

NATURAL RESOURCES AND SUSTAINABLE DEVELOPMENT PRACTICES

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I PERSPECTIVES ON NATURAL RESOURCES

Human beings have always relied on the natural environment for raw materials, energy and waste assimilation. Although we may feel as if we live in largely segregated unnatural or artificial environments, these environments are still created from the basic materials provided by nature. Our homes, workplaces, cars, and other possessions are produced from raw materials such as wood, rock and minerals that have been processed to be better suited to our needs, and are powered by hydroelectricity (flowing water), coal, oil, natural gas or in some situations, the sun, the wind or bio-materials. We depend on natural resources for our very survival and therefore we should use them in a sustainable manner.

Unfortunately, most of the western world has historically viewed nature as something to be conquered and exploited for our own needs. Droughts, floods, diseases, water pollution, species extinctions, climate change, smog, acid rain, and declining marine and terrestrial habitats are testaments to the misuse of our natural heritage.

Today, thanks to the work of countless individuals, such as Rachel Carson, Aldo Leopold, and James Lovelock we have started to recognize the damage we are causing not only the natural environment but also ourselves. The world has begun to come together to collectively find more sustainable ways of living and ways of solving global environmental problems such as diversification, ozone depletion, declining biodiversity, degraded water supplies and climate change.

There are, however, a number of different perspectives on how we should address these issues. There are some radical ecologists who believe that fundamental shifts in social structures and human values are needed. These individuals tend to believe that eco-systems have inherent value separate from human use. Others argue that natural resources should be viewed from a human or anthropocentric standpoint and should be valued for the utility they provide.

An Alternative Perspective

Many cultures, particularly indigenous cultures view humans as a part of an ecosystem. People are believed to be able to use nature in certain ways while also contributing to the natural cycles of the environment. The idea of linear, one-way resource extraction is rejected by these cultures in favour of a non-linear process of living within and giving to as well as receiving from the natural world.

There are others who argue that human values and social systems can remain much the same and that new technologies and greater efficiency will allow for unlimited economic growth despite finite natural resources. Still others view natural resource issues as interconnected to human rights and social justice issues or eco-feminism.

Ultimately decisions affecting natural resources are a balance between the needs and wants of various stakeholders. The decisions are not easy and they are always complex.

For example, imagine you are Mr. Smith, the head of SmithOil facing the decision whether to develop an oil field. You are faced with a difficult decision that must involve the consideration of all perspectives and all potential issues. Your decision-making process should include input from all interested people but it is unlikely that you will be able to please everyone.

As a member of our society you are responsible for making your own decisions about your personal use of natural resources and your participation in decisions and actions about resource use in your community, nation and the world. This paper is designed to give you information about natural resources to help inform **your** decisions.

TO LEARN MORE...

[Renewable Natural Resources Foundation](#)
[Natural Resources in Canada – A Backgrounder](#)
[United States' Definition of Natural Resources](#)
[Conserving Natural Resources](#)

2 WHAT ARE NATURAL RESOURCES?

The majority of people in Western Society define natural resources as the nonhuman factors of production used to produce goods and services to satisfy wants and needs. In other words, natural resources are the physical components of the environment (wood, water, minerals, oil, natural gas, air and solar energy) and living things (animals, plants, vegetables) that can be directly used or transformed to cater to human needs.

We can divide natural resources into two categories: renewable and non-renewable. A natural resource is called renewable if some natural process can replenish it in a perceivable amount of time (soil, air, sunlight, wood, water). Non-renewable resources refer to those that are not replaced; once it is used it can never be replenished (oil, coal, aluminium). Recently, industrialized society has started recycling materials. Recycling is a term used for industrial processes that melt and reshape old materials such as pop cans, bottles and paper products so that they can be used again.

[What are Natural Resources?: A Discussion about “Value”](#)
[What are renewable resources and why are they important? \(pdf\)](#)
[What is a resource? Economic versus Ecological Resources](#)
[The Tragedy of the Commons](#)
[Top Ten Reasons to Remove Nonrenewable Resources from Equalization \(pdf\)](#)

3 OUR NATURAL RESOURCES: PROBLEMS AND OPPORTUNITIES

The extraction, processing and use of natural resources can result in the unsustainable degradation of these resources and the surrounding environment. [Agenda 21](#) identified 12 natural resource issues. They are:

[Agriculture](#)

[Atmosphere](#)

[Biodiversity](#)

[Desertification and Drought](#)

[Energy](#)

[Forests](#)

[Freshwater](#)

[Land Management](#)

[Mountains](#)

[Oceans and Coastal Areas](#)

[Toxic Chemicals](#)

[Waste and Hazardous Materials](#)

Let's take a look at each of these and identify some of the contentious issues in these fields.

