

Canadian Biodiversity Strategy
Canada's Response to the Convention on Biological Diversity
1995

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Canadian Biodiversity Strategy

Executive Summary

Biodiversity supports human societies ecologically, economically, culturally and spiritually. Despite its importance, however, ecosystems are being degraded and species and genetic diversity reduced at an alarming rate due to the impact of our growing human population and increasing resource consumption rates. The global decline of biodiversity is now recognized as one of the most serious environmental issues facing humanity.

Recognition of the world-wide impact of the decline of biodiversity inspired the global community to negotiate the United Nations Convention on Biological Diversity. The Canadian delegation was an active participant in these negotiations. The Prime Minister signed the Convention at the Earth Summit in June 1992 and, in December 1992, Canada became the first industrialized country to ratify it.

The three objectives of the Biodiversity Convention are:

- the conservation of biodiversity;
- the sustainable use of biological resources; and
- the fair and equitable sharing of benefits resulting from the use of genetic resources.

These objectives illustrate the nature and breadth of the Convention. As a global instrument, it sets the stage for each nation to assess the adequacy of current efforts to conserve biodiversity and sustainably use biological resources and to determine how gaps will be filled and opportunities realized.

One of the key obligations for parties that have ratified the Convention is to prepare a national strategy. The Canadian Biodiversity Strategy is a response to this obligation and has been developed as a guide to the implementation of the Biodiversity Convention in Canada. All of the strategic directions contained in the Strategy are relevant from a national perspective, but some elements of the Strategy may not be relevant in some jurisdictions. The Canadian Biodiversity Strategy recognizes existing constitutional and legislative responsibilities for

A society that lives and develops as a part of nature, values the diversity of life, takes no more than can be replenished and leaves to future generations a nurturing and dynamic world, rich in its biodiversity.

biodiversity in Canada. It also emphasizes the importance of intergovernmental cooperation to create the policy, management and research conditions necessary to advance ecological management. Federal, provincial and territorial governments, in cooperation with stakeholders and members of the public, will pursue implementation of the directions contained in the Strategy according to their policies, plans, priorities and fiscal capabilities.

Elements of the Strategy

The Strategy presents a vision for Canada of:

A society that lives and develops as a part of nature, values the diversity of life, takes no more than can be replenished and leaves to future generations a nurturing and dynamic world, rich in its biodiversity.

In support of this vision, the Strategy also presents a series of guiding principles that provide a foundation for implementing its strategic directions.

The Strategy provides a framework for action at all levels that will enhance our ability to ensure the productivity, diversity and integrity of our natural systems and, as a result, our ability as a nation to develop sustainably. It promotes the conservation of biodiversity and the sustainable use of our biological resources, and describes how we will contribute to international efforts to implement the Convention.

The Strategy's five goals are:

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

The Strategy recognizes that the conservation of biodiversity and the sustainable use of biological resources are fundamental to Canada's indigenous communities. It describes mechanisms through which these communities will be able to develop their own understanding of, and response to, the Convention.

Proposed mechanisms for implementing the Canadian Biodiversity Strategy include:

- the filing of jurisdictional reports — within one year of the Strategy's approval — on policies, activities and plans aimed at
- implementing the Strategy;
- coordinating the implementation of national and international elements of the Strategy;
- ensuring that there are mechanisms in place to permit and encourage non-government participation in the implementation of the Strategy; and
- reporting on the status of biodiversity.

Successful implementation of the Strategy will be determined, in large measure, by the degree to which all parts of society adopt its vision and principles and contribute to achieving its goals. Ultimately, the conservation of biodiversity and the sustainable use of biological resources will require the support and participation of individual citizens, local and indigenous communities, urban and regional governments, conservation groups, business and industry, and educational and research institutions.

Introduction

What is Biological Diversity?

Although the term 'biodiversity' is relatively new to policy-makers, scientists have been warning of a global crisis for some time and have ranked the decline of biodiversity as one of the most serious global environmental threats now facing humanity. As a result of human activities, ecosystem, species and genetic diversity are being eroded at a rate that far exceeds natural processes. This accelerating decline in diversity threatens the ecological, economic, spiritual, recreational and cultural benefits that we currently derive from the Earth's living resources.

What is Biological Diversity?

- Often referred to as “biodiversity”, biological diversity refers to the variety of species and ecosystems on Earth and the ecological processes of which they are a part.
- Three components of biodiversity are ecosystem, species and genetic diversity.
- Ecosystems perform functions that are essential to human existence such as oxygen and soil production and water purification.

The Convention on Biological Diversity - A New Understanding

Early in the 1990s, the world community acknowledged the threat posed by degradation of ecosystems and loss of species and genetic diversity by successfully negotiating the United Nations Convention on Biological Diversity. Negotiations were concluded in May 1992 and the Convention was opened for signature by world leaders at the United Nations Conference on the Environment and Development (UNCED) in Rio de Janeiro, Brazil, in June 1992.

The Canadian delegation actively participated in these negotiations, and the Prime Minister signed the Convention at UNCED. On December 4, 1992, with the support of the provinces and territories, Canada became the first industrialized country to ratify the Convention, which entered into force on December 29, 1993.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Our Common Future, 1987

The Convention builds on and echoes the philosophy of such predecessors as Caring for the Earth, A Strategy for Sustainable Living, published in 1991, Our Common Future (the Brundtland Report), published in 1987, and the World Conservation Strategy, published in 1980. All are based on the principle that development must be both ecologically and economically sustainable. That is, our efforts to meet human needs must be carried out within the finite resources of the planet.

The objectives of the Convention are:

- the conservation of biodiversity;

- the sustainable use of biological resources; and
- the fair and equitable sharing of benefits arising from the use of genetic resources.

The Biodiversity Convention is about global sustainable development, which requires the conservation of biodiversity and the sustainable use of biological resources. It conveys an understanding of the relationship between human activity and the natural world and the need to sustain living organisms, genetic diversity and the integrity of ecosystems. It will influence, perhaps profoundly, the future of life on Earth.

Conservation: the maintenance or sustainable use of the Earth's resources in order to maintain ecosystem, species and genetic diversity and the evolutionary and other processes that shape them.

Implementation of the Convention will require a significant shift in the way we use and manage living things. A cooperative, cross-sectoral approach, based on partnerships, must be adopted within and among the nations of the world.

Canada's Response to the Biodiversity Convention

The Biodiversity Convention provides opportunities for Canada to re-examine its relationship with nature, create new global partnerships, harmonize its national activities and develop new economic opportunities. As a party to the Convention, we are bound by its terms, including the obligation to develop a national biodiversity strategy.

In response to this obligation, a Federal-Provincial-Territorial Biodiversity Working Group was established with a mandate from parks, environment, wildlife and forestry ministers to develop a Canadian Biodiversity Strategy within two years. A national Biodiversity Advisory Group, made up of representatives from industry, the scientific community, conservation groups, academia and indigenous organizations, was established to provide advice to the Working Group. Ten expert focus groups were convened to provide additional advice on specific Convention articles.

The development of the Strategy began with an assessment of how well Canada was meeting the objectives of the Convention. Over the last decade, federal, provincial and territorial governments have developed and implemented a wide range of laws, policies and programs that support these objectives. The assessment concluded that

Federal, provincial and territorial governments, in cooperation with members of the public and stakeholders, will pursue the strategic directions set out in the Strategy according to their policies, plans, priorities and fiscal capabilities.

Canada has a strong foundation for responding to commitments under the Convention and a good basis for developing and implementing a national biodiversity strategy. It also revealed that, while it is necessary to do new things, it is sometimes more efficient to enhance or modify current efforts. Such changes require a greater harmonization of efforts among governments and non-government agencies, as well as more integrated resource management approaches that integrate biodiversity conservation and sustainable use of biological resources with economic, social and cultural objectives.

The Canadian Biodiversity Strategy has been developed as a guide to implementing the Biodiversity Convention in Canada and addressing the difficult issues posed by the loss of biodiversity. It recognizes existing constitutional and legislative responsibilities in Canada, while promoting intergovernmental cooperation to advance ecological management. Although all of the directions contained in the Strategy are important from a national perspective, the relevance of certain elements varies across jurisdictions. Also, many initiatives currently underway support the obligations of the Convention.

Canada's Response to the Convention on Biological Diversity:

- June 1992 - Canada signs the Convention at the Earth Summit
- December 1992 - Canada ratifies the Convention
- December 1993 - Convention enters into force
- June 1994 - Draft Canadian Biodiversity Strategy released for consultation
- November 1994 - First Conference of the Parties
- 1995 - Public Release of the Canadian Biodiversity Strategy Implementation Phase

Federal, provincial and territorial governments, in cooperation with members of the public and stakeholders, will pursue the strategic directions set out in the Strategy according to their policies, plans, priorities and fiscal capabilities.

Implementation mechanisms will vary among jurisdictions. In many instances, the directions outlined in the Strategy will be implemented through existing policies, strategies and plans. In other cases, new mechanisms may need to be established.

Coordination will be required to promote the effective implementation of national and international elements of the Strategy. The extent, manner and timing of implementation will depend upon an evolving understanding of how ecosystems function and the effects of human activity on these ecosystems.

The Strategy may also serve as a guide for local and indigenous communities, urban and regional governments, business and industry, conservation groups, educational and scientific institutions and interested individuals.

The conservation of biodiversity and sustainable use of biological resources must be pursued in tandem with social and economic goals. In order to safeguard our natural legacy, decisions must consider the needs of both current and future generations.

Biodiversity: Our Living Legacy

A. The Biological Foundation for Sustainable Development

Conserving biodiversity and using our biological resources in a sustainable manner are essential parts of Canada's effort to achieve sustainable development. The Earth's ecosystems, species and genetic resources both individually and collectively support human society - ecologically, spiritually and culturally. Together with the development of mineral, petroleum and other non-renewable resources, they provide the basis for our economy. The diversity of life on our planet supports vital ecological processes and provides us with a wider range of resources for human use.

Life-sustaining Services

Ecosystems are composed of a variety of animals, plants and other organisms each of which performs a specialized role within the ecosystem. Ecosystems provide ecological services such as the conversion of solar energy into carbohydrates and protein, oxygen production, water purification and climate moderation. They produce the soil in which we grow our crops and remove greenhouse gases from our air. Although human health depends on these ecological services, their value has never been fully appreciated by society.

Biodiversity in our Lives...

When we go to the pharmacy to have a prescription filled, few of us think about the connection between our medicine and biodiversity. Yet many of today's medicines have been developed from plants found around the world. For instance, the active ingredient in aspirin was first discovered in the white willow.

Satisfying Human Needs and Desires

The diversity of the Earth's life forms provides us with a wide array of options for satisfying our needs and desires, including our need for gainful employment. Millions of people who work in agriculture, fishing and forestry rely on biological resources to earn their living. Eco-tourism and outdoor recreation activities are an increasingly important part of our economy, as are pharmaceutical and biotechnological research and development. Many indigenous communities, particularly in the north, depend on the sustainable harvesting of biological resources to provide a large portion of their food and income.

Supporting Canadian Communities

All across Canada, communities have developed with their own distinctive cultures and traditions based on their livelihoods - from fishing and hunting to farming. The future of these communities and their local economies is tied directly to the sustainable use of biological resources.

Spiritual Importance and National Identity

For many Canadians, the diversity of spaces and species in this country is a source of emotional, artistic and spiritual inspiration and cultural identity. Indigenous people have developed, over thousands of years, an intimate cultural relationship with nature. The natural beauty of the rugged coast of Newfoundland, the Gulf of St. Lawrence, the Great Lakes, the Canadian Shield, the grassland regions of the prairies, the west coast forests and the arctic has helped shape the Canadian spirit. This wild, elemental beauty - captured by painters, writers and musicians - defines our country to us and to the world. Many Canadians believe that each species has its own intrinsic value, regardless of its value to humanity, and that human society must be built on respect for the life around us. They believe that we should conserve biodiversity for its own sake, regardless of its economic or other value to humans.

Insurance for the Future:

Rice, maize and wheat supply nearly 60% of the calories and protein humans derive from plants. There are tens of thousands of other edible plants on the Earth. In the future, we may need some of them to feed the world's growing population. United Nations Food and Agriculture Organization, 1993

Insurance for the Future

Maintaining the Earth's biodiversity and using biological resources sustainably means keeping open our options for responding to unforeseen and changing environmental conditions. Maintaining our potential as a country to be creative, productive and competitive will also provide us with opportunities for discovering and developing new foods, drugs and industrial products. For example, many of our native plant species must endure both cold winters and hot summers. These plants may possess genetic material that could be used to develop agricultural crops that can withstand greater temperature ranges. Failing to conserve biodiversity puts future options, flexibility and economic opportunities at risk and passes enormous costs onto future generations. Conserving biodiversity is an investment in the future and makes good business sense.

B. Biodiversity in Jeopardy

Despite the importance of biodiversity to humanity, we are currently witnessing a global biodiversity crisis. Ecosystem, species and genetic diversity are being reduced, largely by human activity, at an unnaturally high rate. It has been estimated that the current rate of global species extinction is 1,000 to 10,000 times greater than natural. Scientists estimate that upwards of 25 percent of the total number of species on Earth could vanish by the first decades of the next century. Forests, wetlands, lakes, coastlines and other natural areas are being altered by human activities, while genetic variation within species - including domesticated crops and animals - is decreasing. These changes threaten our ecosystems and the ecological services that make life on Earth possible.

Extinction is occurring at rates faster than it has ever occurred before. Scientists believe that we are on the brink of a mass extinction and that humans are the cause.
E.O. Wilson, 1992

Unique Canadian Species...

The rigours of the seasonal changes of Canada's climate have forced Canadian species to be highly adaptive. They have developed insulation and anti-freeze compounds, circulatory heat exchangers and dietary changes, as well as innumerable life cycle modifications such as hibernation and migration.

One important indicator of the decline of biodiversity is the changing status of many species. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) evaluates the status of mammals, birds, fish, amphibians, reptiles,

plants, lepidoptera and freshwater mollusks. Of the small number of species evaluated to date, 255 have been designated extinct, extirpated or under some degree of risk. Each year more are added to the list. The status of species of fungi, bacteria, viruses and invertebrates is not well known. For example, as many as half of the estimated 140,000 non-viral species and the vast majority of the estimated 140,000 viruses have not yet been identified. This lack of knowledge makes the task of conserving biodiversity and sustainably using biological resources more challenging.

