is in disrepair.

3.5 What does it all mean?

These stories are not taken from the shelves of science fiction. Each could well be true. Each flows quite logically from the circumstances in 2000. If anything, they perhaps underestimate surprise. In a span of 15 years there are likely to be a lot of surprises - increasing frequency of natural disasters; unanticipated new disease; possible episodes of bioterrorism; unforeseen new technologies. And there may be moments of opportunity when small nations or strategic alliances of people, industries and their governments seize the opportunity and move the world in a certain direction. There are elements in each of these 4 scenarios that could well be integrated into one surprise-rich story.

In 1992 the world community articulated 3 biodiversity objectives: conservation, sustainable use and equitable sharing of benefits. The only scenario that attempts to meet all three objectives is Shared Governance, as it embraces a sustainable development framework. It is less clear what the results will be, however, as building a new institution may well consume significant energies and resources that could be applied directly to achieving the objectives of the Convention. Multistakeholder processes hold promise for a wide-range of actions at the local and regional level. A focus on equity could make financial and technological resources more available to developing countries. Both the Global Club and Regional Dominators scenarios could bring about conservation and sustainable use, but only to the extent that they meet other strategic objectives: in the case of the former, the economic well-being of club members and in the case of the latter, promotion of the power of a region. Some biodiversity-rich regions would invest if biodiversity were seen as a strategic power element while biodiversity-poor regions would be at the mercy of a trade agenda and regions in between would pay little attention. In the Cyberwave scenario there is considerable potential for technological innovation to accelerate erosion of biodiversity and to rob biodiversity-rich countries of a resource. There is no concerted global leadership or interest in the biodiversity objectives.

The scenarios and their impact on biodiversity can also be compared as to their time horizon and the speed of response capability. Only the Shared Governance scenario takes a long term perspective. The Global Club scenario has a short term focus and Cyberwave even shorter. In the final scenario, Regional Dominators, the time horizon varies with the strategic imperatives in each region. The Global Club is able to respond rapidly to surprises and events, as are certain regions under the Regional Dominators scenario The Shared Governance regime is capable of global analysis and response, but only at a

plodding pace because of cumbersome decision-making mechanisms. No coordinated response capability exists in the Cyberwave scenario.

All scenarios foresee a change in governance processes and structures. They range from the formation of a new form of global governance institution, involving all sectors of society (Shared Governance) to a patchwork quilt of individual actions empowered by new information technologies but focused on supporting local initiatives (Cyberwave). Accelerated process breakthrough including effective enforcement and compliance mechanisms and multistakeholder decision-making and accountability under the Shared Governance scenario could mean an orderly access to biological resources. In the remaining two scenarios a global biodiversity convention becomes irrelevant while forms of protectionist or liberalized trade rules attract attention.

Canada, although it is not a member of the Club, is poised to contribute its knowledge and experience in the Global Club scenario, sharing safe biotechnology with the rest of the world. The Shared Governance scenario allows Canada to continue its current foreign policy approach, trying to make a difference in the world, especially for those less fortunate. It is called upon for its science and technology as well as its experience in participatory democracy. Canada's influence in the world is less obvious under the other two scenarios. It is likely that it would take its lead from the United States, either as part of a larger biotechnology industry or as part of a strong global entity. Whether or not Canada is successful under any of these circumstances will be very much influenced by the decisions it takes domestically and the relationship it strikes with members of the federation.

4.0 CANADA RESPONDS

Canada has long had an international presence and equally has been influenced by the world. As a strong supporter of multilateralism it has been a key player in the creation of an extensive international environmental legal regime. In an increasingly integrated world economy Canada promotes rules-based approaches to managing international relations. Not surprisingly, life next door to the world's superpower and an economy oriented to trade means that both continental and global integration have a significant impact on the design of Canada's foreign policy agenda. There is no question that each of the four scenarios would have domestic consequences.

In Canada, a federal state, responsibility for foreign policy has been assigned to the federal government. This allows the nation to speak clearly with one strong voice. The reality however is that in the field of environment, power and authority are shared among jurisdictions. The federal government has clear jurisdiction in transboundary areas and can invoke the "peace, order and good government" clause of the constitution while the provinces have jurisdiction over natural resources. Federalism complicates Canada's independence of action. While Canada can and does enter into international environmental obligations, to be met those obligations usually require the involvement of the provinces. In order to minimize the possibility of inaction or delay in responding internationally, significant effort in consultation and collaboration is necessary.

In 2015, Canada's response to global developments will certainly be influenced by national governance arrangements and inevitably, global and intergovernmental decisions will contribute to the shaping of national institutions and policies.

4.1 Global Club

Canada is not a member of this prestigious club. The United States is assumed to represent Canada's best interests. For a number of years, Canada did not resist. Canada had always espoused the notion of global interdependence and a human security agenda, including warnings of a biosphere under stress. The very events that led to the formation of the Global Club were experienced directly in Canada: disruptive impacts of climate change in the North; the threats of disease with the global movement of

people; unprecedented demands on our immigration system. Rapid response through decisions by a small group of the most powerful players seemed the only efficient solution for the greater good of humanity.

But over time, the authoritarian regime and its lack of accountability did not resonate well with the Canadian public. A general feeling of disenfranchisement and demoralization was leading to unrest and a call to the federal government to assume more of a leadership role. Values, priorities and national pride were at stake. Environmentalists and a growing coalition of others were genuinely alarmed at the lack of attention to biological conservation and the sell-off of natural resources. But, feeling powerless, they focus on individual action and the level of government closest to them.