3.1 AGRICULTURE

The United Nations predicts that by the year 2025, 83 percent of the expected global population of 8.5 billion will be living in developing countries. This incredible increase in population density will pose major threats to food security. Expected population growth coupled with the maldistribution of the world's resources may lead us to exceed the current capacity of available resources and technologies to satisfy demand for food and other agricultural commodities.

Livestock and crop output has increased for the past three decades as a result of technological developments and land-use changes. This growth, however, is not likely to continue indefinitely. The rate of growth has been slowing as land for agricultural conversion has become increasingly scarce. Furthermore, many of the techniques used to increase production such as mechanization, the development of new crop varieties, irrigation systems, fertilizers, and pesticides have had an effect on soil quality and productivity. They have also had unexpected costs on society and they are all now controversial.

Mechanization is energy intensive; it has resulted in high levels of emissions into the atmosphere, high costs, the loss of jobs and the disruption of traditional nutrient recycling processes. Farmland has been degraded by erosion, salinization, compaction, nutrient depletion and pollution caused by new farming practices.

There has also been a high social cost. Many small farmers have found it difficult to pay the high prices required for inputs such as tractors, fertilizers, and automated equipment. Many of them have lost their farms and land ownership to large-scale agri-businesses, most often to become low-wage workers for these owners from richer countries.

New agricultural methods as well as trade systems often involve conflicts over land ownership, the role of the small farmer vs large-scale agri-business or corporations, the development of

Biotechnology – Hope or Hubris?

The controversial bio-tech corporation [Monsanto](#) argues that Bio-technology is essential to: meeting the world's growing food and fibre needs, conserving natural resources, and improving the environment.

In contrast, organizations like [Greenpeace](#) argue that bio-technology is a highly risky industry with many unknown long-term human health and environmental risks that also compromises the rights of farmers and citizens.

monocultures, the use of bio-technology and resulting patents ownership, and the practice of agriculture for self sufficiency vs export.

TO LEARN MORE...

[Canada's Report on Agenda 21 - Agriculture](#)

[University of California – Sustainable Agriculture](#)

[AVISO – Food Security in a Changing World](#)

[AVISO - Population, Change and Human Security](#)

[Agricultural production in the South](#)

[Sustainable Agriculture – Yahoo Portal](#)

[Agriculture and Agribusiness](#)

[Biotechnology](#)

3.2 ATMOSPHERE

The atmosphere, a mixture of oxygen, nitrogen, carbon dioxide, argon and other trace gases, is essential to life, as we know it. The burning of natural resources such as fossil fuels can result in air pollution - the contamination of air by the discharge of harmful substances. Air pollution can cause health problems including cancer, birth defects, brain and nerve damage, and long-term injury to the lungs and breathing.

Air pollution can also damage trees, lakes, and animals, the ozone layer, buildings, monuments, statues, and other structures and can result in haze, which reduces visibility. Air pollution that contains greenhouse gases can also contribute to climate change.

CLIMATE CHANGE

Over the next few decades, scientists believe that the earth may undergo unprecedented climatic changes as a result of human induced increases in greenhouse gases (GHG`s).

WHAT ARE GREENHOUSE GASES?

The atmosphere naturally contains compounds known as greenhouse gases (GHG`s), including carbon dioxide, methane, nitrous oxide, Tropospheric Ozone and water. These gases allow short wave radiation from the sun to pass through them but trap long wave radiation from the earth preventing some heat from escaping from the atmosphere. The presence of these gases maintains the earth at an average of 15 °C. Without these gases earth's average temperature would be - 10 °C and life as we know it would not exist.

WHAT IS CLIMATE CHANGE?

Although our climate is naturally dynamic and has been altered by natural causes in the past, the magnitude and rate of current climatic changes is unprecedented. Global temperatures are projected to rise anywhere between 1.4 and 5.8 °C in the period between 1990 and 2100, resulting in changing weather patterns, increasing frequent extreme events and a 0.09 to 0.88 meter rise in sea level. These changes are attributed to an enhanced greenhouse effect.

The natural greenhouse effect described above is augmented by anthropogenic activities, including land use changes such as deforestation and the use of non-renewable energy sources such as coal, oil and natural gas, that emit large amounts of GHGs, including CFC`s, HCFC`s and HFC`s. Over the last century concentrations of greenhouse gases have increased significantly.

Carbon dioxide levels have increased from pre-industrial levels of 288 ppm to over 364 ppm and the concentration of other GHGs such as methane have more than doubled.