In modern times, the reduction of biodiversity in Canada has been due primarily to human activities. The cumulative impacts of industry, farming, forestry, commercial fishing, expanding urban areas, developing transportation corridors, and our high per capita consumption of resources have led to the degradation of ecosystems and habitats and the reduction of species and genetic diversity. Ecosystems and habitats have also been degraded by pollution, the introduction of alien species, and fragmentation resulting from many aspects of human activity.

C. Conserving Biodiversity: A Shared Responsibility

Under the Canadian constitution and specific administrative arrangements, federal, provincial and territorial governments share legal authority for the management of biological resources and terrestrial, marine and freshwater environments. As well, indigenous people on settlement lands, reserves or land they own have certain authority relating to the management of these resources. As a result, agreements involving federal, provincial and territorial governments and aboriginal authorities have led to cooperative management efforts for wildlife, fish and forests. Such efforts need to be continued.

How Many Species Are There?

Scientists believe that there are somewhere between 5 and 25 million species on Earth. Some even think there could be as many as 100 million species! Even the number of species recorded to date is uncertain: estimates range from 1.4 million to 1.8 million species. World Conservation Monitoring Centre, 1992

There currently exists a wide range of policies and programs for the management of biological resources. The Canada Forest Accord, the Wildlife Policy for Canada, the RENEW strategy, the Federal Policy on Wetland Conservation, and provincial and territorial conservation and sustainable development strategies, wildlife and wetland policies, forest management plans and protected area strategies, all reflect the efforts of governments to promote sustainable development, through the

conservation of biodiversity and the sustainable use of biological resources. These efforts provide the Canadian Biodiversity Strategy with a strong foundation. The Strategy will build on this foundation by promoting greater cooperation and coordination among governments.

In recent years, governments have used a variety of processes to provide for public participation in decisions affecting biodiversity. By drawing on the knowledge, experience and interests of members of the public, governments are trying to develop and implement policies and programs that reflect the range of values held by Canadians. They are also attempting to develop a strong base of support and to avoid the harmful consequences of new initiatives.

Partnerships involving governments, non-government conservation organizations and the private sector, as well as individual and community stewardship initiatives, will be essential to achieving the goals of the Canadian Biodiversity Strategy. Businesses and industries, local and indigenous communities, citizens' groups and individuals all take actions that affect biodiversity. As land claims are settled, indigenous people are managing extensive tracts of land and resources in conjunction with other jurisdictions. Conservation organizations are developing and delivering information and education programs to mobilize public action. Businesses, individual farmers and private landowners all manage significant proportions of Canada's land base. The active participation of all Canadians in the effort to conserve biodiversity and sustainably use biological resources is vital.

Who Would Have Thought?

By studying biodiversity scientists have been able to develop many of our medicines. Who would have thought that: the rosy Periwinkle, a Madagascar flower, could help treat childhood leukaemia; bee venom could be used to treat arthritis; research on black bears during hibernation would provide clues to curing human kidney disease; or the Purple Foxglove, a species native to western Europe and Morocco, could help treat heart failure.

Growing awareness of the environmental consequences of everyday activities has already motivated people to try to adopt more sustainable lifestyles. Individuals and communities are adopting ways to reduce their impact on the environment. Industries are establishing codes of practice, changing land-use practices and taking other steps to ensure that their operations are more environmentally friendly. The Canadian Biodiversity Strategy builds on these efforts, but can be a success only if everyone recognizes that "business-as-usual" is not an acceptable option.

D. Biodiversity's Link to the Future

If we fail to recognize the link between biodiversity loss and human well-being, future generations will face significant ecological, economic, social and cultural costs. Degraded forest, agricultural and aquatic ecosystems are less productive and require greater inputs if they are to continue supporting the communities that depend on them. It has recently been estimated, for example, that the cost of managing the crisis caused by the closure of most east coast ground fisheries is several billion dollars. Soil erosion has cost agriculture hundreds of millions of dollars. Rehabilitation programs currently being pursued in the St. Lawrence River, the Great Lakes and the Fraser River Basin are also costing hundreds of millions of dollars.

Hopes for future prosperity require that our actions and decisions reflect the value of biodiversity. Lessons from our history illustrate the importance of conserving biodiversity and using our biological resources in a sustainable manner. Our production of wheat has benefited greatly from selectively breeding domesticated wheat with genetic material from wild relatives found in other parts of the world. If these relatives had been lost, wheat production would not have reached its current state. If we fail to conserve biodiversity, we risk losing genetic material that could be used to enhance agricultural productivity further. We risk losing opportunities to develop new drugs and industrial products. In short, we risk losing opportunities to improve the quality of our lives. These costs can be avoided, however, if we recognize that preventive action and more careful management of the Earth's resources are more cost-effective in the long-term than relying on programs to tackle problems once the damage has been done.

E. Contributing to Global Biodiversity Conservation

Canada is one of the largest countries on the planet, with approximately 13 million square kilometres of land and water. Canadians are stewards of almost 20 percent of the planet's wilderness, 24 percent of its wetlands, 20 percent of its freshwater, and 10 percent of its forests; as well as 244,000 kilometers of coastline and a large arctic ecosystem that covers nearly 1/4 of the country's landmass. Some of Canada's ecological features contribute to global ecological processes. For example, forests, wetlands and peat bogs serve as sinks for greenhouse gases while the arctic region acts as a global heat sink by cooling the air and absorbing the heat transported north from the tropics.

Heritage Gardens in Canada

Members of the Heritage Seed Program are taking action to preserve the genetic diversity of heritage flowers, fruits and vegetables by planting them in their own gardens and sharing seeds with other interested groups and individuals.

Canada has many skilled and experienced farmers, fishermen, foresters, trappers, scientists, planners, resource managers and operators, businesses and conservation organizations - all of whom can be called upon to meet the challenges posed in the Convention. With expertise in biological resource management, remote sensing, satellite imaging and geographic information systems, we can contribute scientific, traditional and technical knowledge to global conservation efforts. Our experience in policy-making could also be useful to decision-makers and others. Canada has long shared its knowledge and financial resources to assist other countries in their efforts to conserve biodiversity and to use their biological resources in a sustainable manner. The Canadian Biodiversity Strategy recognizes our responsibility to continue to contribute to the global efforts to achieve these goals.

A Vision For Canada

Canadians are privileged to live in one of the largest and most beautiful countries in the world - a rich tapestry of landscapes and waterscapes ranging from arctic tundra and prairie grasslands to ancient temperate rainforests, the Great Lakes region, abundant fresh rivers, streams and ponds, and rocky coastal reefs, all supporting life of many descriptions. With this privilege comes the responsibility to care for this inheritance on behalf of the global community. By acting with wisdom and prudence today, we will leave to future generations a world in balance, capable of sustaining and enriching life.

Our Vision

A society that lives and develops as part of nature, values the diversity of life, takes no more than can be replenished and leaves to future generations a nurturing and dynamic world, rich in its biodiversity.

Guiding Principles

- Biodiversity has ecological, economic, social, cultural and intrinsic values.
- All life forms, including humans, are ultimately connected to all other life forms.
- All Canadians depend on biodiversity and have a responsibility to contribute to biodiversity conservation and to use biological resources in a sustainable manner.
- All Canadians should be encouraged to understand and appreciate the value of biodiversity and to participate in decisions involving the use of our air, water, land and other resources.

- An ecological approach to resource management is central to conserving biodiversity and using our biological resources in a sustainable manner.
- Development decisions must reflect ecological, economic, social and cultural values.
- Healthy, evolving ecosystems and the maintenance of natural processes are prerequisites for the in situ conservation of biodiversity and the sustainable use of biological resources.
- Ex situ measures may be required to support the conservation of some species and populations and are essential to ensuring the sustainable use of many agricultural, forest and aquatic resources.
- The knowledge, innovations and practices of indigenous and local communities should be respected, and their use and maintenance carried out with the support and involvement of these communities.
- The conservation of biodiversity and the sustainable use of biological resources should be carried out using the best knowledge available and approaches refined as new knowledge is gained.
- The conservation of biodiversity and the sustainable use of biological resources requires local, regional, provincial, territorial, national and global cooperation and a sharing of knowledge, costs and benefits.

The Use of Key Terms

Several explanations of terms are provided below to enhance the understanding of the directions contained in the Strategy. A more complete listing of definitions is contained in the Glossary.

The Convention does not define conservation. In the Strategy, conservation of biodiversity means managing human uses of the Earth's resources in order to maintain ecosystem, species and genetic diversity and the evolutionary and other processes that shaped them. Conservation includes the option to use resources. Conservation of biodiversity allows natural ecological processes such as evolutionary processes including extinction and speciation and maintains biological, chemical and physical processes and the natural species and genetic diversity that result from these processes. Changes to the composition and structure of ecosystems, the extinction of species and changes in the genetic diversity of any one species are natural processes which occur over time. It is not the intent of conservation to increase biodiversity through the release of alien organisms . Conservation of biodiversity requires us to eliminate or reduce adverse impacts to biodiversity that result from human activity.

In the Strategy, sustainable use is defined as "the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations".

The Convention notes that "the fundamental requirement for the conservation of biological diversity is the in situ conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings. " The Strategy emphasizes in situ conservation to allow evolutionary and other ecological processes to continue unimpaired. However, emphasis on in situ conservation is not intended to downplay the vital role of ex situ conservation . Ex situ conservation is defined in the Strategy as the conservation of components of biodiversity outside their natural habitats. In some circumstances, ex situ conservation offers the only chance of survival for some species-at-risk, and has an essential role to play in conserving economically valuable genetic resources, particularly for forest, aquatic and agricultural resources and the development of medicines.

Ecological management (sometimes called ecosystem management or an ecological approach to management) is essential to achieving the goals of the Strategy. It is defined in the Strategy as the management of human activities so that ecosystems, their structure, composition and function, and the processes that shaped them can continue at appropriate temporal and spatial scales. Ecological management requires an understanding of ecosystems and the impacts and implications of human activities. impacts and implications of human activities.

Conservation and Sustainable Use

GOAL 1

To conserve biodiversity and use biological resources in a sustainable manner.

Ecological Planning and Management

This section outlines elements that are required to conserve biodiversity and use biological resources in a sustainable manner. To achieve Goal 1, an ecological management approach must be implemented based on:

- A. the maintenance of viable populations of native wild flora and fauna in their natural habitats, ecosystems, landscapes and waterscapes;
- B. the completion of networks of protected areas;
- C. the restoration and rehabilitation of individual species and degraded ecosystems, where practical and where restoration will make a significant contribution to the conservation of biodiversity and the sustainable use of biological resources;

D. the development and implementation of integrated resource use policies, plans, legislation and programs for agricultural, forested and aquatic areas that support the conservation of biodiversity and sustainable use of biological resources;

E. the development and implementation of measures such as policies, plans, legislation and programs to prevent alien and living modified organisms from adversely affecting biodiversity;

Federal, provincial and territorial governments, in cooperation with members of the public and stakeholders, will pursue the strategic directions set out in the Strategy according to their policies, plans, priorities, and fiscal capabilities.

F. the development and implementation of measures such as policies, plans, legislation and programs to prevent or reduce human-caused atmospheric changes that threaten biodiversity; and

G. the development and implementation of measures to reduce the adverse impacts of human population growth and settlement on ecosystems, species and genetic resources.

A. Wild Flora and Fauna and Other Wild Organisms

The first element of the ecological management approach is to maintain populations of wild and native flora and fauna and other wild organisms, in their functioning ecosystems, landscapes and waterscapes. Results of conservation biology research indicate that the key to conserving species is to maintain viable populations across their natural geographic range.

Many policies and programs have been developed and are being implemented to manage ecosystems and species. In 1990, A Wildlife Policy for Canada was released by the Wildlife Ministers' Council of Canada. The goal of this policy is to maintain and enhance the health and diversity of wild flora and fauna and other wild organisms , both for their own sake and for the benefit of present and future generations.

Wild flora and fauna and other wild organisms refers to any wild and native species, including mammals, birds, fishes, reptiles, amphibians, invertebrates, plants, fungi, algae, bacteria, viruses, protozoa and other organisms.

Numerous programs are currently being implemented to maintain or restore populations of wild flora and fauna and other wild organisms. These include programs to manage species or populations that are harvested for commercial, subsistence and recreation programs, as well as those that are not used for consumptive purposes. Many of these programs have been very successful in ensuring the sustainable use of biological resources.

Communities have relied on wild flora and fauna and other wild organisms for food, shelter, clothing, employment, income and spiritual purposes for centuries. Today, individuals and communities continue to value wild flora and fauna and other wild organisms for the ecological, economic, social and cultural benefits they provide.

The Peregrine Falcon

As pesticide use increased in the years following World War II, populations of Peregrine Falcons declined in Canada and the United States. In southern Canada, the species all but disappeared from its former range. More recently, however, conservation efforts have brought the Peregrine back from the brink of extinction. In 1992, the subspecies *tundrius* was downlisted from threatened to vulnerable. Since 1976, over 1,200 birds of the *anatum* subspecies have been successfully raised in captivity and released in the wild. Positive results from these recovery efforts make wildlife officials optimistic that a population survey of *anatum* subspecies planned for 1995 may result in a change in status from endangered to threatened.

The ecological roles and economic importance of many plants, invertebrates, micro-organisms, fungi and other wild organisms are not fully understood. These lifeforms create and maintain soil, recycle nutrients and play a critical role in maintaining the balance of oxygen and carbon dioxide that affect climate and rainfall patterns. Wild flora and fauna and other wild organisms, and the ecological services they perform, have made it possible for humans to exist on Earth. In economic terms, ecosystem functions or services provide the foundation for economic activities that generate billions of dollars.

In addition to ecosystem services, uses of wild flora and fauna and other wild organisms make a significant contribution to our economy. Millions of people spend billions of dollars participating in activities such as fishing, hiking, bird-watching, hunting and photography.

Wild floral and faunal resources are also valued for cultural or spiritual reasons. These values are difficult to describe in monetary terms, but they are real values contributing to the health and enjoyment of millions of people.

As a result of effective resource management, many populations of wild flora and fauna and other wild organisms are sustainable. However, some populations are declining, largely as a result of habitat loss or deterioration. For example, several species of waterfowl have seriously declined in number in the past 20 years as a result of lost nesting cover, drainage of wetlands, and habitat modification along migration routes. Over-harvesting and poaching have also contributed to the decline of some species. Despite many examples of good resource management, there are still many species-at-risk in Canada.