The federal government was eager to be more of a player. It attempted first to influence decisions intellectually through participation in the Club's scientific "dream team". Research into adaptation under climate change was of particular importance. Canada also positioned itself as a long-time friend and potential entree to some of the countries that had been targeted as strategic biodiversity hotspots - Costa Rica and others in the Andes. The wisdom of indigenous peoples was helpful in developing appropriate strategies. It also became apparent that Canada's services as a mediator between highly polarized members of the Club might be needed. Other smaller nations still saw Canada as a bridge to the more powerful. In the past we have spoken in the interests of the developing world especially recognizing the need for equity in the biodiversity convention, and we have tried to facilitate an understanding of a pragmatic approach to biosafety that would meet the concerns of the Europeans as well as the desires to protect emerging biotechnology industries in the United States and Canada.

Although Canada has not yet been identified by the Global Club as a strategic area, its wealth of natural resources will likely draw attention in the future. Bioprospecting in Canada may not be that far away. If Canada wants to take maximum advantage of such a possibility in the long term, stringent biodiversity conservation in those areas should start soon. The business community urged the government to look on our biodiversity as a marketable commodity. Forests will continue to be needed for softwood lumber products. Climate change and population growth will increase demand for food and agricultural productivity. Water shortages will put pressure on Canadian resources and hydroelectric power generation. Growth in the tourism sector has continued. Thus far the focus has been short term, narrowly focused, appealing to the economic bottom line. The results are that biodiversity in general is not being conserved. Attention is paid to sustainable use of the resources only where a clear economic benefit has been determined and even there short term pressures lead to continuing practices of monoculture and sale of the resource at the highest market price. In large measure the management of these natural resources falls within provincial jurisdiction.

The federal government focuses its attention on enhancing the competitiveness of its agricultural and biotechnology sectors. The products of safe biotechnology will be of value to the Global Club. The Departments of Industry and Foreign Affairs and International Trade, supported strongly by the business community are positively engaged in seeking markets and influencing any trading rules of the world community.

Economic and trade policies are pursued to achieve compliance with international measures and avoid sanctions. But demands of the Club to reduce subsidies, set national standards and ensure sustainable management practices in targeted areas pose difficulties in the management of relations with the provinces.

The threats and opportunities posed by the approach of the Global Club to biodiversity have caused Canada to reflect on what constitutes a country. If Canada is to be an effective voice in the world, to influence the Club successfully and to protect its national sovereignty, it will need to speak with one authoritative voice. But a strong,

unified and coherent position will mean less room for individual differences. It must be able to act quickly, in real time, not after 3 years of federal-provincial meetings. Being out of the Club has forced a re-examination of dysfunctional arrangements. Clearly current domestic arrangements are inadequate. Harmonization no longer works. The convenient division of labour with the federal government taking the lead on matters of biotechnology while the provinces assume responsibility for natural resource conservation and management frustrates coherent national policy. While there is no appetite for proposing constitutional change, the provincial and federal governments recognize that they must overcome their differences, through moral suasion, convincing leadership, or executive decision.

The federal government recommits itself to designing an effective institutional arrangement with the provinces. Energy and financial resources are expended to build the necessary technical capacity in smaller jurisdictions and to genuinely share key research and analysis. International scientific assessments are used as a common base for discussion. Fiscal incentives for technological innovation are created. There is even an attempt at sharing power through rotating chairmanship of a joint Ministerial Council. Some provinces and territories develop a more national perspective, but for fiscal and/or ideological reasons, the negotiation of joint decisions remains a slow and difficult process. Progress is made in agreeing broad environmental objectives, but competitive dynamics hinder the reconciliation of precise responsibilities and monitoring for accountability. The design of an impartial dispute adjudication process is incomplete.

In keeping with the demands of the Club, Canada must guarantee compliance with trade and economic requirements that have a direct impact on the management of natural resources. It must align itself in the most friendly way with the global rules of trade. To do this brings the federal government directly into the field of provincial resource management. Fortunately, the considerable investment made by the federal government in joint decision-making, has resulted in greater trust and receptivity by the provinces. The provinces recognize the global circumstances and the need to have the federal government speaking for them with members of the Club and ratcheting up the country's influence. But, at the least they want a say in how the decisions will be implemented. The federal government is anxious to reach an agreement as it has seen ample evidence of bilateral arrangements being reached between members of the Club, either governments or industrial members, with biodiversity-rich communities, with or without national government concurrence.

The business community wants to take advantage of Canada's economic opportunities, but to do so requires a stable domestic climate and would be assisted by an influential Canadian voice internationally. Civil society is growing increasingly disillusioned at the ineffectiveness of both orders of governments as the country becomes more fragmented and its fundamental resource base is threatened. In addition, they see government as having been co-opted by industry and its preoccupation with only those species and ecosystems that are deemed to be economically important.

Canada is becoming more national in outlook, pulling together in common cause, but in 2015 these issues have not yet been resolved.

4.2 Shared Governance

Sustainable development is working. A spirit of optimism wafts around the globe. The reality of interdependence and the practice of multilateralism have been validated. Globalization continues, but the call to "put a human face" on globalization has been heeded. Global consciousness and the threat of crises has emboldened the Security Council to be prepared to take action on matters of environmental and human security. The decision in 2002 to create GEO - an authoritative global voice for sustainable development - has resulted in slow but steady progress in linking environmental,

economic and social considerations in most parts of the world.