WHAT ARE THE IMPACTS OF CLIMATE CHANGE?

Evidence suggests that climate change, attributed at least in part to human induced increases in greenhouse gases, has already had a significant impact on natural ecosystems (e.g. forests), the physical environment (e.g. sea levels) and associated socio-economic systems (e.g. tourism). Over the last century global average surface temperatures have increased by about 0.6 °C, resulting in decreased snow and ice cover, rising sea levels, increased ocean heat content, increases in precipitation and severe weather phenomena and a reduction in severely low temperatures. Agriculture, tourism and insurance industries have reported significant losses due to these changes and many regions have been forced to repair or redesign infrastructure that has been impacted by floods and droughts.

Although uncertainties remain in determining the rate, magnitude and regional implications of climatic changes that are expected to occur, the scientific community has concluded that increases in surface temperature and changes in precipitation associated with the enhanced greenhouse effect are expected to result in sea level rise and coastal flooding, declining snow and ice cover, increases in severe storms and other weather events, increasing water scarcity, forced species migration, declining bio-diversity, increased health risks and the spread of vector born diseases. The impacts of these changes will be felt by all societies, especially less developed nations that do not have the resources with which to predict, mitigate and adapt to these changes.

HOW CAN HUMAN POPULATIONS RESPOND TO CLIMATE CHANGE?

There are essential two responses to climate change: mitigation and adaptation. Mitigation aims to reduce current climate change by minimizing greenhouse gas emissions through increased energy efficiency, the use of renewable energy and shifting transportation and living patterns. Adaptation focuses on activities that will enable populations to survive in predicted future climates. Adaptive action includes, developing drought resistant crops, building sea wall barriers and building cooling systems. Both mitigation and adaptation strategies are essential components of the global response to climate change.

WHAT HAS BEEN DONE SO FAR?

Climate change has been a major issue on the international agenda since 1970 when the Secretary General of the United Nations warned of potentially "catastrophic warming". In 1979 the 1st World Climate Conference was held in Geneva and since then many international conferences have been held around the world. In 1992, the [United Nations Framework Convention on Climate Change](#) was signed at the Earth Summit in Rio de Janeiro.

TO LEARN MORE...

[Agenda 21- Atmosphere](#)

[United Nations Framework Convention on Climate Change](#)

[Common questions about Climate Change](#)

[WWF Climate Change Campaign](#)

[Responding to Climate Change](#)

[Global Climate Change and Human Health](#)

[Global Environmental Change and Human Security](#)

3.3 BIODIVERSITY

The earth is composed of millions of species. About 1.75 million species have been identified but scientist believe there could be anywhere between 3 to 100 million species on earth. Different species contain different genes and exist in widely different landscapes (deserts, forests, wetlands, mountains, lakes, rivers, and agricultural landscapes). This diversity is essential to life. Species are essential part of complex ecosystems. They interact with one another and with the air, water, and soil around them to maintain natural cycles to complete various functions and ensure that natural resources are maintained.

Earth's natural ecosystems are essential to life, as we know it. They provide food, fuel, fibre, shelter and building materials. They purify air and water, detoxify and decompose wastes, stabilize and moderate Earth's climate, moderate floods, droughts, temperature extremes and the forces of wind. They also generate and renew soil fertility, including nutrient cycling, pollinate plants, including many crops, control pests and diseases, maintain genetic resources as key inputs to crop varieties and livestock breeds, medicines, and other products, provide cultural and aesthetic benefits and adapt to change.

The greater the diversity of species in an ecosystem then the greater the resilience of these natural systems to weather, climactic extremes and shocks such as fires and floods. Therefore loss of biodiversity is not only a problem in itself but it can aggravate other natural resource problems such as desertification, climate change, and declining agricultural productivity. Biodiversity is also important for human exploration, for the development of medicines and humans derive great pleasure from a diverse natural world.

The extraction, processing and use of natural resources for economic purposes can often have adverse impacts on biological diversity. The clearing of land for agriculture, forestry, or urban development results in the loss of habitat of thousands of species. Species are currently declining at an alarming rate.

There are many international efforts to address this issue. One of the key agreements adopted at Rio was the [Convention on Biological Diversity](#).

There are however, many opponents of bio-diversity conservation. They argue that the costs of protecting endangered species are too high and that conservation measures impede development.

TO LEARN MORE...

[Agenda 21- Biodiversity](#)

[Convention on Biological Diversity](#)

[Biodiversity on the Internet](#)

[World Resources Institute – Biodiversity and Protected Areas](#)

[Biodiversity Support Program](#)

3.4 DESERTIFICATION AND DROUGHT

Deserts, also known as arid lands, are regions that receive less precipitation than their potential evapotranspiration (evaporation from the soil and plants plus transpiration from plants equals evapotranspiration, abbreviated as ET). The lack of moisture in these areas often makes it difficult for people to settle and live there.