Economic Impacts of Fish-and Wildlife-Related Activities in Canada

- In 1991, nearly 19 million Canadians spent \$5.6 billion pursuing wild floral- and faunal-related activities such as wildlife photography, birdwatching, hunting and fishing. This shows a 33% increase in expenditures since 1981.
- In addition, about 1.8 million tourists from the United States travelled to Canada to take part in these activities. They spent an estimated \$800 million.

Survey of the Importance of Wildlife to Canadians, 1991

Strategic Directions

1.1 Use ecological planning and management approaches with more emphasis on landscape/waterscape-level planning to integrate economic and social objectives with biodiversity conservation objectives.

1.2 Conserve ecosystems and critical habitats to support populations of wild flora and fauna and other wild organisms.

1.3 Through research, increase our understanding of the status, genetic diversity and ecological relationships of species and populations to improve ecological planning and management.

1.4 Ensure that the harvest of wild flora and fauna and other wild organisms is sustainable and minimize adverse impacts of harvesting on non-target species.

1.5 Re-connect fragmented ecosystems where practical and necessary, providing corridors and protecting habitats for isolated species or populations.

1.6 Modify or eliminate elements of government policies and programs that create unintentional adverse impacts on wild flora and fauna and other wild organisms on private and public property.

1.7 Strengthen measures to reduce and eliminate the release of substances, or quantities of substances, that are harmful to ecosystem, species and genetic resources.

1.8 Ensure that both economic and ecological factors are considered in designating pests and in implementing pest management strategies.

1.9 Develop indicators to monitor trends and support the management of wild populations, species, habitats and ecosystems.

1.10 Maintain or improve measures that prevent in situ populations from becoming jeopardized by specimen collecting for ex situ conservation and other purposes. (When only a single population of a species exists and it is in a highly endangered state, it may be necessary to move all of its members to ex situ conservation facilities in order to build up its numbers and eventually re-establish in situ populations).

1.11 Foster the participation of non-government ex situ conservation experts and institutions in in situ conservation efforts, and improve the participation of government agencies in non-government ex situ conservation efforts.

1.12 Implement mechanisms to conserve and use in a sustainable manner transboundary native wild populations, species, habitats and ecosystems in cooperation with other countries and organizations.

Establishment of Protected Areas

Article 8:

a) Establish protected areas to conserve biodiversity.

b) Develop guidelines for the selection, establishment and management of those protected areas. Convention on Biological Diversity

B. Protected Areas

The establishment and management of protected areas is the second element of the ecological management approach. Protected areas contribute to the conservation of biodiversity, although they must be complemented by sound stewardship across the entire country with particular attention to areas around protected areas.

The Convention defines a protected area as "a geographically defined area which is designated or regulated and managed to achieve specific conservation objectives. " Within that definition, protected areas may be established and managed to achieve one or more diverse objectives. These may include: the maintenance of ecological integrity; the conservation of ecosystem, species and genetic diversity; maintenance of essential ecological processes and life-support systems; wilderness preservation; scientific research and the protection of specific natural and cultural features; environmental education; outdoor recreation and tourism; and, in specific cases where consistent with the conservation objectives of the area, the sustainable use of resources from natural ecosystems.

In November 1992, Canada's federal, provincial and territorial ministers of the environment, parks and wildlife signed "A Statement of Commitment To Complete Canada's Networks of Protected Areas".

Just as the purposes of protected areas vary, so too do the levels of protection afforded them. In some, human activities and access are strictly limited, while in others, multiple land-use objectives are pursued. Some protected areas fulfil more than one purpose and are zoned for different levels of protection. Site-specific analysis and establishment of management objectives is required to determine appropriate and compatible uses.

Canada's First Protected Areas

The first protected areas in Canada were established just after Confederation to preserve outstanding scenic areas for outdoor recreation and tourism and to protect wildlife habitat.

- First National Park - Banff, Alberta (1885)
- First Wildlife Sanctuary - Last Mountain Lake, Saskatchewan (1887)
- First Provincial Park - Algonquin, Ontario (1893)
- First Municipal Park - Mount Royal, Montreal, Quebec (1872)

In Canada, the first protected areas were established in the late 1800s, in the first decades after Confederation. Today, federal, provincial, territorial, and regional and urban governments, and indigenous communities, individuals and private organizations acquire and manage lands to conserve biodiversity.

The World Conservation Union (IUCN) has developed a system for classifying protected areas. According to this system, about eight percent of Canada is

classified as protected and about four percent removed from all commercial extractive activities. The National Conservation Areas Data Base (NCADB) developed by Environment Canada, the Canadian Council on Ecological Areas and others, identify approximately 3,500 publicly-owned protected areas covering about 800,000 km² and approximately 10,000 km² held by non-government groups.

Canadian Council on Ecological Areas

The Canadian Council on Ecological Areas (CCEA) was established in 1982 to encourage and facilitate the establishment and use of a comprehensive

network of protected areas that are representative of Canada's terrestrial and aquatic diversity. As a non-profit, independent organization, CCEA serves as a unique forum for federal, provincial and territorial government agencies, non-government organizations, researchers, industries and other sectors involved in conserving ecological areas. Through conferences, consultations, projects and technical reports, CCEA educates and provides valuable guidance and support for efforts to complete a comprehensive Canadian network of protected areas.

Governments, conservation organizations and individuals are continuing to establish protected areas. Efforts have also been directed at improving biological inventories, ecological land classifications and planning to support the establishment of protected areas.

Despite the efforts of governments and non-government organizations, networks of ecological reserves, national, provincial, territorial and regional parks, managed wildlife areas, protected landscapes and internationally designated sites are not yet complete. Not all of our ecological regions are represented in existing protected areas networks. In some regions of the country, opportunities to establish protected areas are being diminished or foreclosed.

Completing Canada's Networks

In Quebec, plans are underway to establish eight new parks by the year 2000, including Mont Mégantic in the Eastern Townships and Vaureal River at Anticosti Island. The Saguenay Marine Park is also being established as the result of an agreement between the Government of Quebec and the Federal Government. In British Columbia, the Khutzeymateen Valley was designated as a provincial park and Canada's only grizzly bear sanctuary in August 1994. The park is home to about 50 grizzly bears and will be co-managed by the Tsimshian Nation.

Strategic Directions

1.13 Make every effort to complete Canada's networks of protected areas representative of land-based natural regions, by the year 2000 and accelerate the protection of areas that are representative of marine natural regions.

Canadian Biodiversity Strategy

1.14 Use open and meaningful public and stakeholder participation processes and sound scientific information and traditional knowledge to ensure that social, economic, cultural and ecological factors are considered in the establishment of protected areas.

1.15 Use interim protection measures to ensure that candidate protected areas are not compromised by development.

1.16 Develop comprehensive criteria for determining priority sites for designation as protected areas considering criteria such as: the habitat requirements for species-at-risk and endemic species and other critical wildlife habitat; areas supporting high diversity; migratory species or representative or unique species; and genetic resources that are of scientific or economic importance.

1.17 Prepare and implement, in consultation with interested stakeholders, legislation and policies, inventories, plans, guidelines, monitoring programs and other measures to support the establishment and management of protected areas.

1.18 Manage, in consultation with landowners, regional and urban governments, local and indigenous communities, and interested stakeholders, human activities in and around protected areas to minimize adverse impacts on protected area biodiversity and to maintain connectivity, using mechanisms such as United Nations Educational, Scientific and Cultural Organization Biosphere Reserve Program.

1.19 Support and promote the development of agreements between governments and local and indigenous communities, property-owners and/or private corporations for the voluntary allocation of land for conservation purposes.

1.20 Use a variety of mechanisms, including easements and covenants, to secure relatively intact ecosystems within intensively developed areas, and restore or rehabilitate them if necessary and practical.

C. Restoration and Rehabilitation

The third element of the ecological approach is restoration and rehabilitation, which includes the restoration or rehabilitation of species and ecosystems.

Rehabilitation and Restoration

Article 8:

f) Rehabilitate and restore degraded ecosystems and promote the recovery of threatened species through the development and implementation of plans or other management strategies.

Convention on Biological Diversity

Species Recovery

Several species recovery efforts are underway. On a national level, species recovery efforts are currently coordinated by the committee on the Recovery of Nationally Endangered Wildlife (RENEW). Since 1988, the committee has been leading recovery efforts for birds, terrestrial mammals, reptiles and amphibians at risk. Although recovery and reintroduction form part of the RENEW mandate, an overriding objective of the RENEW strategy is to prevent species from becoming threatened or endangered. Where species are threatened, endangered or extirpated, recovery efforts are undertaken within jurisdictions to enhance or reintroduce species, subspecies and populations. These recovery efforts are designed to improve the viability of threatened and endangered species through such actions as: the protection or enhancement of habitat; the rehabilitation or creation of habitat; the development of contingency plans for major disruptions; captive-breeding and the transplanting of wild or captive-bred individuals; and the enhancement of public awareness and support.

Additionally, some plans are being developed between federal, provincial and territorial governments and indigenous communities to ensure the conservation of species-at-risk and to restore them to levels at which traditional harvesting can be sustained.

Ex situ or "off-site" conservation is sometimes required to support the conservation of vulnerable, threatened and endangered species. There are a number of institutions in Canada currently involved in ex situ conservation supporting both domestic and international species recovery programs. In Canada, ex situ institutions are playing an essential role in conserving native endangered species, such as the Black-footed Ferret and the Whooping Crane, and supporting international efforts to conserve endangered species from other countries, such as

the Puerto Rican Toad. All three species are being bred in captivity to produce offspring for re-introduction to their native habitats.

Thelon Game Sanctuary

The Thelon Game Sanctuary was established in the Northwest Territories in 1927 to provide a safe haven for muskoxen, which were then on the brink of extinction. Today, much of the mainland tundra has been repopulated by muskoxen migrating out of this protected core population. The success of the Thelon Game Sanctuary in recovering this species is an illustration of the key role played by protected areas in providing species-at-risk a chance of recovery.

Strategic Directions

1.21 Federal, provincial and territorial governments will review their current legislation to determine if improvements are required in order to protect species-at-risk and their habitats, determine the benefits and costs of a more harmonized legislative approach and pursue harmonization where appropriate and practical.

1.22 Federal, provincial and territorial governments will work towards harmonizing methodologies to designate species-at-risk.

1.23 Determine the ecological requirements of species-at-risk and develop, implement and evaluate the success of recovery plans for species that are defined as extirpated, endangered or threatened, where practical and necessary. Consider the recovery of vulnerable species on a case-by-case basis.

1.24 Consider multi-species/habitat recovery plans for areas that contain a number of species-at-risk.

1.25 Encourage the involvement of ex situ facilities and expertise in the recovery of species-at-risk.

1.26 Federal, provincial and territorial governments will continue to participate and support the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the Recovery of Nationally Endangered Wildlife (RENEW) and new programs such as the Canadian Nature Federation's Endangered Plants and Invertebrates of Canada program (EPIC).

1.27 Expand the mandate of COSEWIC and RENEW to encompass further taxonomic groups adding groups incrementally. Canadian Biodiversity Strategy

Safe Haven for Shorebirds

More than 150,000 shorebirds will continue to have safe haven in the newly designated International Shorebird Reserve at Quill Lakes, Saskatchewan. Nearly 16,188 ha in size, the reserve includes the largest saline lake in Canada, freshwater marshes, mixed grass prairie and aspen parkland communities. This reserve joins the Western Hemisphere Shorebird Reserve Network, which comprises 23 other sites in seven countries.

1.28 Enhance participation of urban and regional governments, local and indigenous communities and landowners in species recovery projects from early planning phases through implementation.

1.29 Support and promote international efforts to recover species-at-risk by: participating in mechanisms, such as the Convention on International Trade in Endangered Species, that regulate or control trade in species-at-risk; supporting the recovery of migratory and trans-boundary species-at-risk; and participating in other international efforts, such as the IUCN Species Survival Commission.

Ecosystem Restoration and Rehabilitation

Several ecosystem restoration and rehabilitation projects are currently underway. In 1988, the Federal Government and the Government of Quebec launched the St. Lawrence Action Plan, allocating approximately \$173 million towards the rehabilitation and sustainable use of this ecosystem. In 1991, the Fraser River Basin Action Plan was introduced to promote the sustainable development of the Fraser River ecosystem in British Columbia. This partnership project involves governments, indigenous people and non-government organizations. There are also numerous smaller scale ecosystem restoration and rehabilitation projects underway.

These include restoring wetlands, repairing eroded stream banks and reclaiming areas such as abandoned gravel pits. Many of these projects are community-based and contribute to the conservation of biodiversity.

Ecosystem restoration and rehabilitation can be extremely expensive and is not always successful in fully restoring ecosystems. Preventing ecosystem degradation is, therefore, critical. The cost and scientific and technical implications of each proposed restoration or rehabilitation program must be critically evaluated to determine the program's long-term value in conserving biodiversity. In some cases, scarce financial and human resources could be used more effectively in other conservation initiatives.

Strategic Directions

1.30 Using objective criteria to select sites for restoration and rehabilitation, including the habitat requirements of species-at-risk, develop and implement restoration or rehabilitation plans for degraded ecosystems, where practical and necessary.

St. Lawrence Vision 2000

In 1994, the federal and Quebec governments renewed their commitment to the St. Lawrence Action Plan. The new St. Lawrence Vision 2000 includes biodiversity as one of its seven long-term objectives. Over \$26 million has been committed to actions such as:

- conserving 7000 ha of habitat;
- recovering the Beluga Whale; and
- rehabilitating the smelt population in the Boyer River.

1.31 Develop improved approaches and technologies for ecosystem restoration and rehabilitation, evaluating the potential impacts of programs on ecosystems and species to ensure that desired outcomes are achievable without causing negative impacts.

D. Sustainable Use of Biological Resources

The fourth element of the ecological management approach is the development and implementation of sector-specific policies, plans and programs. The sustainable use of biological resources and ecosystems is essential to the well-being of members of society and is necessary to conserve biodiversity.

Waterfowl Management Plan

The aim of the North American Waterfowl Management Plan is to restore waterfowl populations to 1970s levels by improving their habitats. The Plan calls for the preservation of 2.4 million ha of land across North America including

1.5 million ha in Canada. It is funded by public and private sources in both Canada and the United States and involves governments, conservation groups, hunters, farmers and other landowners.

In Manitoba, Prairie Care and the Manitoba Habitat Heritage Corporation have acquired cultivated lands and returned them to native grass species. This work will support biodiversity conservation efforts in southwest Manitoba.