The decision to recommit to the Biodiversity Convention has resulted in a revitalized regime. Scientists and economists have worked together to develop new analytical tools. Advances in technology have enhanced data bases and allowed nations to target valuable resources to be conserved and used sustainably. The slowness of decision-making has been somewhat ameliorated by intensive efforts to improve the knowledge base and to build capacity for education and research in developing countries. Industry has worked hand - in - hand with indigenous peoples, benefiting from their knowledge and recognizing a responsibility to share benefits with the local custodians of the resources. A pragmatic approach to the assessment of the environmental and health impacts of biotechnological developments has the growing confidence of the public and a second "green revolution" is underway. Biodiversity is recognized as a key element in the wealth of nations.

Canada occupies a prominent position, disproportionate to its population. Canada had strong assets to bring to the table. Its long-standing experience with participatory decision-making was drawn upon in the early days of the creation of GEO to develop tools for building consensus; its partnerships with developing countries were cited as role models of equity based on Canada's multicultural and linguistically diverse environment; its science and technology often provided the foundation for international rules. Others perceived Canada as a vast and relatively unspoiled environment whose citizens and their governments recognized the intrinsic value of biodiversity. Canada is fully engaged in global governance.

While this prevailing world condition generated a sense of national pride amongst Canadian citizens, governance at home was not an easy matter. What Canada said internationally was expected to be implemented domestically. Well-organized voices in civil society reminded government of that fact regularly. A results and rules based United Nations also meant that Canada could be subject to decisions taken outside its borders, in the long-term interests of the global commons, but not necessarily in the short-term economic interests of Canada. Other orders of government and industry challenged the federal government and demanded to be heard before such decisions became binding.

A national biodiversity strategy had been in place for several years. Although the affinity for wildlife and protected spaces remained constant, public awareness had been greatly expanded with a focus on security issues. Debates about new research on endocrine disrupters and the pervasive impact of certain chemicals on human health and the environment, the growing evidence of the impact of climate change on the agricultural sector and on northern infrastructure, and the remarkable yet unnerving advances in biotechnology, caused public interest to be high. Years of educational initiatives and access to powerful communications technology resulted in an informed citizenry that could influence governments.

Civil society and non-governmental organizations demanded accountability of their governments. They saw themselves as watchdogs on ethical issues and the health of both humans and the environment. Conservation of biodiversity was intrinsic to the values of these groups. It was understood and respected. Indigenous people, whose knowledge was in demand internationally, assumed a significant place. Furthermore civil society and non-governmental organizations now had access to the international community - directly or through international coalitions. All took a guarded view of governments' willingness to take precautionary environmental decisions and their ability to comply with international rules. Specifically, although biotechnology was highly regulated, the sheer pace of developments led them to be concerned about the continuing effectiveness of the regime, both internationally and nationally.

The Canadian business community was supportive of an international regime that was predictable and allowed them to compete on a level playing-field. International standard setting through the International Standards Organization was effective, facilitative and supportive trade measures were in place and trade sanctions, although rarely invoked, were in place. For economic reasons, mutual interdependence made sense. The sector was diligent in attempting to influence government before it entered international negotiations, but taking nothing for granted they worked through their transnational parents and international coalitions of like-minded groups to gain more direct influence at international negotiating tables.

In Canada, industry preached the gospel of ecoefficiency, economic growth and social progress and strongly supported multistakeholder decision-making. Mirroring the international picture, many examples of partnerships with civil society and non-governmental organizations to conserve species and spaces could be found. Industry's credibility grew, although the more extreme advocates of environmental protection at all costs remained unconvinced of the sector's sincerity. Exploiting biotechnology developments and shaping the rules of trade and regulation remained a top priority to the agricultural and biotechnology communities.

The record of provincial governments in conserving biodiversity was mixed. In some, a protection of spaces and species had become part of the culture. In others economic development and use of natural resources was preeminent. Influenced by their new international networks, megacities and even smaller urban centers began to take environmentally-responsible land-use planning decisions. However when it came to dealings with the federal government, the provinces spoke with one voice. Resource management was by the constitution their responsibility. They demanded a seat at the table during the development of any Canadian position and a guarantee that decisions would not be taken in areas of their responsibility without their concurrence. As the voice of Canada became more significant in international affairs and as consideration of environmental issues became more integrated the provinces worried that their role would be eroded.

In Canada, environmental laws and institutions had been strongly developed. Command and control policy via direct regulation had been the most prominent policy instrument in the eighties, but its effectiveness declined with lack of manpower and financial resources, lack of institutional coordination and policy integration. The increasing complexity of environmental regulation, high control costs and demands from

the private sector for more flexibility, self-regulation and cost-effectiveness

brought about change. In the nineties, there was a shift towards deregulation, increased use of economic instruments and subsidy reform, reliance on voluntary action by private sector and more public and non-governmental organization participation. Tax reform led to a reduction in income taxes being offset with higher taxes on environmentally destructive activities.

But with shared responsibility the norm at the global level, tension was escalating within Canada. A messy regime of many players was not only confusing, but also a recipe for paralysis and potentially an inability for Canada to meet her international commitments. Canada had multiple layers of self-governance and multiple processes to be coordinated. At the same time, internationally it was recognized as a champion for participatory, transparent and accountable decision-making processes. A reformed process was essential.