Changes in vegetation patterns, the misuse of natural resources such as the clearing of forests, climate change, extreme weather events and natural disasters can sometimes lead to the desertification of a previously less arid region. Approximately one quarter of the land on earth is threatened by desertification.

Every year thousands of people die from drought – long periods of time without rain – that result in the loss of agricultural productivity and the absence of adequate drinking water.

There have been many international efforts to address this problem. The best known effort is the [United Nations Convention to Combat Desertification](#), an international treaty established in 1996.

TO LEARN MORE...

[Agenda 21- Desertification and Drought](#)

[Desertification Information Network](#)

[United Nations Development Programme Dryland Web](#)

[Lack of Development Impedes Fight Against Desertification](#)

Desertification in China

Most people when they think of deserts think of Africa. In reality many places, such as China, are dealing with major desertification problems.

More than 27%, or 2.5 million square kilometers, of land in China is desert. Desertification costs the country about \$2-3 billion annually. An estimated 110 million Chinese people suffer firsthand from the impacts of desertification and, each year 2,500 sq km turns to desert.

3.5 ENERGY

Energy is fundamental to modern day society. Energy lights our cities, powers our vehicles, trains, planes and rockets, warms our homes, cooks our food, plays our music, gives us pictures on television and powers machinery in factories. Energy is necessary for most forms of economic and social activity.

Society derives energy from many different sources including:

- Fossil Fuels – Coal, Oil and Natural Gas
- Hydro Power and Ocean Energy
- Nuclear Energy
- Solar Energy
- Wind Energy

Unfortunately, energy production and consumption has had significant environmental implications. The combustion of fossil fuels emits greenhouse gases into the atmosphere that contribute to [climate change](#). The extraction, processing and

Energy in Canada

Canadians are one of the biggest per capita users of electricity.

There are many programs in place such as the Residential Energy Evaluation Program and Voluntary Challenge and Registry that encourage energy conservation in Canada but Canadians still have a long way to go.

use of fossil fuels can also contribute to [air pollution](#), the loss of biodiversity and the contamination of terrestrial and marine habitats.

Nuclear energy, although it has less impact on the air and climate produces dangerous wastes that must be stored for many years and may also pose a serious risk of nuclear meltdowns such as Chernobyl.

The use of dams for capturing hydro-energy has also been very controversial because they frequently result in floods, the spread of disease and the displacement of people.

Renewable energy such as solar, and wind are often difficult to store, transmit and maintain reliably. Therefore the use of these types of energy is not always economical.

Sustainable development in energy deals with minimizing the environmental impact of how we produce and use various kinds of energy. It focuses on using energy efficiently as well as promoting and developing alternative fuels and processes that minimize environmental impacts.

TO LEARN MORE...

[Canada's Report on Agenda 21- energy](#)

[European Commission's Green Paper on Renewable Sources of Energy](#)

[A Guide to Energy by Oneworld](#)

[Chernobyl Radiation Disaster Information](#)

[The Narmada Dam Project, India](#)

[Energy in Canada](#)

3.6 FORESTS

Forests are centres of biodiversity, play a key role in water distribution, and are essential for carbon storage - key aspects of effort to address [climate change](#). They are also vital to the livelihoods of billions of people as sources of wood fuel, building materials, food and timber.

Forests are one of the strongest symbols of what is Canadian. From the earliest times, the inhabitants of this land have relied on the forest for basic needs. Besides covering half the Canadian landscape, some 417 million hectares, forests are a dominant feature of our economy, culture, traditions and history. About 340 communities in Canada depend largely on the forestry industry and more than 842,000 (1996) Canadians work in the forest industry or related organizations. Forests not only provide natural and wilderness areas for the cultural, spiritual and recreational benefit of everyone in Canada, but they are an integral part of our natural environment, providing habitat for thousands of species of plants, animals and micro organisms.

Forestry, however, is an important industry in many nations around the world including Canada. There are often significant conflicts between those who want sustainable management of forests and those who believe that development and economic returns from logging are more important than conservation.

TO LEARN MORE...

[The State of Canada's Forests 1997-1998](#)

[National Forest Strategy](#)

[Model Forest Home Page](#)

[International Institute for Sustainable Development - Forestry](#)

3.7 FRESHWATER

Water is perhaps our most precious resource. Unfortunately, many people do not have adequate access to this important resource. Although over 70 percent of the surface area of the earth is covered in water most of this is saline and unfit for human consumption. Freshwater makes up only about 2.5 percent of the world's water supply. Much of this is tied up in ice, permanent snow cover and fossil groundwater. Only 93 billion cubic meters of water is accessible for human uses and much of this is concentrated in North America.