There are numerous policies, laws and programs in effect in Canada to support the sustainable use of biological resources. These include soil conservation programs, sustainable harvesting rates for wildlife, trapping and fishing, sustainable grazing rates on agricultural lands, and the sustainable use of forest resources. Unfortunately, there have also been instances where unsustainable resource use has resulted in adverse impacts to the economy and community social well-being. Canada is responding to resource management issues that have arisen from such practices. For example, the North American Waterfowl Management Plan is being implemented in response to very significant declines in waterfowl populations. The tourism industry is developing environmental codes of practice to promote the sustainable use of wildlife, parks and other resources necessary to sustain the growing eco-tourism sector.

Sustainable Use of Components of Biological Diversity

Article 10:

a) Integrate consideration of the conservation and sustainable use of biological resources into national decision-making.

b) Integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.

Convention on Biological Diversity

Indigenous communities are playing an increasingly significant role in the development of cooperative regimes to sustain our resources for future generations. Other sectors of society are becoming increasingly aware of the need to conserve biodiversity and use biological resources in a sustainable manner.

In some instances it may be possible to develop opportunities for the secondary processing of biological resources as a means of increasing employment, profits and economic diversity. Where such opportunities exist, they should be pursued as a means of supporting sustainable harvest rates for biological resources.

Biological systems are dynamic and can change significantly in biological productivity, species distribution and abundance. Consequently, resource managers and users must be aware of natural adjustments and fluctuations and respond with appropriate management practices.

In the following section, strategic directions 1.32 to 1.38 apply to all renewable resource sectors. This is followed by sections addressing agricultural, aquatic, and forested areas.

The Whitehorse Mining Initiative (WMI), co-sponsored by the Mining Association of Canada and Canada's Mines Ministers, was a multi-stakeholder process aimed at moving towards a socially, economically and environmentally sustainable mining industry underpinned by political and community consensus. The process produced an umbrella Accord endorsed by the Mines Ministers, the federal Minister of Indian and Northern Affairs, and leaders from aboriginal organizations, industry, labour and environmental groups. The Accord recognizes that protected area networks are essential contributors to environmental health, biological diversity and ecological processes and a fundamental part of the sustainable balance of society, economy and environment. As such, one of the goals of the Accord is "to create and set aside from industrial development by the year 2000, those protected areas required to achieve representation of Canada's land-based natural regions".

Strategic Directions

1.32 Modify, develop and implement government policies and programs to ensure that they support the sustainable use of biological resources, the conservation of soil, water, air and other essential resources, and the long-term integrity of supporting ecosystems.

1.33 Improve methods and technologies that support the sustainable use of biological resources and eliminate or minimize adverse impacts on biodiversity resulting from resource use.

1.34 Develop and implement education and training programs for policy-makers, property owners, lease operators, resource managers and others involved in the management, development and use of biological resources, to ensure that they have access to the best available information, methods and technologies.

1.35 Develop and improve methods of monitoring ecosystems and biological resources to support the sustainable use of these resources.

1.36 As possible, provide information to assist consumers in understanding the impacts and implications of their decisions and to promote the sustainable use of biological resources and ecosystems.

1.37 Improve the effectiveness of public participation in developing policies for the use of biological resources using a variety of measures, such as integrated decision-making processes and conflict resolution mechanisms.

1.38 Develop linkages and ensure coordination between the implementation processes for the Canadian Biodiversity Strategy and other related national initiatives, such as the national forest strategy, air quality and climate change programs, the Wildlife Policy for Canada, the North American Waterfowl Management Plan, agricultural strategies and the Whitehorse Mining Initiative.

Agricultural Areas

The agriculture and agri-food industry is a major contributor to the Canadian economy, accounting for eight percent of the Gross Domestic Product and 15 percent of total employment. Approximately seven percent of Canada's total land base is under some form of agricultural production, with one half million farmers engaged in primary food production worth \$18 billion annually. Over one million individuals are employed in the food processing sector, which in 1992 was the second largest manufacturing industry in Canada, worth a total of \$43.6 billion.

Land Area in Agriculture		
	Land Area in 1000 ha	Land Area in %
Cultivated Farmland	33,508	3.64
Summerfallow	7,921	.86
Grasslands, Pasturelands & Other	26,326	2.86
Total Arable Land	67,755	7.36
Total Land Area of Canada	920,000	100.00
Statistics Canada, 1993		

Just as humans depend upon the products of agriculture, agriculture depends upon biological resources and ecosystems that provide the raw materials to produce new and better food plants, breeds of animals, and other products.

International access to diverse genetic resources is necessary for us because almost all major Canadian crops and domestic animals originated in other parts of the world. We must continue to be involved in global cooperative efforts in conservation and germplasm exchange in order to maintain a broad genetic base that will ensure our competitive position in the international market place.

The economic impact of soil erosion in Canada is estimated to be between \$484 and \$707 million per year.
Agriculture Canada, 1994

Genetic resources can be preserved in specialized facilities, on farms or in the wild. In Canada, ex situ preservation plays a critical role in providing continued access to viable seed stocks and cell lines, that would otherwise be lost as wild populations and species and traditional crops and breeds change or become extinct. Efforts are underway in Canada to preserve rare breeds of domesticated plants and animals in on-farm conditions.

On a broader scale, the impact of agriculture on other aspects of biodiversity has been recognized and, in many cases, solutions have been identified and are being implemented. Governments, agricultural producers, conservation organizations and others are addressing problems associated with soil erosion, the chemical contamination of water, wetland drainage, urban encroachment, wildlife and habitat impacts, energy efficiency, air and climate influences, pollution and waste

management. In 1991 it was estimated that 87% of Canada's original prairie grassland had been converted to farmland. Canada has established Grasslands National Park to maintain a representative example of the arid shortgrass grassland region.

Nearly 500,000 hectares of land at severe risk from erosion have been removed from cultivation by the Permanent Cover Program between 1989 and 1993.
Prairie Farm Rehabilitation Administration, 1994

There is growing recognition within the farm sector that agriculture can benefit, in certain circumstances, from the maintenance and enhancement of populations of wild flora and fauna. Governments are funding research and technology transfer programs to assist farmers in adopting practices that minimize impacts on surrounding ecosystems. Efforts must continue to optimize the use of agricultural lands by determining the most suitable crops for particular soil types and other conditions. Optimizing the use of agricultural lands is not only an essential element of agricultural sustainability, but also can significantly contribute to the conservation of biodiversity by maintaining or enhancing crop production without expanding the agricultural land base.

It is essential that individual landowners and agricultural producers continue to be involved in the development and implementation of environmentally sustainable agricultural policies and programs.

Strategic Directions

1.39 Assess current and proposed major government agricultural policies and programs to ensure that ecological, economic, social and cultural objectives are considered.

1.40 Maintain, adjust or develop economic incentives that promote the conservation of biodiversity and sustainable use of biological resources on agricultural lands.

1.41 Inventory and evaluate genes, populations, species and ecosystems to ensure the conservation of natural control systems and the identification of species for use as biocontrol agents.

Genetic Improvement of Crops in Canada

Genetic diversity has allowed crop breeders around the world to improve many crops by adapting them to local conditions.

Agriculture Canada's Rust Research Laboratory has bred and released a series of wheat varieties that are genetically resistant to wheat stem rust, a fungus that wiped out spring wheat crops in 1916. As a result, there has been no stem rust epidemic in western Canada since 1954, and there is no longer a need to use pesticides to control it.

Since the 1950s, characteristics such as high protein and energy, seed dormancy and disease resistance have been incorporated into new varieties of oats.

Agriculture Canada

1.42 Develop and use agricultural pest-control products and integrated pest management approaches to minimize negative impacts on non-target ecosystems and those species approaching or already at risk.

1.43 Conserve biological resources that are essential to agriculture, including domesticated animals, plants and microbial germplasm, and their wild relatives, with priority given to genetic material that is most at risk.

1.44 Develop and implement programs that promote and facilitate the co-existence of wild flora and fauna and other wild organisms and their habitats in agricultural landscapes.

1.45 Through research, training and technology transfer, facilitate the further adoption of environmentally sustainable farm practices, including those that:

a) reduce soil erosion, surface and ground water contamination and air pollution; and

b) lead to the identification of productive soil types in relation to specific crop requirements.

1.46 Encourage agricultural producers to develop farm management plans that support the conservation of biodiversity and the sustainable use of biological resources.

1.47 Facilitate the sharing of experiences and expertise among farmers to promote management practices that favour the conservation of biodiversity and the sustainable use of biological resources.

1.48 Maintain or develop policies or programs that conserve biodiversity by supporting the sustainable use of native grasslands.

1.49 Identify and conserve areas that support native species and communities or could contribute to systems of protected areas, especially in intensively developed areas in accordance to the directions provided in the section on protected areas of the Strategy.

1.50 Maintain or develop in situ and ex situ conservation mechanisms to support the conservation and sustainable use of biological resources essential to agriculture by:

Environmental Farm Plans

The Ontario Farm Environment Coalition is pro-actively dealing with environmental issues facing agriculture. Their agenda, developed in consultation with 28 major Ontario farm organizations, forms the basis for the voluntary Environmental Farm Plan process. The Environmental Farm Plan identifies areas of potential environmental concern and promotes realistic goals to minimize these concerns. This includes the need to make reasonable efforts to conserve Ontario's natural biodiversity, while recognizing the requirements of working farms. As the application of this process increases, it is expected that the conservation of Ontario's natural biodiversity in agricultural landscapes will be improved.

- a) determining and acting upon regional, provincial, territorial, national and international priorities for the conservation of biological resources, research and training, and the establishment of facilities; and
- b) continuing to support existing federal, provincial, territorial, regional and international ex situ institutions.

Aquatic Areas

Aquatic areas include freshwater, marine and wetland ecosystems. For centuries humans have used these ecosystems for food, recreation, sewage treatment, transportation, irrigation, cultural and spiritual purposes. Ground and surface waters are used as sources of potable water, and access to water has been a determining factor in the location of towns, cities, farms and other settlements. Globally, aquatic ecosystems produce the largest single source of animal protein for human consumption. Aquatic resources are also used for medicines and as raw material for manufacturing industries. Marine ecosystems play a significant ecological role, exerting influence over global processes such as the absorption of atmospheric carbon dioxide.

Direct and Indirect Employment in Fisheries Sector:

1990 - 130,000 people

1994 - 100,000 people

Department of Fisheries and Oceans, 1994

While humans have benefited enormously from aquatic ecosystems, they have not always used these resources in a sustainable manner. Some aquatic ecosystems have been stressed by commercial exploitation, long-range transport of contaminants, loss of habitat, and local and regional developments.

The Great Lakes and St. Lawrence ecosystems have been greatly modified by intensive fishing, introduced species, pollutants and habitat changes. On the Atlantic coast, major reductions of groundfish species such as the northern cod appear to be due to a number of factors, including high exploitation, predation, inappropriate harvesting practices and environmental variants that have affected the survival of very young fish as well as growth rates and behaviour. On the Pacific coast, salmon, halibut and herring have gone through major fluctuations due to fishing pressure and environmental changes.

Significant reductions in population size and distribution can erode genetic diversity and ultimately lead to the extinction of species. In communities that depend upon biological resources, significant reduction in aquatic resource harvesting levels can devastate local economies and social well-being.

Approximately 1,100 species of fish are known to inhabit Canadian waters. (Ocean Voice International) Four freshwater species are thought to be extinct, two have been extirpated from Canadian waters and 53 are listed as endangered, threatened or vulnerable. (COSEWIC, 1994)

Canada is responding to aquatic resource issues in a variety of ways: financial and human resources are being devoted to solving management issues; habitat restoration and protection programs are being implemented; and restoration and rehabilitation programs are being developed and implemented to address water quality concerns. Canada is also continuing to work with other countries to address international aquatic resource issues.

Strategic Directions

1.51 Assess current and proposed major government aquatic resource policies and programs to ensure that ecological, economic, social and cultural objectives are considered.

1.52 Use objective criteria to select sites for restoration and rehabilitation, and restore or rehabilitate degraded aquatic ecosystems where practical.

In Canada there are at least 36 federal acts, 20 provincial and territorial acts, and numerous international conventions and accords relating to the protection and use of aquatic environments and resources.

1.53 Implement biological and ecological inventory, monitoring programs and classification systems to determine appropriate biodiversity conservation measures and provide a framework for managing aquatic resources on a sustainable basis.

1.54 Increase our understanding of the structure, function and composition of aquatic ecosystems to enhance conservation and management practices.

1.55 Enhance efforts to conserve aquatic biodiversity by protecting: species and ecosystems at risk, endemic species, vulnerable spawning areas and unique and representative ecosystems.

1.56 Establish reserves to conserve aquatic biodiversity and contribute to networks of national and international protected areas in accordance with the strategic directions provided in the section on protected areas of this Strategy.

1.57 Develop training programs to promote the use of equipment and harvesting procedures that eliminate, or reduce to acceptable levels, the adverse impacts on populations, species, habitats and ecosystems, including the capture of undersized fish, incidental catch, and habitat destruction.

1.58 Reduce to acceptable levels, or eliminate, adverse impacts of species introductions on aquatic biodiversity resulting from aquaculture projects, fisheries enhancement programs and interbasin transfers of water and organisms.

Fisheries Resource Conservation Council

Established in 1992, the Council created a partnership among governments, scientists and fisheries industry members to determine management needs in Atlantic Canada. The Council has recommended changes to fishery management approaches, including:

- moving towards an ecosystem approach;
- conducting research in interdisciplinary terms;
- enhancing our understanding of the impacts of fishing on fish stocks; and
- enhancing communication between scientists and individuals who have practical experience in and knowledge of the fisheries industry.

1.59 Investigate the use of alternative aquatic resource management mechanisms to enhance the integration of social, cultural, economic and ecological objectives.

1.60 Participate in international fisheries conservation efforts to develop and encourage the implementation of ecological management approaches, and to develop sustainable use agreements.

1.61 Conserve ocean-based fisheries resources by:

- a) taking effective action to address foreign overfishing outside Canada's 200 mile limit;
- b) improving the enforcement of existing rules within the Northwest Atlantic Fisheries Organization (NAFO); and
- c) enhancing international collaboration in the development of conservation/sustainable use policies by building on discussions at the United Nations Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks.

1.62 Support the development of international agreements to encourage the development of biological reference points in fisheries management that provide a basis for the conservation and sustainable use of harvested species.