About 10 years ago, the federal government took the lead to propose a system of genuine co-management. In order to maintain the strength of its position internationally the country would speak as one internationally. All orders of government and stakeholders would be represented in preparations and attendance at international fora. It was agreed that while there might be intense discussion and disagreement leading up to a position, once taken, it would be

promoted by all. In return, all jurisdictions agreed to the creation of a coherent national biodiversity service, modeled on existing customs and revenue experiences. This service took its authority from all existing legislation in the country, but was managed as a single entity. It was neither federal nor provincial. It was a collaborative partnership built upon shared objectives but flexible implementation. Effective coordination, dispute settlement, benefit sharing, compliance and accountability processes were developed and negotiated. Through innovative advisory arrangements the service took advantage of the strengths of all governments, a credible scientific cadre, academic institutions, civil society and industry. Governments did not relinquish their formal constitutional responsibilities, but their authority was delegated to a national institution and informed by broad consultation and made public. Stakeholders did not lose their identities, but were able to share a common vision as Canadians.

All is not perfect, but during the last 10 years trust and confidence has improved. As in any relationship, care and nurturing is a constant requirement. Self-discipline on the part of individual governments remains a big challenge. Technology is moving quickly, norms of governance much less so. All parties have become convinced that they are better equipped now to handle threats from other nations over scarcity of water resources, to adapt to climate change and to respond to unpredictable and unwanted side effects of rapid changes in biotechnology. A national biodiversity strategy and effective mechanisms for implementation are a matter of self-interest.

4.3 Cyberwave

Governments are largely irrelevant in the world of cyberwave - and Canada is no exception. Technology is king and the ruthless market supreme. Any voice that Canada had in the international arena is either drowned out by wealthy entrepreneurial molecular biologists, technologists and financiers, or has no forum in which to be heard. Even with primacy of the trading system, there is no international harmonization of intellectual property laws and patenting has become less relevant in an environment where the cycle of innovation is measured in months. Global institutions have become cumbersome and ineffective. In this environment biodiversity is far from being a priority on anyone's agenda.

The country looks inward. But even as Canada struggles to support its biotechnology industry, the pace of development means that even with the best of intentions, it is running to catch up. Policies are outdated before they are fully developed or implemented. We take our lead from the United States and their powerful biotechnology industry. Quietly and behind the scenes we continue to promote a reformed rules-based international regime under the authority of the United Nations. That has been our history and we have not totally given up.

The Canadian public has benefited from technological advances - many leading longer and healthier lives. The dominant concern of an aging population is health .Economic opportunities abound for certain groups in society , namely the technology elites. But even as there is a demand for the products of biotechnology, there is underlying anxiety verging on hysteria at times. The complexity and speed of developments in genetic engineering magnify the public's fear of the unknown. The world is moving too fast. There is no time for reflection about appropriate and safe applications of technology. There is a vast amount of information, but it lacks meaningful interpretation. The spectre of "superbugs", growing body parts and experimenting on people, easy to disperse bioweapons and a world system out of control looms large. In this innovate-or-perish world, consumers consume at their own risk. Moral and ethical questions are dismissed. Distrust of multinationals has only deepened and a demoralized public has grown disaffected with any order of government. They are treated as consumers, not citizens.

Scientific advances are significant, but are only exploited when there is deemed to be an

apparent economic benefit. Loyal environmentalists bemoan the inattention to biological conservation, citing evidence of continued destruction of habitat and resulting species extinction. It does not appear that any risk analysis, risk management or quality control is being undertaken. Short of a localized disaster event which could emerge, such as the demise of indigenous West Coast salmon due to invasive, genetically-modified species, the interests of the general public are not visible on the government's agenda. While non-governmental organizations attempt to put pressure on governments, the only limited success seems to be at the local level. Recognizing this, non-governmental organizations are gradually shifting their focus from government to business. With members of civil society and through creative use of powerful information technologies, they organize policing and labelling networks for products of greatest concern. Their pleas to harness technology in the interest of the environment rather than harvesting natural resources have had little impact.

The business sector is thriving. New companies are created, merged and de-merged daily with each discovery and innovation. Companies collecting and synthesizing environmental information or promoting small-scale environmental technologies could just as easily be winners or losers in this fast-paced and highly competitive environment. Small companies raid quickly and insider trading is rampant. While some worry about over-heating of the market, the race is on. Those with superb negotiating skills make bilateral deals for gene resources in biodiversity-rich countries of the South. Some are even extending the search for nature's germplasm to the northern hemisphere, and Canada, with its largely untouched land mass, is bound to surface on the list. Government is seen as a drag on innovation and any certification or standard setting schemes are set voluntarily by industry. Industry deals directly with customers, bypassing governments. While there are many technologies that could make for a better world, displacing toxic chemicals and building nutrients into agricultural crops, only those deemed to increase profit margins survive in the absence of significant incentives and direction from government. Monocultures, ultimately destructive of biodiversity, are prevalent. For business, biotechnology is a priority.

Not so for either level of government. Initially, governments tried to cope individually with the impact of these new technologies. However, the sheer pace and complexity of developments outstripped the collective capacity and agility of governments to respond. As public policy failures mounted and citizen frustration grew, each order of government sought to shift blame to the other. Dysfunctional federal - provincial relations were seen as an additional irritant requiring considerable attention if they were to be resolved and not worth the effort for biodiversity. Such energy was redirected elsewhere. High priority was given to searching for mutually advantageous technological fixes for climate change because of its inextricable link to energy and the economy. Biodiversity conservation did not capture the same resolve.

A national biodiversity strategy has been forgotten. Even the federal-provincial tensions surrounding attempts at collaborative environmental decision-making have dissipated. There is no dialogue with each other or with stakeholders. There is no federal-provincial activity. Governments feel impotent in the face of the aggressive speed of technology and the confusing plethora of seemingly unconnected individual actors and actions. Decisions are made by default. Coordination seems impossible, and consequently not sought. There is no energy or will to create effective institutions or reformed arrangements. To the extent that any standards or policies exist, they are the result of voluntary action by industry. Governance is dysfunctional.

Biodiversity is not a priority. In the absence of leadership, any biological conservation is limited, incidental and accidental. This is a short-lived scenario, driven by greed. How much longer before it self-destructs?

4.4 Regional Dominators

The notion of a global commons is a far-distant memory. No nation is thinking or acting in the global interest or is driven by any sense of interdependence. Even potential crises generated by bioterrorism or the threats of resource scarcity and war do not generate concerted international action. The United Nations and other related institutions are dying slow deaths. Canada's traditional world view has been shattered. Now its future lies in its relationship with the United States.

Within the bloc, biodiversity has no intrinsic value. Only if there is an economic opportunity or strategic value attached to the resource is it conserved or managed sustainably. Thus, genes are considered valuable and those species necessary to support the biotechnology industry are protected. All others and their habitats are ignored or endangered in the rush to use minerals, oil and gas, water, timber and other resources as commodities to enhance the bloc's wealth and power.

Isolated from the rest of the world, Canada pursues two strategies for survival. The first is to prove its value as a strategic resource for the United States in the region's quest for power and in that way guarantee relevance and influence. Canada's wealth of natural resources, its nuclear capacity and biotechnology industry are potential assets for the bloc. At the very least, membership in the bloc means strict adherence to bloc policies and priorities. The second strategy evolves concurrently and quietly: strengthening the country's ability to protect itself against unwanted intrusion in its affairs by its neighbour to the south.

Within Canada, the federal government has become the dominant actor. Compliance with regulations under NAFTA and other policies of the bloc must be ensured. The federal government is accountable to other members of the bloc and consequently an effective enforcement regime had to be designed. Strategically, commitment of Canada's assets, be they the science and technology community or natural resources, has to be managed with care to maximize benefits and influence. The national biodiversity strategy, no longer driven by international commitments, is redesigned to meet these two objectives.

Furthermore, fragmentation of any kind within the federation could endanger the very integrity of the country. As a potential site for bioprospecting, there will be demand for Canada's resources. For example, large scale transfer of Canada's water will undoubtedly be requested. A liberalized trade regime within the bloc is in place and transfers could be difficult to resist. Bilateral, silent deals with provinces or even smaller jurisdictions or companies is possible. The actions of any one province, under duress and in the short-term economic interest, would have considerable impact on others in the federation. Notwithstanding provincial constitutional jurisdiction for natural resource management, Canada uses the power of "peace, order and good government" to assume leadership.

Although certain individual resource-rich provinces step boldly into the regional marketplace, they soon discover that they are at a disadvantage in attempting to negotiate with other strong national governments. Economic activity has shifted to being organized at the regional level and the rules of the game are designed by and assume the involvement of legitimate governments. For some provinces, particularly in their agricultural sector, continued fiscal subsidization of activity is desirable, if not essential. For others the safety net in support of Canadian interest provided by the federal government becomes more important as regional disputes arise and provincial legislation is insufficient to respond to the ultimate threat of external take-over of resources or businesses.

As a matter of principle, the provinces initially opposed the activism and interference of the federal government. Over time it becomes clear that in the regional bloc context not all provinces have equal stature. Those who have valued resources benefit, while others lose and

require federal support. The latter have begun to promote forging a common front, for their own protection, but also to enhance Canada's bargaining power. There is considerable intergovernmental tension, but the federal government is determined in its leadership. Agreement is near on a coordinated strategy that supports research and technology development. Lip-service is paid to consultative mechanisms. All-encompassing federal legislation becomes binding on the provinces and sanctions are strictly enforced. - to protect the health and future of the nation state. Constitutionally, the "peace, order and good government" power is pressed into service.

The reaction of Canadian citizens is mixed. For many, there is an instinctive reaction against being considered, de facto, an appendage of the United States. In particular, land and water are such an inherent part of the Canadian psyche that sale or loss of these resources is unthinkable. These citizens support a strong federal protectionist role. For other, more independently minded entrepreneurs, there is great advantage to working with a powerful ally and to using our natural resources to gain competitive advantage.

With the support of civil society, environmentalists are slowly reemerging. The patchwork quilt of multiple strategic moves on the natural resources of the country is in danger of destroying irreparably the ecosystem upon which life in the long term depends. Non-governmental organizations are gearing up for war on the environmental battlefield. As a first step they link arms with like-minded citizens in various small scale, manageable local conservation projects.

Natural resource extraction industries and the biotechnology sector are doing well. There is however always a risk that for strategic reasons, the bloc might simply appropriate certain resources, or enlist the support of the Canadian business community, in the interest of the greater good. The market, not government, is the determining force. Any actions that would increase the bottom line costs, such as labeling, are opposed vigorously. However the days of voluntary action and self-policing may be coming to an end as the bloc demands Canada's compliance with bloc standards. Marketers are in demand, as are scientists and technologists who can bring their innovations to commercialization.