1.63 Enhance communication with those who possess traditional knowledge to improve information sharing, and to promote the conservation of aquatic biodiversity and the sustainable use of aquatic biological resources.

1.64 Maintain or develop in situ and ex situ mechanisms to support the conservation of biodiversity and the sustainable use of aquatic biological resources by:

a) determining and acting upon federal, provincial, territorial, regional and international priorities for the conservation of aquatic biological resources, research and training, and the establishment of new facilities; and

b) determining federal, provincial, territorial, regional and international priorities for ex situ aquatic biological resources, facilities, research and training.

Forested Areas

Forests cover half of Canada and are essential to the survival of many species. As well as being ecologically significant on a global scale, forests are important contributors to our economic and social well-being. About 300 communities depend largely on forestry and more than 800,000 people work in the forest products industry or for organizations associated with it. In 1993, forest product exports contributed \$22.4 billion to our net balance of trade.

Forest resources provide food, fuel and medicines for many communities, and are used for hunting, trapping, gathering, spiritual or religious purposes, and wilderness experiences. Being able to access and enjoy forested areas greatly improves our quality of life. While it is difficult to assign a monetary value to the social and cultural benefits of forests, these extremely important values must be considered in determining appropriate forest uses.

Goal Statement of Sustainable Forests:

A Canadian Commitment

To maintain and enhance the long-term health of our forest ecosystems for the benefit of all living things, both nationally and globally, while providing environmental, economic, social and cultural opportunities for the benefit of present and future generations.

Given the importance of forests to Canadians, and the diverse uses that occur in these areas, it is essential that integrated management practices continue to be improved and implemented. Management decisions must be based on our best understanding of forest ecosystems and the implications of various forest uses.

Governments, forestry companies, woodlot owners, conservation groups and other organizations and individuals are directing resources towards addressing forest issues. Research and new technologies are improving forest management practices. Greater effort is being directed at improving forest inventories and reducing adverse impacts on soil, water and wildlife. A variety of mechanisms, such as land-use planning, forest management plans and guidelines are being implemented to solve conflicts between users. Protected areas have been and will continue to be established in support of the conservation of forest biodiversity. In 1992, Canada's national forest strategy, *Sustainable Forests: A Canadian Commitment*, was published. Now being implemented, this strategy provides a framework for jurisdictions to address forest issues and realize opportunities. The Canadian Biodiversity Strategy does not repeat all of the elements of the national forest strategy, but rather attempts to build upon those elements that are most relevant to the objectives of the Biodiversity Convention.

The national forest strategy, *Sustainable Forests: A Canadian Commitment*, expresses a new vision for the future of Canadian forests. Biodiversity conservation and the sustainable use of biological resources are important themes throughout this national strategy, and action is taking place across the country to ensure that these aims are met.

Strategic Directions:

1.65 Assess current and proposed major government forest policies and programs to ensure that ecological, economic, social and cultural objectives have been considered.

1.66 Increase our understanding of forest biodiversity by enhancing ecological site classification systems and the inventory and monitoring of commercial and non-commercial species, soil, soil biota, climate and other biophysical characteristics.

1.67 Improve our understanding of forest ecological functions by determining the benefits of ecological services provided by forest ecosystems, monitoring the ecological responses of forests to resource management practices, and by carrying out other activities.

1.68 Eliminate or reduce to acceptable levels, the adverse impacts of forest management practices on watersheds, soils, adjacent ecosystems and species.

1.69 Continue to develop and implement improved forest management practices that provide for the sustainable use of forests while maintaining the regional forest mosaic. Use practices that are as consistent as is practical, with natural disturbance regimes, patterns and processes.

Forests of Canada

There are 416 million ha of forested land in Canada. A little more than half of this land is considered capable of producing timber. Approximately 119 million ha are currently managed for timber production. A further 156 million ha, found mostly in northern Canada and comprised of muskeg, small trees and shrubs, are "open" forests that will likely be left in their natural state. An estimated 12% of our forested land has been protected from harvesting by policy or legislation.

The provincial governments are responsible for managing 71% of the nation's forests, while the federal and territorial governments share responsibility for 23%. Six percent of Canada's forests are on private property belonging to more than 425,000 private landowners.

State of Canada's Forests, 1993

1.70 Provide improved training opportunities for forest scientists, managers and operators to increase their understanding of forest ecosystems.

1.71 Use integrated pest management approaches that eliminate or reduce to acceptable levels, adverse impacts on non-target species and ecosystems.

1.72 Inventory and evaluate forest ecosystems and species to ensure the conservation of natural biological control systems, and to identify species for use as biocontrol agents.

1.73 Develop and implement programs to conserve the genetic diversity of tree species in in situ conditions .

1.74 Establish and maintain forest seed and clonal gene banks to conserve the genetic diversity of tree species.

1.75 Allow fire, disease, succession and natural forest regeneration to maintain biodiversity, where they are compatible with forestry and other land use objectives, and where natural regeneration can be effective.

1.76 In consultation with regional and urban governments, landowners and lease holders, identify and correct policies that discourage the conservation of biodiversity and the sustainable use of forest biological resources on private lands and leased crown lands.

Forest Birds, Biodiversity and Management

In 1989, the Canadian Wildlife Service and the Ontario Ministry of Natural Resources began collaborative research to examine the value of an ecosystem-based approach for describing the habitats of a number of wildlife species in relation to forest management. Research demonstrated distinct patterns of distribution and abundance for more than 70 forest bird species in relation to 38 mature forest types. Managing these forest types can maintain ecosystem features for many other species and contributes to forest biodiversity.

1.77 Where practical, restore or rehabilitate degraded forest ecosystems that will make a significant contribution to conserving biodiversity.

1.78 Establish protected areas to conserve representative and critical forest ecosystems as part of an overall network of protected areas in accordance with the strategic directions provided in the section on protected areas in this Strategy.

1.79 Develop and implement forest management plans and codes of practice to promote the sustainable use of forest ecosystems and the conservation of biodiversity.

1.80 Support research, management and policies that assess and promote new uses of timber and non-timber products from forests to increase the economic return from forest ecosystems, while conserving biodiversity.

E. Biosafety: Harmful Alien Organisms and Living

Modified Organisms

Harmful Alien Organisms

Alien organisms are species that enter ecosystems beyond their natural range through deliberate or inadvertent introduction by humans. Organisms that have extended their natural range without human help are not considered alien. The term "alien" is not meant to imply positive or negative impacts on biodiversity. Many alien organisms have been intentionally introduced into Canada and have provided important economic and social benefits. For example, most of Canada's agricultural crops and many horticultural products were developed from genetic material obtained in other countries.

Alien Organisms

Article 8:

h) Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.

Convention on Biological Diversity

Other alien organisms that have been introduced have caused harmful effects to biodiversity. Some well known examples are the sea lamprey and zebra mussels which have had considerable impacts on the Great Lakes ecosystem, and purple loosestrife, which has spread rapidly throughout wetland areas. Such undesirable introductions have had major environmental and economic impacts.

Impacts of Harmful Alien Organisms

Human use and enjoyment of natural areas is directly affected by harmful alien organisms. For instance, Eurasian watermilfoil has invaded many lake shorelines and slow-moving rivers in Ontario and southern British Columbia adversely affecting these areas as recreational resources.

Harmful alien organisms may affect biodiversity through species displacement, disease, parasitism, hybridization, predation or habitat destruction. This results in the decline or extinction of native or endemic populations and the transformation or degradation of ecosystems. Control or elimination of harmful alien organisms is necessary to conserve biodiversity and prevent the further destruction of ecosystems.

Strategic Directions

1.81 Take all necessary steps to prevent the introduction of harmful alien organisms and eliminate or reduce their adverse effects to acceptable levels by:

- a) developing and implementing effective means to identify and monitor alien organisms;
- b) determining priorities for allocating resources for the control of harmful alien organisms based on their impact on native biodiversity and economic resources, and implementing effective control or, where possible, eradication measures;

Alien Organisms on the Queen Charlotte Islands

- Over 70% of the world's population of Ancient Murrelets and significant populations of other seabirds such as Cassin's Auklet, Rhinoceros Auklets and Tufted Puffins use the islands as breeding grounds.
- Introduction of raccoons and rats threatens more than 70% of the seabird colonies nesting there. State of the Environment Report for British Columbia, 1992

- c) identifying and eliminating common sources of unintentional introductions;
- d) developing national and international databases that support the identification and anticipation of the introduction of potentially harmful alien organisms in order to develop control and prevention measures;
- e) ensuring that there is adequate legislation and enforcement to control introductions or escapes of harmful alien organisms, and improving preventative mechanisms such as screening standards and risk assessment procedures; and
- f) enhancing public education and awareness of the impacts of harmful alien organisms and the steps that can be taken to prevent their introduction.

1.82 Promote research into methods and approaches that improve our ability to assess whether or not alien organisms will have an adverse impact on biodiversity.

Living Modified Organisms

Living modified organisms resulting from biotechnology offer the potential for important economic and social benefits as well as a means to address existing

ecological problems affecting biodiversity. However, these organisms also have the potential to adversely affect populations, species and ecosystems.

Strategic Directions

1.83 Prevent the introduction of potentially harmful living modified organisms by:

a) ensuring that there is adequate legislation and enforcement to control introductions or escapes of harmful living modified organisms, and improving preventative mechanisms such as screening standards and risk assessment procedures; and

b) developing national and international database capacities that enable Canada to identify and anticipate the introduction of potentially harmful living modified organisms.

1.84 Promote research into methods and approaches that improve our ability to assess whether or not living modified organisms will have an adverse impact on biodiversity.

F. Atmosphere

Life on Earth depends on the atmosphere. Past changes in the atmosphere have caused significant shifts and mass extinctions. The current climate, with its variability and extremes, directly affects all ecosystems. Future global atmospheric changes resulting from human activities may exert the greatest influence on biodiversity. Atmospheric pollutants (greenhouse gases, toxic air pollutants, ozone depletion chemicals) are giving rise to climate change, increased ultraviolet light penetration, and stress on human and biodiversity well-being. It is not known how ecosystems and species will adjust or fail to adjust to these stresses, or what the potential effect on genetic diversity will be. Canada's northern ecosystems may be especially vulnerable to the impacts of a changing climate.

Acid Rain Reduction

The first scrubber system in Canada was installed by New Brunswick Power in the new Belledune generating station. The utility is currently installing a second scrubber system in an existing plant. When this second system comes fully online, provincial sulphur dioxide emissions will drop to 125,000 tonnes – 50,000 tonnes lower than the current commitment under the Eastern Canada Sulphur Dioxide Emission Reduction Agreement and a 43% reduction since 1980.

Long-range air pollutants acidify sensitive head-water lakes, are associated with birch dieback and other impacts on New Brunswick forests and have recently been linked to respiratory stress. Studies indicate that even with the full implementation of the United States Clean Air Act Amendment and emission reductions in Canada, there will still be excessive acid deposited in our southern ecosystems. Smog and acid aerosol levels may continue to stress our environment well into the next century. New Brunswick has done and will continue to do its part. Further significant reductions in acid deposition levels in New Brunswick will come about only if acid-causing emissions are reduced in jurisdictions upwind of New Brunswick.

Province of New Brunswick

Conserving Forests and prairie grass lands...Not only supports the conservation of biodiversity but also removes gases from our atmosphere that have been linked with climate change.

Strong linkages between biodiversity issues and atmospheric change were emphasized at the Earth Summit in 1992, when the Convention on Biological Diversity and the Framework Convention on Climate Change were signed by most United Nations countries. Both conventions arose from a common concern that human activities were endangering life-support systems. The objectives of these conventions are complementary. For example, conserving forests and prairie grasslands or providing permanent cover in agricultural areas not only supports the conservation of biodiversity but also removes gases from our atmosphere that have been linked with climate change.

National and international research and development efforts aimed at addressing atmospheric issues have been underway for more than a decade. A National Air Issues Coordinating Committee, formed to address air quality issues, has established task forces to develop a National Action Plan on Climate Change as well as strategies to eliminate, reduce or control smog, acid precipitation, and hazardous air pollutants. A national emissions and forecasting working group has also been created to update Canada's inventory of substances that are known to affect atmospheric conditions.

Strategic Directions:

1.85 Develop linkages in the implementation processes for the Conventions on Biological Diversity and Climate Change and other atmospheric agreements and programs.

1.86 Maintain and enhance bioclimatic monitoring to track the effects of atmospheric changes on ecosystems, species and genetic diversity.

1.87 Increase coordination among national programs to determine potential impacts on biodiversity from past, present and future atmospheric changes.

1.88 Apply multi-disciplinary research to investigate relationships between atmospheric changes and changes in biodiversity.

1.89 Implement measures to eliminate or reduce human-caused atmospheric changes that adversely affect biodiversity.

G. Human Population and Settlement

Canadians are becoming increasingly aware of the adverse impacts of human activities and resource consumption patterns on ecological, economic, social and cultural systems. Thus, human population policies must be developed to reflect societal objectives and ecological carrying capacity.

The capacity of Earth to support an ever-growing human population and satisfy increasing demands on its resources is limited. If the present human population of 5.6 billion continues to grow at current rates, it could reach 12 billion by 2050.

In addition to human population growth, high consumption rates, particularly in developed countries, are stressing global ecosystems and influencing atmospheric systems. Canada's per capita rate of water and energy consumption and waste generation is among the highest in the world.

In Canada, human settlement has already had a significant adverse impact on ecosystems, species and genetic diversity. Farming, forest development, commercial fishing, urban development, mining, oil and gas use and development, the development of transportation infrastructure and other activities have each had varying degrees of impact on our resources.

The effect of human settlement on biodiversity is most evident in the southern part of the country, where urban development has been concentrated, native grasslands have been converted to cropland and wetlands drained. Not surprisingly, most of Canada's endangered species are concentrated in the areas of southern British Columbia, the southern prairies and the Quebec City-Windsor corridor where 75% of Canada's population lives.

Ecosystem degradation has also contributed to the decline of biodiversity. Degradation has resulted from pollution, the introduction of harmful alien organisms, and habitat fragmentation caused by such activities as forest and agricultural developments, highways and urban sprawl. Lakes in eastern Canada have suffered from acid precipitation, and the Great Lakes, St. Lawrence River, Fraser River Basin and Atlantic and Pacific fisheries are all under ecological stress resulting directly and indirectly from human activities.