The result is that unless and until the governments shift to a longer view of the needs of their citizens, present and future generations, the environment loses. Powerful market and external government forces will smother the well-intentioned actions of non-governmental organizations and civil society. Without the concerted intervention of the federal and provincial governments, an effective response cannot be mounted. And even if it were successful within the country, environment is indivisible. Global action is ultimately required.

4.5 Lessons for the future

All four scenarios have consequences for Canadians, posing both opportunities and threats. They do not paint a rosy picture for the priority accorded to conservation of biodiversity in Canada. Even in the most optimistic scenarios, biodiversity is conserved for economic rather than intrinsic value. Species may be protected while habitats are not, and even then implementation of any national strategy will be subject to unevenness.

Environmental matters continue to test domestic intergovernmental relations and the fragile balance of power among orders of government. In each of the scenarios described, change would appear desirable, if not inevitable. The Global Club scenario requires a strong, coherent position to be taken in a timely and responsive manner, if Canada is to influence the Club or to protect itself from the Club. The Shared Governance scenario suggests that the need for change was recognized before 2015 and a form of co-management was designed in order that Canada could meet its international commitments and live up to its international reputation. The change required by either scenario could flow logically from the existing federal-provincial arrangements, with a healthy

dose of leadership and moral suasion. In fact, some might argue, that in matters of biodiversity, more so than in other environmental issues, a reasonable degree of collaboration already exists. On technical matters, quiet diplomacy is often at work.

The two remaining scenarios seem to demand more extreme measures. In the Regional Dominators scenario, the federal government assumes by fiat a dominant role, either because of the need to adhere to the dictates of the Bloc, or to protect itself from resource raiders. National imperatives demand strength and speed of response, not insecurity arising from unpredictable provincial actions or time-consuming consultations leading to ambiguous conclusions. In the Cyberwave world of government impotence and ad-hocery there are no collaborative attempts. There is no energy or will to create effective institutions or reformed arrangements because there is no sense of likely success.

Designing a governance regime to accommodate the characteristics of the biodiversity issue is a challenge. The issue is complex, covering genes to ecosystems. The concepts of sustainable use and benefit sharing take us into political, social, legal, cultural and ethical domains as well as those of environment, science and technology.

It requires non-traditional interdisciplinary and systemic analysis. Some of those concepts may even be conflicting. How do we reconcile protection of a global resource with national sovereignty? Does the existing framework of international property rights law allow for equitable sharing of benefits? The scope of the issue is extensive. Deciding what to tackle first and how to set priorities is difficult. There remain uncertainties in the science: how many species are we talking about, how do we undertake assessments of unknown species, how do we assign a value to species and their habitats. Differing expectations and interpretations can lead to political polarization. The legal framework that guides us is ambiguous with vague commitments and no targets and timetables.

Canada's regime for protection of biological diversity is an example of concurrent governance with provinces and the federal government having overlapping roles and responsibilities. Ecosystems are not influenced by political boundaries, nor can they or their inhabitants be protected by discrete sectors of society or academic disciplines. While political cultures may value autonomy, biodiversity conservation is quintessential interdependence. Competition and inconsistent behaviour by potential partners in various orders of government and in civil society will be detrimental to meeting the objectives of the biodiversity and ultimately to the health and safety of Canadians and life on Earth.

The current domestic collaborative arrangements, while laudable in defining principles, are less successful in creating a regime which elaborates clear results to be expected, articulates clear roles and accountability for those results and a compliance and enforcement mechanism and dispute resolution procedure to ensure that results are achieved. The complexity of the issue requires a more holistic and transparent response involving a diverse collection of actors and institutions if better and more equitable outcomes are to be achieved. Failure to include all provinces and territories could also jeopardize success. Encouragement of other actors at the federal-provincial table, supported by unassailable scientific advice, could be significant elements of change. Harmonization of differing approaches and needs is costly in terms of time and control, yet there should be models which can balance national standards with provincial diversity in means of implementation. In the interest of local constituents in trade, investment and tourism for example, provinces are already engaged in the international arena. Each order of government hesitates to assume responsibility for financial reasons and hesitates to give up responsibility for fear of losing the political support of its constituents.

The principle of subsidiarity is particularly meaningful in addressing biodiversity loss. Actions at the local level are significant, if not essential. Global integration and influence are also being felt at the local level prompting representatives of municipal governments, especially large and entrepreneurial cities, to be engaged in environmental issues. Some compete in the size of their economic activity with sovereign nations. With the digital revolution, liberalized trade and accelerated economic expansion city to city connections can bypass traditional higher orders of government.

Aboriginal peoples whether Indian nation governments on reserves or the Inuit government of Nunavit are demanding greater participation in decision-making. Specific reference to indigenous knowledge in the biodiversity Convention and the fact that they manage a land base strengthen their claim for such involvement. Nurturing of aboriginal diversity and culture is closely allied to conservation of biological diversity.

In each scenario civil society is present. Shared Governance is the most accommodating and in some cases non-governmental organizations actually enter into partnerships with governments to develop and implement policy. International networks allow them knowledge and influence beyond national borders. Those who do not wish to be co-opted by their governments organize their own fora. In other scenarios citizens feel increasingly vulnerable. Cyberwave treats citizens simply as consumers and there is no government dialogue in which to engage. Decisions made and events transpiring outside of Canada in the Regional Dominators scenario are of such concern that civil society supports a dominant role for the federal government. In the Global Club scenario citizens are disillusioned even cynical. They no longer accept authority without question and turn their attention to local initiatives where they can make a difference. In all, they are apprehensive about the pace and direction of change, particularly with respect to technology developments. There is no time for reflection.