In response to concerns about human impacts on the environment, governments, communities, businesses, educational institutions and individuals are taking action. Numerous programs have been implemented to reduce energy use, conserve water, recycle material, manage hazardous waste and reduce pollution emissions. These types of actions must be continued to conserve biodiversity and support the sustainable use of biological resources.

Strategic Directions:

1.90 Use a variety of planning and approval mechanisms that provide for meaningful public and stakeholder participation to prevent or reduce negative impacts on biodiversity that may arise from human settlement activities.

1.91 Develop and implement educational and incentive programs to encourage biodiversity conservation on private lands.

1.92 Promote the acceptance of the requirements of the Convention within the urban development sector through the voluntary establishment of codes of environmental management and the provision of relevant biodiversity education material.

1.93 Determine and mitigate, where practical, incremental and cumulative impacts of human activities on ecosystems and biological resources.

1.94 Support research on ecological carrying capacities and the way that changes in biodiversity, human population density, land and resource development and resource consumption patterns and rates affect one another.

1.95 Reduce resource consumption by promoting initiatives based on the "three R's" - reduce, reuse and recycle - and by increasing awareness of the value of biodiversity and the lifestyle choices that cause its decline.

1.96 Work through appropriate national and international organizations to improve dialogue and communication and to encourage research on the linkages among population, social issues, consumption and production of resources and ecological carrying capacity in order to formulate sustainable development policies.

Ecological Management

GOAL 2

To improve our understanding of ecosystems and increase our resource management capability.

Considerable effort has been directed at developing an ecological management approach in Canada. In order to conserve biodiversity and use our biological resources in a sustainable manner, we must continue to improve our understanding of ecosystems and our planning and management capabilities.

The focus of Goal 2 is to set directions for enhancing our ecological management capacity by emphasizing management and planning at the landscape and waterscape levels.

Ecological Management -

The management of human activities so that ecosystems, their structure, function, composition, and the physical, chemical, and biological processes that shape them, continue at appropriate temporal and spatial scales. Ecological management is also referred to as ecosystem management or an ecological approach to management.

A. Improving Our Ecological Management Capability

Research

In order to develop an ecological approach to the management of resources, it is necessary to better understand ecosystems and to determine the impacts of human use of resources on biodiversity. An effective research agenda for biodiversity must be coordinated and prioritized.

Research can lead to new uses of biological resources, identify new opportunities for conservation incentives, and provide the basis for further economic diversification and investment.

Research

Article 12:

b) Promote and encourage research which contributes to the conservation and sustainable use of biodiversity.

Convention on Biological Diversity

Strategic Directions:

2.1 Focus research to improve policy development and to integrate multiple land and resource-use objectives, with emphasis on:

- a)increasing our understanding of the impacts of human use on ecosystems and biological resources;
- b) providing support for multi-disciplinary or system-based research that improves the integration of social, economic and environmental policies;
- c) developing methodologies that permit an improved valuation of biodiversity;

d) developing and implementing issue identification measures and adaptive management techniques to enhance management performance; and

e) developing and implementing conflict resolution models to resolve conflicts between various resource users.

2.2 Focus research to increase our understanding of ecosystems and our ability to manage human use of ecosystems and resources by:

a) examining the structure, function and composition of ecosystems, landscapes and waterscapes and the ecological services they provide;

b) developing cost-effective biodiversity inventory and monitoring methods and programs, including rapid assessment procedures and biodiversity indicators , to detect and monitor changes to ecosystems, species and genetic diversity;

c) evaluating and improving methodologies to determine sustainable resource use levels;

d) improving in situ and ex situ conservation methods, especially to enhance the recovery or rehabilitation of populations, species or ecosystems that are at risk; and

e) exploring new sustainable uses of biological resources for economic applications.

Indigenous Knowledge, Innovations and Practices

Article 8:

j) Subject to national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant to the conservation and sustainable use of biodiversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.

Convention on Biological Diversity

Traditional Knowledge

Many communities, families and individuals have accumulated traditional knowledge that is relevant to the conservation of biodiversity and the sustainable use of biological resources. This knowledge may relate to harvesting resources,

planting crops, using natural herbs and other material for medicinal purposes, and understanding changes that have occurred to local biological features and landscapes.

Traditional knowledge can provide an excellent basis for developing conservation and sustainable use policies and programs. All too often, however, traditional knowledge is inappropriately used or disregarded by policy-makers, scientists, resource planners and managers.

Occasionally the holders of traditional knowledge are reluctant to pass on information to individuals who are not members of their community. They may be concerned that this information will be used inappropriately or without their permission.

Strategic Directions:

2.3 Identify mechanisms to use traditional knowledge, innovations and practices with the involvement of the holders of such knowledge, innovations and practices, and encourage the equitable sharing of benefits arising from the utilization of such knowledge, innovations and practices.

Inventories: Landscape, Species and Genetic Levels

Comprehensive and reliable biological inventories are a fundamental requirement for the conservation of biodiversity and the sustainable use of biological resources. They provide the foundation for:

- determining the status of ecosystems, species and genetic resources;
- setting sustainable harvest rates for biological resources;
- conducting research;
- developing resource- and land-use plans; and
- assessing the impacts of resource management practices on ecosystems.

Inventory of Biodiversity

Article 7:

a) Identify components of biodiversity important for its conservation and sustainable use.

Convention on Biological Diversity

In Canada many kinds of biological inventories are conducted at the landscape and ecosystem levels. They are used to develop macro-scale policies and plans, regional land-use plans, forest management plans and frameworks for selecting protected areas.

Most of Canada's trees, flowering plants, mammals, birds, fish, reptiles and amphibians are relatively easy to observe and have, therefore, been discovered, named and classified. At the species level, many resource agencies have well developed inventories, especially for harvested species. Wildlife agencies routinely survey game species such as ducks, geese, deer and moose. Forest agencies inventory commercially valuable tree species. Species that have a potentially negative impact on commercial crops are also surveyed so that agencies and individuals can predict and prevent or reduce damage. However there are large gaps in our knowledge of organisms that are more difficult to observe and classify, such as viruses, bacteria, fungi, protists and insects. Scientists estimate that only 50 percent of Canada's species have been discovered, named and classified.

We cannot even estimate the number of species of organisms on Earth to an order of magnitude, an appalling situation in terms of knowledge and our ability to affect the human prospect positively. There are clearly few areas of science about which so little is known, and none of such direct relevance to human beings.
Peter H. Raven, *Global Biodiversity Strategy*

The genetic diversity of the Earth's flora and fauna is very poorly understood. Even within institutions such as gene banks, which were expressly established to conserve economically important genetic resources, the genetic diversity of these resources has hardly been studied.

Inventory work requires highly skilled and trained personnel. There is currently a shortage of taxonomists and biosystematists - experts who identify and describe species. Moreover, very few university students are entering these fields, making it very difficult to replace retiring scientists.

Priorities need to be set to address gaps in our biological and biophysical data base. Landscape/waterscape-level inventories will be effective in supporting the development of land-use and resource management policies and plans, while more detailed inventories will be required to support more refined planning and site-specific developments. Inventories must be designed to achieve specified objectives.

Strategic Directions:

2.4 Improve biophysical inventories at ecosystem, species and genetic levels by:

- a) developing and applying regionally integrated landscape-level classification systems for terrestrial, freshwater and marine areas to provide a framework for the collection of information and the management of resources;
- b) linking biological inventories and soil, climate and other surveys;
- c) conducting biological inventories, based upon jurisdictional priorities, that take into consideration vulnerable, threatened and endangered species and ecosystems, critical habitats, little-studied taxonomic groups, taxonomic groups of economic importance, areas of high diversity and areas where human development and disturbance are the most significant; and
- d) encouraging the use of innovative and traditional methods to increase knowledge about the diversity of micro-organisms, their functional roles in ecosystems, and their potential economic uses.

Loss of Seeds in North America

A 10-year survey of all seed catalogues in North America indicated that the erosion of traditional varieties of vegetable plants may be quite severe.
Seed Savers Exchange

2.5 Enable agencies and individuals to conduct biological and biophysical inventories by:

- a) developing ways to collectively identify funding sources and determine priorities for inventories; and
- b) ensuring that there is sufficient expertise available to conduct inventory work, including taxonomists, biosystematists, parataxonomists, museum professionals, ecologists, geneticists and other experts.

2.6 Support efforts to improve the reliability and cost-effectiveness of biological inventory methodologies and technologies.

2.7 Maintain the capacity of museums and other institutions to scientifically describe, classify and store collected specimens, as well as maintain their ability to effectively disseminate data and information.

2.8 Continue to establish networks of Conservation Data Centres or Natural Heritage Centres to develop and harmonize data bases for the conservation of vulnerable, threatened and endangered species and ecosystems.

2.9 Improve inventories to determine the genetic diversity of domesticated and non-domesticated biological resources to maximize the conservation and economic use of genetic resources.

2.10 Collaborate with other countries to inventory populations and habitats of transboundary species, particularly those that are at risk.

B. Increasing Resource Management Capability

Data and Information Management

Many government and non-government agencies collect data and information necessary for the conservation of biodiversity and the sustainable use of biological resources. However, collected data and information are often not available because of exchange problems between management systems or because individuals are not aware of potentially useful sources. Also, the full range of data including biological, physical, chemical, social, cultural and economic data, required by resource planners and managers is often unavailable. Effective management systems are required to ensure data and information are available to those who need it.

Data Management

Article 7:

d) Maintain and organize by any mechanism data derived from identification and monitoring activities.

Convention on Biological Diversity

Enhanced coordination among agencies and individuals could solve many data and information communications problems, although access to some information may need to be restricted in order to protect certain populations, species or sites.

Strategic Directions:

2.11 Investigate and implement means to enhance the collection, sharing, analysis, scope and distribution of data and information required to conserve biodiversity and sustainably use biological resources.

2.12 Promote the continuing development of information management systems such as Geographic Information Systems and other technologies that facilitate the rapid analysis and distribution of biological and biophysical data and information.

2.13 Work towards ensuring that data and information generated by publicly-funded studies are made available to potential users through appropriate sharing arrangements.

2.14 Participate in the development and maintenance of appropriate international data bases.

Integrated Planning and Ecological Management

Ecological planning and management, especially at landscape and waterscape levels, are essential to implementing an ecological management approach. Such planning processes should integrate ecological, social, cultural and economic objectives. They should also provide for public and stakeholder participation to prevent and resolve conflicts among various resource users. Integrated planning and ecological management enhances the effectiveness of environmental assessments.

Planning and Integration

Article 6:

a) Develop, or adapt existing strategies, plans or programmes for the conservation and sustainable use of biodiversity reflecting the measures set out in the Convention.

Article 10:

a) Integrate consideration of the conservation and sustainable use of biological resources into national decision-making.

Convention on Biological Diversity

Ecological planning and management efforts have been successfully implemented in many regions of the country. For example, planning processes have been applied

in several forested regions to provide opportunities for multi-stakeholder participation in determining resource use and conservation approaches. Land use planning and ecological management have been effective in determining appropriate land uses in urban areas, and have led to the establishment of protected areas. However, biodiversity conservation considerations are not yet fully integrated into these activities. Enhanced collaboration between all orders of government responsible for planning is required to achieve the conservation of biodiversity and the sustainable use of biological resources.

Strategic Directions:

2.15 Design and implement improved ecological planning and management at the landscape/waterscape level to conserve biodiversity and use biological resources in a sustainable manner.

2.1 6 Improve ecological planning to assist in the conservation of biodiversity and the sustainable use of biological resources, especially in or near sensitive aquatic areas, in areas that support populations of endemic, threatened or endangered species, and in areas that are undergoing significant changes resulting from human activity and development.

Integrated Systems Planning Along the St. Croix River

The St. Croix River, a designated Canadian Heritage River, extends along the Canada/United States border for approximately 185 km. Industrial and residential development along the lower portions of the river threaten the land and water quality. New Brunswick has developed a land-use plan and zoning regulation aimed at protecting the natural environment, scenic values, rural lifestyle and economy, and wildlife along the river corridor, while taking into consideration the need to combine land and water planning. New Brunswick's planning efforts are being harmonized with those of the State of Maine.

2.17 Use ecological or land-use planning to help identify and establish protected areas and to ensure that the ecological integrity of established protected areas is maintained.

2.18 Strengthen planning processes to work toward the conservation of biodiversity and the sustainable use of biological resources of internationally-shared ecosystems and trans-boundary rivers and aquatic ecosystems, such as the Great Lakes and the St. Lawrence River.

2.19 Strengthen international planning efforts and other processes to eliminate or reduce adverse impacts on biodiversity and the sustainable use of biological resources, resulting from activities in other countries, with special consideration placed on migratory species, aquatic ecosystems and airborne pollutants.

Conflicts in British Columbia

The Commission on Resources and Environment (CORE) was established in 1992 to resolve land-use conflicts in British Columbia by bringing land users together to discuss land-use allocations. CORE has initiated land-use plans in four regions of British Columbia, including Vancouver Island, Cariboo-Chilcotin, East Kootenay and West Kootenay-Boundary.

Environmental Assessments and Emergency Planning

Effective mechanisms must be implemented to provide for the adequate assessment and mitigation of the adverse impacts on biodiversity that could result from proposed projects.

Environmental Assessment and Emergency Response

Article 14:

- a) Introduce appropriate procedures requiring environmental impact assessment of proposed projects likely to have significant adverse effects on biodiversity.
- b) Introduce appropriate arrangements to ensure that the environmental consequences of programmes and policies likely to have adverse effects on biodiversity are duly taken into account.
- c) Promote notification, exchange of information and consultation on activities likely to adversely effect biodiversity beyond the limits of national jurisdiction.
- e) Promote national arrangements for emergency responses to activities or events, which present grave or imminent danger to biodiversity.

Convention on Biological Diversity

Environmental assessments, as defined by legislation and policy, are used to determine the effects of projects that have the potential to significantly affect the environment. As our ability improves to inventory, describe and understand the components of biodiversity, better information will be available to enhance the effectiveness of environmental assessments.

Environmental assessments are also conducted to determine the potentially adverse impacts of government initiatives on biodiversity. Often these can be effectively assessed by applying simplified environmental assessment procedures. In some instances, land-use planning and environmental impact assessment have been

successfully merged. This can be very effective in decision-making, as well as in reducing the cumulative impacts of developments.

In addition to implementing environmental assessments, the Convention requires all contracting parties to promote arrangements for emergency responses to events, such as coastal oil spills, that present a grave and imminent danger to biodiversity beyond national jurisdictions.