The well-developed civil society in Canada is seen by enlightened governments as an asset in providing legitimacy, developing a constituency of support for policies and programs, and often delivering programs. They are frequently consulted and participate

actively in Canadian delegations to international fora. But like provincial governments and aboriginal peoples, they are no longer content just to be consulted. They demand a process that is more open, transparent and accountable.

The business sector is a player in each scenario: thriving in Cyberwave; successful in biotechnology, agriculture and natural resource extraction particularly in Regional Dominators and Global Club; involved as a partner in Shared Governance. In each case they value stability of governance and predictability in policies, domestically and internationally, to protect their continued growth, return on investment and market penetration. They expect governments to avoid overlap and duplication to minimize costs and to be clear in assigning responsibilities. As with other sectors of society they demand recognition, cooperation, responsiveness and transparency of their governments.

Any weaknesses in the existing accords and their implementing institutions will only be exacerbated with increasing global economic, political and institutional integration. Multi-level governance, permeable borders and attempts to incorporate the interests of civil society, in its broadest definition, will challenge coherence in domestic policymaking at a time when federal cohesion needs to be demonstrated internationally. The federal government must be the national government, for all regions.

While constitutional reform may not be necessary, a more transparent, robust and accountable regime is required, and sought by all sectors of society. The co-management proposal in the Shared Governance scenario is one possibility based on a partnership among equal governments and with civil society, focused on

substantive issues rather than being dominated by political and bureaucratic needs and infused with mutual respect. It is intended to be driven to solve problems rather than preserve the status quo. With responsive and sensitive leadership, the federal government could facilitate the formation of a coalition of autonomous, but related, actors and activities from all sectors to provide the overarching framework , long-term view and political commitment while actual implementation is left to the most effective partner.

Renewed attempts at manufacturing consent and broadening the decision-making process can start immediately. One multilateral environmental agreement (the Biodiversity Convention) could be chosen as a pilot study on how to implement international agreements in Canada. Without revisiting how we got to this stage, the Canadian Council of Ministers of the Environment could be charged with the responsibility of guiding a time-limited process, not of consultation, but of actual decision-making and accountability.

5.0 THE WAY FORWARD

The value of scenarios is that in their blunt speculations, they make visible precautionary measures - or at least food for thought. The following three broad observations might be drawn from the stories just told: conservation of biological diversity is not a priority (unfortunately); the context for federalism is changing; and, Canada can yet adapt.

5.1 Conservation of biological diversity is not a priority

The loss of biological diversity is much more than a problem of protecting individual species or saving representative samples of habitat. It is also a problem of intellectual property rights and of giving people, not just industries and their governments, the right to benefit. It is complex and complicated. In a perverse way our economic systems encourage the destruction of natural ecosystems while GDP rises. Half the world's wetlands have been lost in the last century; more than 60 percent of marine fisheries are at the limit of exploitation; 87 percent of grasslands are suffering from soil degradation and plant and animal species become extinct daily. Concurrently, biotechnological developments are racing ahead of the ability of governments and legal regimes to monitor and regulate in the public interest.

Yet, there is little understanding of the real significance of fragmentation of the web of life. The public continues to worry about air and water pollution, not about extinction of species. They appreciate the charismatic and endangered pandas and polar bears but only a few concern themselves with unnamed plants and insects. Most enjoy protected parks and wilderness areas but are oblivious to the impact of encroaching tourist conveniences. They are unnerved by the dizzying speed and mystery of biotechnology, yet want to benefit from higher-yielding crop varieties and pharmaceutical advances. Only when mobilized by threats to health or the economy does biological diversity appear on the radar screen of peoples and their governments. Controversy is intensifying about the "right to know" and science is often suspect or disregarded. With the exception of biotechnology issues, there is no evidence that in Canada conservation of biological diversity will be a significant priority in the next 15 years.

This paper reviewed the status of the issue in 2000 and again in 2015, under four different and possible scenarios. In the early days of the new millennium there is plenty of evidence that notwithstanding an international regime to address biodiversity, promoting conservation, sustainable use and equitable sharing of benefits, we continue on a trajectory of destruction. The Shared Governance scenario is the most positive in attempting to meet all three objectives of the Biodiversity Convention, but there are concerns that the pace of activity may be too slow to reverse the trend. In both the Global Club and the Regional Dominators scenarios the objectives are partially met. Conservation and sustainable use of certain species and ecosystems happen when they are valued in terms of economic well-being

or strategic power. Although there are projects at the local level, erosion continues in many parts of the world , but in the Regional Dominators scenario the extent of loss cannot be measured. In the world of Cyberwave, conservation of species is incidental to technological innovation and the downward slide to extinction continues.

A crisis or significant scientific discovery could get the issue on the agenda. Failing that, under any scenario, at both international and national levels, increased public awareness and leadership are going to be required, and quickly, if the trends in biodiversity loss are to be reversed and if we are to achieve the objectives of the Biodiversity Convention.

5.2 The context for federalism is changing

In a connected world of many inhabitants, with rapid technological change, the role of governments is certain to be altered profoundly. The scenarios expose a range of possibilities in response to integration and interdependence including new forms of global governance, a network or collectivity of individual actions empowered by new information technology, or the decline in relevance of environmental international institutions and arrangements in the face of powerful protectionist or liberalized trade regimes.