Strategic Directions:

2.20 Use environmental assessments to determine potential impacts of developments on ecosystem, species and genetic resources and to recommend appropriate ways to avoid or reduce them to acceptable levels.

International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 Requires that:

- *ships and oil handling facilities have oil pollution emergency plans and report any spills; and*
 - *countries promptly respond to oil pollution accidents and cooperate in sharing pollution-control information and training.*
-

2.21 Continue to examine and develop ways to harmonize environmental assessments nationally and internationally, where appropriate.

2.22 Enhance efforts to determine and eliminate or reduce to acceptable levels, cumulative environmental effects that result from human activities on ecosystems, species and genetic diversity. This includes developing early-warning indicators and working towards incorporating cumulative environmental effects into relevant national and international agreements.

2.23 In cooperation with other countries, maintain or develop environmental disaster prevention plans, procedures and other measures, and respond to events that pose grave and imminent risk to national, international and trans-boundary biodiversity.

2.24 Maintain or develop arrangements to notify and respond with appropriate action to events originating in Canada that could significantly affect the biodiversity of other countries.

Training

Ecological planning and management training programs, tailored to the needs of policy-makers and resource managers are required. Training will also help policy-makers understand the implications of policies and programs before they are implemented.

Scientific Training

Article 12:

a) Establish and maintain programmes for scientific and technical education and training in measures for the identification, conservation and sustainable use of biodiversity and its components. Convention on Biological Diversity

Training and information programs are also necessary to keep personnel informed of improved management practices, new technologies, and the appropriate use and

application of traditional knowledge. Highly trained, professional staff will be required in order to implement certain provisions of this Strategy. This will require taking advantage of existing facilities and expertise as much as possible and enhancing communication between educators and institutions.

2.25 Improve coordination and efficiency of training and information programs by strengthening relationships among educational institutions, government agencies, local and indigenous communities, private property owners, non-government organizations, business and industry.

2.26 Strengthen training programs in: ecological management, sustainable use inventory methodologies, monitoring, data management, multi-disciplinary research, management of protected areas, environmental education, environmental assessment and emergency planning.

C. Monitoring

Monitoring programs are required to detect and measure changes in biodiversity, to better understand functional linkages in ecosystems, and to evaluate the success or failure of biodiversity conservation and sustainable use policies and programs.

Monitoring

Article 7:

b) Monitor, through sampling and other techniques, the components of biodiversity... paying particular attention to those requiring urgent conservation measures and those which offer the greatest potential for sustainable use.

c) Identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biodiversity and monitor their effects through sampling and other techniques.

Convention on Biological Diversity

There are currently many monitoring programs underway, including programs that monitor water and air quality, wildlife population and species trends, climate, disease outbreaks, fire and successions. Monitoring is conducted by government and non-government agencies, often independently of each other.

Instances in which species and ecosystems are significantly affected by human activities are on the rise. For example, industrial and domestic acid emissions have increased atmospheric acidity, which, through deposition, has affected the acidity of thousands of water bodies and altered the habitat of many aquatic species. Effective

monitoring programs must be integrated and ecologically-based in order to determine and implement appropriate management practices.

Strategic Directions:

2.27 Develop and implement monitoring programs to:

- a) better understand the functional linkages in ecosystems;
- b) evaluate the success or failure of conservation and sustainable use policies and programs; and
- c) better integrate the monitoring of biological and non-biological parameters.

2.28 Develop and use biodiversity indicators that are meaningful, scientifically defensible, practical and compatible with regional, provincial, territorial, national and international programs.

Everyone can help conserve biodiversity

Biologists are worried that populations of frogs and toads may be declining because of human activities. Volunteers across Ontario are listening to frog calls each night, identifying the species and recording the time, air and water temperature, and weather. These records will help biologists monitor populations and determine what actions are necessary to conserve them.

2.29 Identify appropriate locations to establish base monitoring sites.

2.30 Target monitoring programs on ecosystems, species and populations that are currently under the most stress.

2.31 Develop and implement measures to monitor the ex situ collection of biological resources.

2.32 Use volunteers in monitoring programs where appropriate and practical.

Education and Awareness

GOAL 3

To promote an understanding of the need to conserve biodiversity and use biological resources in a sustainable manner.

The loss of biodiversity is a global problem requiring solutions based on individual and community participation and commitment. If national and international efforts to conserve biodiversity and use biological resources in a sustainable manner are to succeed, individuals and communities must understand and appreciate the value of biodiversity and the causes of its decline.

Education and Awareness

Article 13:

a) Promote understanding of the importance of, and the measures required for, the conservation of biodiversity.
Convention on Biological Diversity

It has been demonstrated that education is the most cost-effective means of producing long-term social change. Education allows individuals to make lifestyle and consumption decisions that are sensitive to biodiversity conservation and sustainable use objectives.

Biodiversity education and community awareness should be strengthened in a variety of ways to reach people across the country. Biodiversity themes should be enhanced in the curricula of formal education systems, as well as in non-formal settings such as museums, zoos, aquariums, botanical gardens, nature centres and parks. Awareness-raising and education could also take place through such means as the mass media, films or interactive computer programs.

A significant portion of Canada's biodiversity exists on private land. Education programs developed for land-owners and local communities will need to be tailored to the needs of these vital audiences.

Education by Example

The Antelope Creek Ranch was established in 1986 through a partnership involving Alberta Fish and Wildlife, Ducks Unlimited Canada and Wildlife Habitat Canada, to demonstrate that sound range management can benefit the land, wildlife, livestock production and recreation.

Members of the public possess valuable knowledge that can contribute significantly to government policies, plans and programs. Processes should be designed in such a way that full and meaningful public participation takes place.

Strategic Directions:

3.1 Develop and deliver effective biodiversity education and awareness programs by:

- a) evaluating and monitoring the level of public understanding and knowledge regarding biodiversity conservation and the sustainable use of biological resources in order to design and target effective education and awareness programs;
- b) integrating themes and messages about biodiversity conservation and the sustainable use of biological resources into the formal educational curriculum;
- c) increasing biodiversity conservation and the sustainable use of biological resources messages by building on existing interpretive programs in national and provincial parks and other protected areas, and at libraries, museums, zoos, aquariums and botanical gardens; and
- d) strengthening coordination among educational institutions, government departments, museums, zoos, aquariums, botanical gardens, businesses, conservation groups and other organizations.

3.2 Enhance opportunities for professional development for those involved in teaching environmental education.

Alberta's Provincial Parks

- Alberta has established environmental education centres known as “outdoor classrooms” in Fish Creek, Peter Lougheed and Dinosaur Provincial Parks.
- Alberta has also developed teaching resources for its provincial parks.

3.3 Create educational material that emphasizes measures that can be taken to prevent or reduce impacts on ecosystems and biological resources.

3.4 Promote public awareness of biodiversity issues, conservation and sustainable use requirements and changes in the state of biodiversity and improvements in resource management practices through periodic reports, fact sheets, electronic information systems and other communication material and methods.

Incentives and Legislation

GOAL 4

To maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources.

Incentives

Canadian society has not recognized the value of ecological services, species and genetic resources. Often, environmental conservation has been seen as a cost to society, rather than an investment in the future, and the benefits of conservation, especially biodiversity conservation, have been improperly understood. As a result, economic decision-making has not adequately reflected the value of biodiversity. However, there is now growing recognition that the ecological systems that support human society are under severe pressure, and that economic activities must be pursued in harmony with the Earth's capacity to support them.

Government and international policies have influenced, and will continue to influence, the conservation of biodiversity and the sustainable use of biological resources. These policies have affected corporate behaviour in major resource sectors, including fisheries, forestry and agriculture and in the development of non-renewable resources. If the objectives of the Convention are to be achieved, federal, provincial, territorial, regional and urban government policies will need to be supportive of biodiversity conservation and the sustainable use of biological resources.

Economic instruments should be developed to influence consumer behaviour in ways that support biodiversity conservation and the sustainable use of biological resources. Individuals and families make daily decisions based on the costs of goods and services. Economic instruments have successfully been used to change consumer spending in many areas. For example, water consumption has been significantly reduced in some urban areas by charging consumers for the volume of water they use, rather than charging a flat fee. Consumers have also shown some willingness to pay more for products they believe are environmentally friendly. Economic instruments such as "green taxes" have been used to influence consumer behaviour. Deposits on containers have been successful in promoting recycling, and debt-for-nature swaps have been effective in establishing protected areas in some countries.

Economic and Social Incentives

Article 11:

Adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biodiversity.

Convention on Biological Diversity

Strategic Directions:

4.1 Maintain or develop and use appropriate social/economic policies and incentives as a means of promoting the conservation of biodiversity, the sustainable use of biological resources and new sustainable uses of biological resources.

4.2 Enhance our capability to assign a value to biodiversity, and increase efforts to construct a natural resources account that considers ecosystem degradation, loss of species and genetic diversity and resource depletion, and complements standard national income accounts.

4.3 Investigate the impact of proposed biodiversity conservation policies and programs on economic activities in order to develop effective conservation measures that enhance positive impacts and minimize negative impacts on the economy.

4.4 Determine and make available to policy-makers the estimated costs associated with unsustainable use of biological resources, including the costs of ecosystem degradation and the depletion of species and populations.

4.5 Ensure that economic, trade, conservation and sustainable resource-use laws and policies are mutually supportive.

4.6 Encourage the participation of property owners and resource developers in biodiversity conservation programs.

Legislation

Legislation is an important tool that can contribute to achieving the conservation of biodiversity and the sustainable use of biological resources. Legislation is most effective when it is developed and used as part of an overall strategy that includes planning systems, education and incentives.

Legislation regarding biodiversity is administered by the various orders of government. Implementing the Convention does not require changing the

constitutional division of powers in Canada. However, governments are prepared to examine current administrative arrangements with a view to ensuring that administrative efficiency and effectiveness are optimized.

National Decision-making

Article 6:

Develop national strategies, plans or programmes for the conservation and sustainable use of biodiversity, or adapt for this purpose existing strategies, plans or programmes.

Convention on Biological Diversity

Strategic Directions:

4.7 Jurisdictions will examine their current legislative regimes with respect to the goals of this Strategy, and take the necessary and practical steps towards creating an improved legislative framework that supports the conservation of biodiversity and the sustainable use of biological resources.

4.8 Jurisdictions will determine whether harmonization among Canadian jurisdictions and other countries of biodiversity-related legislation is necessary to reduce duplication and fill gaps and work towards harmonization where appropriate and practical.

International Cooperation

GOAL 5

To work with other countries to conserve biodiversity, use biological resources in a sustainable manner and share equitably the benefits that arise from the utilization of genetic resources.

In ratifying the Convention, Canada has demonstrated a commitment to the international effort to conserve the planet's biodiversity and use biological resources in a sustainable manner. Canadians recognize that the protection of the global environment is the common concern of all nations. The international dimension of the Convention addresses the need for countries to coordinate and organize efforts on a global scale, while respecting each country's own priorities and sovereignty over its biological resources.

International Cooperation

Article 5:

Cooperate with other Contracting Parties through competent international organizations, in respect of areas beyond national jurisdiction and on other matters of mutual interest, for the conservation and sustainable use of biodiversity.

Convention on Biological Diversity

One of the key features of the Convention is to share benefits arising from the use of genetic resources in a "fair and equitable way", particularly with respect to developing countries. Working with other countries involves participating in international biodiversity programs, activities, institutions and agreements. The international community will need to assist some countries in improving their capacity to address the objectives of the Convention. Canada realizes the importance of building partnerships with other countries by developing and sharing knowledge, expertise, technologies and genetic resources in a fair and equitable way. The establishment of a consistent framework for sharing benefits will be a key outcome of the Convention.

Canada is cooperating with developing countries on a broad range of activities in order to develop their capacity to conserve biodiversity and use biological resources in a sustainable manner. Through contributions to the Global Environment Facility, Canada has provided new and additional funding to address global environmental concerns, including biodiversity loss. Canada's Official Development Assistance programs provide resources and technical assistance to support sustainable development in developing countries, including projects and programs designed to help these countries reap long-term benefits from the sustainable use of

their biological resources. Other Canadian government and non-government organizations also carry out valuable work in developing countries which support the objectives of the Convention. Canada is an active participant in international bodies devoted to the conservation and sustainable use of biodiversity in these countries.

Strategic Directions

5.1 Participate in international efforts to coordinate and enhance activities related to the conservation of biodiversity and the sustainable use of biological resources by:

- a) encouraging the implementation and integration of the objectives of the Convention;
- b) participating in international bodies to consider the development of international agreements to complement the Convention; and
- c) considering the objectives of the Convention in the context of, and in relation to, other international agreements.

Wetlands of International Importance - The Ramsar Convention

The Convention on Wetlands of International Importance, was signed in Ramsar, Iran in 1971 and came into force in 1975. This Convention provides a framework for international cooperation for the conservation of wetland habitats.

Canada has designated over 30 Ramsar sites since its accession to the Convention in January 1981.

5.2 Support the implementation of the Convention in developing countries by:

- a) providing assistance, in particular through the Global Environment Facility; and
- b) cooperating with developing countries to improve their capacities to plan and implement biodiversity conservation policies, strategies and plans and to use biological resources in a sustainable manner.

5.3 Explore mechanisms to facilitate the transfer of environmentally sound technologies to promote the conservation and sustainable use of biodiversity by:

a) encouraging collaboration to develop new approaches to technology transfer among the private sector, government, non-governmental organizations and communities; and

b) facilitating access to samples of Canada's genetic resources on mutually-agreed terms, and under the understanding that arrangements will differ for each sector using these resources.

5.4 Cooperate with the international community to explore mechanisms to encourage the private sector, government, indigenous communities, non-government organizations and communities to share benefits derived from using genetic resources provided by other countries.

5.5 Encourage the participation of stakeholders, including non-government organizations, the private sector, and indigenous communities, in international efforts to implement the Convention.

5.6 Incorporate biodiversity conservation and the sustainable use of biological resources into the criteria for choosing, designing, and evaluating development assistance projects.

Implementation

The Canadian Biodiversity Strategy is a key building block in our efforts to achieve sustainable development. Ultimately, the degree to which the Strategy is able to enhance our national capacity to conserve biodiversity and achieve sustainable development will be the measure of its success. Specifically, we will know that the Strategy is making a difference if:

- the value and importance of biodiversity is reflected in the actions and decisions of all sectors of society, from corporations to individual consumers, private property owners, and various orders of government;
- we are capturing existing information, generating new knowledge about biological resources and conveying that knowledge in a useful, timely and efficient way;
- we are no longer planning and making decisions based exclusively on a species-by-species or sector-by-sector basis, but are practising ecological management;
- opportunities are being created through technological innovation, application of traditional knowledge, scientific discoveries and new applications of sustainable use; and

- we are maintaining biodiversity for future generations and contributing to conservation and sustainable use efforts worldwide through financial assistance, knowledge, expertise and exchange of genetic resources.

The capacity to determine how biodiversity is managed is not limited to governments. Local and indigenous communities, businesses and industries, conservation groups, research and educational institutions, and individuals must be involved in the implementation of the Strategy. Success will require a coordinated approach based on cross-sectoral cooperation and partnerships among all orders of government, non-government organizations, private sector interests and individuals.

Numerous policies, plans and programs have been developed in Canada to enhance the conservation of biodiversity and to achieve the sustainable use of biological resources. Jurisdictions have developed conservation and sustainable development strategies and policy statements regarding the conservation of wetlands and other aquatic ecosystems, wildlife, fisheries, forest and agricultural resources, and protected areas.

Wildlife Habitat Conservation Initiative in Newfoundland

In 1993, the Government of Newfoundland and Labrador and Wildlife Habitat Canada entered into a three-year Memorandum of Understanding (MOU) regarding the protection and enhancement of wildlife habitat in Newfoundland.

Among other things, this MOU calls for the establishment of a framework for biodiversity conservation that challenges an array of potential partners to cooperate on and participate in wildlife habitat conservation programs. The MOU also provides for the establishment of a Steering Committee responsible for advocating biodiversity initiatives.

Conservation and sustainable development strategies, sectoral policies and programs, and regional plans, Round Tables on the Environment and Economy, land claim settlement agreements, and many other mechanisms can be immediately used to help implement the Strategy. Mechanisms to more specifically address the provisions of this Strategy will be brought on stream according to the policies, priorities, constraints and needs of each jurisdiction.

Given the broad scope of the Strategy, it will be necessary to set priorities for action. Priority setting will require evaluating the costs of inaction as well as the costs of taking proposed actions.

To ensure effective and coordinated implementation of the Canadian Biodiversity Strategy in accordance with each jurisdiction's priorities and fiscal capabilities, federal, provincial and territorial governments will:

6.1 Strengthen linkages at the Ministerial level to oversee the implementation and monitoring of the Canadian Biodiversity Strategy.

6.2 Report within one year after the Ministerial endorsement of the Canadian Biodiversity Strategy on policies, programs, strategies and actions that are underway or will be undertaken to implement the Strategy, and subsequently report publicly on progress in implementing the Canadian Biodiversity Strategy at a frequency to be determined.

6.3 Within each jurisdiction, maintain or develop mechanisms to provide opportunities for meaningful participation of regional and urban governments, local and indigenous communities, interested individuals and groups, business interests, and the scientific community in implementing the Strategy.

6.4 Coordinate elements of the Strategy that require national participation in order to help develop international positions on biodiversity matters and oversee the development of national and international progress reports.

6.5 Ensure that there are mechanisms in place that permit and encourage non-government organizations and members of the public to participate in the implementation of the Strategy and the development of international biodiversity agreements.

6.6 Report periodically to Canadians and the international community on the status of Canada's biodiversity.

6.7 Challenge and invite all Canadians to contribute toward achieving the goals of the Strategy and take action to conserve biodiversity and to use biological resources in a sustainable manner.

6.8 Explore mechanisms to provide opportunities for participation of indigenous communities in implementing the Strategy through a variety of mechanisms such as resource management agreements, management boards, model forest programs and other means.

Indigenous Community Implementation

For thousands of years prior to the arrival of Europeans, indigenous people depended on the land and its natural resources to meet their physical, social, cultural and spiritual needs. Many indigenous communities continue to have an intimate cultural relationship with the land and its resources. Individuals in these

communities possess a range of expertise that could significantly contribute to the conservation of biodiversity and the sustainable use of biological resources.

The existing aboriginal and treaty rights of the indigenous people of Canada are recognized and affirmed in the Constitution and by decisions of the Supreme Court. Agreements between governments and aboriginal authorities have led to the creation of cooperative management regimes for wildlife. Indigenous people have certain management authorities relating to the use of settlement and reserve lands and management of the resources on those lands. Through negotiated cooperative agreements, indigenous communities are assuming increased responsibility for the management of biological resources.

In 1987, the report of the World Commission on Environment and Development highlighted the importance of preserving the traditional knowledge and experience that exists within indigenous communities. The report stated that the loss of traditional knowledge and skills in sustainably managing complex ecosystems would be a loss to society. The Convention on Biological Diversity reinforces the need to respect, preserve and maintain the knowledge, innovations and practices of indigenous communities that relate to the conservation and sustainable use of biodiversity.

Protecting Traditional Practices

Article 10:

c) Protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation and sustainable use requirements.

Convention on Biological Diversity

Indigenous response to the Convention must be community-based and community-paced. This will require formulating local systems for preserving, using and regenerating traditional indigenous knowledge.

Strategic Directions

7.1 Indigenous communities develop an approach to implementing the Convention with a view to reflecting distinct indigenous values, social networks, traditional economies and cultures by:

- a) building on the current networking process of meetings, workshops and other consultation methods that enable indigenous communities to determine how they will contribute to the implementation of the Biodiversity Convention;

- b) demonstrating the role of indigenous knowledge and management in the conservation and sustainable use of biodiversity, and establishing opportunities for indigenous communities to share their knowledge of biodiversity and the management of biological resources with non-indigenous communities;
- c) leading the development of community-based regimes designed to preserve traditional indigenous knowledge, innovations and practices and recognizing their potential economic, scientific, social and cultural values;

The Beverly-Qamanirjuaq Caribou Management Board

The Beverly-Qamanirjuaq Caribou Management Board was set up in the Northwest Territories in 1982 to provide a mechanism to incorporate the knowledge and values held by traditional caribou users into decision-making. The Board consists of representatives from eight user communities and five government jurisdictions. The success of the Board represents a practical example of the capability of co-management structures to integrate specialized knowledge held by traditional resource users with the scientific knowledge of biologists, leading to effective, efficient and fair management of the resource.

- d) establishing linkages with federal, provincial and territorial agencies responsible for implementing the Convention; and
- e) facilitating the maintenance of indigenous social and cultural traditions that support the communication of traditional knowledge and resource use methods among generations and communities.

7.2 Encourage the development of an indigenous community analysis of the Convention with reference to "knowledge, innovations and practices of indigenous communities" by taking into account issues of intellectual property rights and the use of genetic resources. This analysis should emphasize ways in which knowledge and practices are applied in biodiversity conservation and examine how innovations can be protected by intellectual property rights.

7.3 Examine ways in which indigenous groups can share their knowledge and experience, and develop joint programs with indigenous groups inside and outside Canada.

Glossary

Aquatic Biodiversity - includes both marine and freshwater biodiversity including wetlands, bogs, marshes, groundwater, etc.

Biodiversity or Biological Diversity - the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

Biodiversity Indicators - indicators or measures that allow us to determine the degree of biological or environmental changes within ecosystems, populations or groups of organisms over time and space.

Biological Reference Point - with respect to fisheries management, is an estimated value derived through agreed-upon scientific procedures, that corresponds to the state of a stock and can be used as a guide for fisheries management.

Biological Resources - includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity.

Biosystematists - scientists who discover, describe, scientifically name and classify species while also considering evolutionary aspects of the species.

Biotechnology - the application of science and engineering in the direct or indirect use of living organisms, or parts or products of living organisms, in their natural or modified forms.

Conservation - the maintenance of sustainable use of the Earth's resources in a manner that maintains ecosystem, species and genetic diversity and the evolutionary and other processes that shaped them. Conservation may or may not involve the use of resources; that is, certain areas, species or populations may be excluded from human use as part of an overall landscape/waterscape conservation approach.

Corridors - this term is used in the Strategy in a general sense to refer to measures that are taken to ensure the natural immigration and emigration of populations and species. This may be a [physical corridor, such as a terrestrial or marine migration route, a flyway, or it may refer to a particular management practice that allows species and populations to continue patterns of movement.

Debt-for-Nature Swap - a form of debt-equity conversion whereby a portion of a developing country's external debt is forgiven or paid by another country in exchange for specified environmental protection or biodiversity conservation measures.

Ecological Management - the management of human activities so that ecosystems, their structure, function, composition, and the physical, chemical, and biological processes that shaped them, continue at appropriate temporal and spatial scales. Ecological management is sometimes called ecosystem management or an ecological approach to management.

Ecological Services - services that humans derive from ecological functions such as photosynthesis, oxygen production, water purification and so on.

Ecosystem - a dynamic complex of plants, animals and micro-organisms and their non-living environment interacting as a functional unit. The term ecosystem can describe small scale units, such as a drop of water, as well as large scale units, such as the biosphere.

Endangered species - species that are threatened with immediate extinction or extirpation if the factors threatening them continue to operate. Included are species whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic Species - are species which exist in only one specific areas, or ecological zone.

Ex situ Conservation - the conservation of components of biological diversity outside their natural habitats, often in such institutions as zoos, museums, botanical gardens, aquariums and gene banks.

Extirpated Canadian Species - species that are no longer found in the wild in Canada but exist elsewhere in the world.

Genetic engineering - the technique involving the transfer of specific genetic information from one organism to another.

Genetically modified organism - an organism whose genetic information has been altered by any technique including natural processes, mutagenesis or genetic engineering.

Genetic Resources - genetic material of actual or potential value.

Germplasm - genetic material (with a definite chemical and molecular constitution) that forms the physical basis of inherited qualities and is transmitted from generation to generation by the germ cells.

Global Environment Facility (GEF) - a financial mechanism that provides grant and concessional funds to developing countries for projects and activities that aim to protect the global environment. It is jointly implemented by the United Nations Development Programme (UNDP), the United Nations Environment Programme

(UNEP) and the World Bank. In 1994, 73 participating governments, including Canada, agreed to replenish the GEF with over US \$2 billion to be committed over a three year period. GEF resources are available for projects and other activities addressing biodiversity, climate change, international waters and the depletion of the ozone layer.

Habitat - the place or type of site where an organism or population naturally occurs. Species may require different habitats for different uses throughout their lifecycle.

Harmful Alien Organisms - organisms that enter an ecosystem in which they are not naturally known to exist - through deliberate or inadvertent actions by humans - and thereby pose a threat to native species.

In situ Conditions - conditions where genetic resources exist within ecosystems and natural habitats, and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive properties.

In situ Conservation - the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings and, in the case of domesticated or cultivated species, in the surroundings where they have developed their distinctive characteristics.

Integrated Pest Management (IPM) - a holistic or integrated approach to controlling the risks and damage associated with natural predators, diseases and pests. It involves using site-specific information to determine the most effective combination of physical, chemical, biological, or cultural practices to reduce damage, while reducing impacts on the environment, biological diversity and human health. In agriculture, this means a farmer can use a combination of tillage practices or crop rotations, intercropping, crop mixes, strip isolation, etc. with certain chemical or biological control products, to effectively control damage to his crops and animals while having minimal impact on humans and the environment.

Landscapes - complexes of terrestrial ecosystems in geographically defined areas.

Living Modified Organisms - organisms that have been genetically modified through the applications of biotechnology, including organisms that have been modified by novel recombinant DNA techniques, as well mutagenesis or classical breeding and selection techniques.

Micro-organism - any organism that can be seen only with the aid of a microscope.

Mutagenesis - a process whereby the genetic information of an organism is changed in a stable, heritable manner, either in nature or induced experimentally via the use of chemicals or radiation. In agriculture, these genetic changes are used to improve agronomically useful traits.

Natural Resources Accounting - accounting for the state and quality of the environment and the natural resource base by deducting from the gross domestic product various aspects of environmental degradation, such as the value of pollution abatement and control expenditures, the cost of environmental damage, and the depletion of natural resources.

Non-renewable Resources - resources such as minerals, metals, natural gas and oil, whose reserves are depleted by their use.

Pest Control Products - classes of substances that are generally referred to as insecticides, pesticides, herbicides, fungicides, germicides, nematicides, bactericides, viricides and are either of a chemical or biological nature.

Protists - uni-cellular organisms.

Protected Area - geographically defined areas that are designed or regulated and managed to achieve specific conservation objectives.

Rare Species - small populations of species that are not currently endangered or vulnerable, but are at risk. These species are usually localized within restricted geographical area or habitats or are thinly scattered over a more extensive range. Rarity can be defined locally, regionally, provincially/ territorially, nationally or globally.

Rehabilitation - the return of a species, population or ecosystem to a healthy, functioning state.

RENEW - committee on the Recovery of Nationally Endangered Wildlife, consisting of government, non-government and private sector representatives. The RENEW committee prepares recovery plans at the multi-species or ecosystem level to benefit all components of biodiversity. Since RENEW was formed in 1988, cooperating agencies have spent more than \$10 million on endangered species recovery efforts. Currently recovery teams are in operation for 33 species, with approved recovery plans in effect for 13 of them.

Resources Harvesting - the harvesting of biological resources for the purpose of subsistence or economic gain. Includes both aquatic and terrestrial resources.

Restoration - the return of a species, population or ecosystem to its state prior to disturbance.

Speciation - the evolutionary process of species formation.

Summerfallow - land which is plowed and tilled frequently during the summer in preparation for the crop the following year.

Sustainable Development - development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable Harvest Rate - the rate of harvest that is within an ecosystem's natural ability to recover and regenerate.

Sustainable Use - the use of components of biodiversity in a way and at a rate that does not lead to their long-term decline thereby maintaining the potential for future generations to meet their needs and aspirations. Sustainable use in this Strategy refers to consumptive uses of biological resources.

Taxonomists - scientists who discover, describe, scientifically name and classify species.

Threatened Species - species that are likely to become endangered if the natural or human pressures causing them to be vulnerable are not reversed.

Traditional Knowledge - knowledge gained from generations of living and working within a family, community or culture.

Vulnerable Species - species that are at risk because they exist in low numbers or in restricted ranges due to over-exploitation, extensive habitat destruction or other factors.

Waterscapes - complexes of aquatic ecosystems in geographically defined areas.

Wild Flora and Fauna and other Wild Organisms - includes mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, protists, viruses, fungi, algae and bacteria.

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