The scenarios imagine distinct worlds in 2015, yet what is likely to emerge is a future with elements of all 4 scenarios. The current world order of centralized rule-making and authority and a hierarchy of institutions is already being challenged by multinational enterprises flourishing in a regime of liberalized trade and networked non-state actors. Citizens have multiple allegiances and new channels for demanding government and industry accountability. Governments are not likely to lose sovereignty to international institutions, but influencing the agenda of those institutions will be a full-time preoccupation. And although international environmental enforcement and compliance regimes are virtually non-existent, moral suasion is a powerful tool especially if it is being exercised within and outside one's borders. Responsiveness to public anxiety and concern about possible loss of control in a technological revolution in cell biology may well force a nation to meet international obligations.

Canada sees its future intimately linked to that of the world community. Instinctively, it seeks to contribute to the creation of a more just and better world. And in two of the scenarios (Shared Governance and Global Club), there is potential to influence and shape the scenario as it emerges due to Canada's experience in participatory democracy and its scientific resources. On another level, the health of Canada's agricultural and biotech industries is dependent upon smooth functioning of rules-oriented global markets. Canada has a stake in the debate as to whether genetically modified organisms will be subject to a science-based World Trade Organization regime or decisions based on the precautionary principle.

What we can be sure of is that we will be vulnerable to surprises, whether of the environmental, economic, social or political kind. At both international and national levels, institutions and processes will need to be resilient. Seeking a path by which economic health, social stability and environmental security are mutually supportive should be a priority. In the interval between 2000 and 2015, the promise of bioengineering and genetic manipulation will be a genuine test

5.3 Canada can adapt

It is a given that conservation of biological diversity is essential for the long term welfare of Canadian and global societies. It is also evident that actions beyond Canada's borders will have an impact on the degree to which Canada is successful in achieving its goal. The four scenarios lead to a common conclusion: change in Canada's internal governance arrangements is either desirable or inevitable. While the Shared Governance scenario could require only an extension in effectiveness of what already exists, other scenarios which call for a strong, coherent national position, either to influence or defend (Global Club and Regional Dominators), would require significant modification in process,

policy and institution. The Cyberwave scenario describes dysfunctional governance and assumes no collaborative intergovernmental arrangements. That too would be a significant departure from today's regime.

Someone has said that Canada is always in the state of becoming. These four stories reach a similar conclusion. Canada as we know it is brought into question and the federation is tested. There is potential for deep division between the resource-rich and those with financial and technological wealth - be they provinces and territories, megacities or aboriginal peoples. Within our own borders differing beliefs and scientific evidence about the potential benefits or harm of genetic modification technologies need to be articulated, debated and resolved. Concerns about health, safety, economics and ethics must be evaluated in association. With our concurrent governance arrangements it is not clear who speaks authoritatively for Canada, who is accountable the long-term interest of Canadians and where is the forum for informed debate among all sectors of society.

The good news is that these questions can be answered. There are workable models that will allow Canada to adapt to the global context, provide a stable regime that meets the expectations of it's citizens and conserve it's rich biological heritage. Constitutional change is not needed. What is needed is a reconciliation of competing visions of Canada and an agreement to share power in the best interests of Canada as a whole. There is a legitimate role for everyone. What is needed is persistence and will.

SOURCES

A number of web-sites provided invaluable sources of Canadian analysis and data: Environment Canada (http://www.ec.gc.ca); Canada's Biodiversity Convention Office (http://www.cbin.ec.gc.ca); and the Canadian Biodiversity Information Network (http://199.212.18.79/Biodiversity/).

Information about the Convention on Biological Diversity can be found at the Secretariat's web site (http://www.biodiv.org/chm.html) and from the Earth Negotiations Bulletin, the reporting service for all environment and development negotiations (http://www.iisd.ca/linkages). Of specific note at the International Institute for Sustainable Development (IISD) site is a briefing paper by Cosbey and Burgie entitled *The Cartegena Protocol on Biosafety: An Analysis of Results*

The proceedings of a September 1999 conference on biotechnology and globalization organized by the Center for International Development (CID) at Harvard University (http://www.cid.harvard.edu/cidbiotech) articulate some of the latest academic thinking on this topic.

The Forum of Federations' International Conference on Federalism (http://www.ciff.on.ca) provided current and diverse views of the challenges facing federalism. A paper prepared concurrently for this project on The Future of Global and Regional Integration by Douglas Brown, *A Baseline Study of International Relations and the Federal System in Canada,* was particularly helpful, as was the January - February 2000 (Vol 21 No 1) issue of *Policy Options,* published by the Institute for Research on Public Policy, which summarized an IRPP Roundtable on Canadian Federalism.

The opening quotation from David Suzuki was taken from page 54 of *EarthTime Essays* (Toronto: Stoddart Publishing Co. Ltd., 1988).

Two books provided inspiration. I acknowledge the influential ideas and words of their authors, which appear throughout this text: Linden, Eugene. 1998. *The Future in Plain Sight: Nine Clues to the Coming Instability* (New York: Simon & Schuster); Rifkin, Jeremy. 1998. *The Biotech Century: Harnessing the Gene and Remaking the World* (New York: Tarcher/Putnam).

Finally, I am grateful for the wisdom and insight offered through many conversations with Dr. Calestous Juma, formerly Executive Secretary of the Convention on Biological Diversity and currently Special Advisor, Center for International Development at Harvard University (CID).