Over the last few decades, declining water quality, increasing scarcity of finite fresh water resources and unequal distribution of existing freshwater resources have resulted in major water shortages. Globally it is considered that 1700m³/capita/year is adequate to meet basic human needs. 1700-1000m³/capita/years is considered water stressed and people with access to less than 1000m³/capita/year are considered to be facing severe water scarcity. The UN predicts that 2 out of every 3 people will be living with water shortages by 2025. Today, over 1 billion people in the world lack access to safe water and over 2.4 billion people lack access to adequate sanitation. Meanwhile countries in the North continue to use water in excessive quantities.

This leads to the important point that though earth's water supplies are finite, water shortages are not intrinsic to development. Water shortages arise when water is wasted or polluted. Many people, who have adequate access to water, tend to abuse it. The average American uses over 1000 litres of water/day, whereas many people in parts of Africa survive on less than 3 litres a day.

This type of water scarcity can lead to dehydration and diseases resulting in human suffering and death. It can also limit irrigation making it impossible to grow adequate food, speed desertification processes, and have significant impacts on ecosystem cycles and the human populations that depend on these ecosystems for food and shelter.

Water resources are often degraded by inappropriate use. Water is polluted by the dumping or toxic chemicals, run-off or dumping of excess nutrients and increased sedimentation caused by poor land-use practices.

Toxic substances enter water in a variety of ways including: direct dumping or runoff from human excrement; dumping or seepage from garbage disposal, dumping or seepage of mining effluent, dumping or seepage of chemicals from steel production, generation of electricity, chemical production, accidents such as oil spills, atomic leaks, acid rain and polluted ground water and runoff. Many of these substances accumulate in the food chain and are stored at potential lethal levels in higher organisms including humans through the process of bio-concentration.

Excess nutrients such as nitrogen and phosphorus come mainly from municipal sewage, farm fertilizers and animal waste. These nutrients can cause eutrophication – the excess growth of aquatic plants leading to reduced oxygen content and declining ecosystem health.

Sedimentation occurs as a result of human activities such as forestry, farming and construction. Increasing particulate matter in water prevents sunlight from penetrating water services decreasing primary productivity in the water.

Degraded water supplies are a significant problem in both the developed and the developing world. Polluted water is a leading cause of disease. It is estimated that 25,000 people a day die from infection ridden water in the developing world. In the developed world, water related infections and death are less common but toxic chemicals in water are linked to severe illnesses such as development and learning disabilities, infertility and cancer, especially in vulnerable members of the populations. The most vulnerable groups include children and the elderly who are more prone to illness due to weaker immune systems, and traditional people who tend to be exposed to greater concentration of these chemicals due to their direct relationship with the natural world.

There have been many international efforts to address water shortages. Corporations from around the world have joined together as conglomerates such as the [World Business Council on Sustainable Development](#), to address the need for sustainable water usage. International Non-Governmental Organizations such as the [IUCN](#) and the [WWF](#), have developed broad ranging water campaigns. International Organizations such as the [United Nations Environment Programme](#), have also invested significant resources in water development. In addition, several international organizations such as the [Global Water Partnership](#) and the [World Water Council](#) have been formed specifically to target international water issues.

There have also been significant efforts at the national level to address water issues. Canadians are privileged to have the most abundant water supply. Approximately 20% of the world's freshwater resources are located in Canada. Abundance, however, often leads to misuse. Canadians are the second highest users of water in the world.

Furthermore, water pollution remains a significant problem in Canada. Just last year, several people died in [Walkerton](#), Ontario due to E-coli contaminated water supplies. The majority of Canadians depend on water filtration and treatment systems for their water. The security of these systems is crucial to Canadians. Canadians also often face water shortages during dry periods in the summer.

In order to address these issues, Canada has developed water legislation and management policies as well as broad ranging water education campaigns. Many of these are organized and funded by [Environment Canada](#). Canada has also worked with the US to form the International Joint Commission to resolve water disputes between Canada and the US.

TO LEARN MORE...

[Earth Summit - Fresh Water](#)

[AVISO – Water and Human Security](#)

[Universities Water Information Network](#)

[The World Water Assessment Programme](#)

[World Resources Institute – Freshwater Systems](#)

[Freshwater – Key Issues](#)

[The Walkerton Case – An E.Coli Tragedy](#)

3.8 LAND MANAGEMENT

Land resources include physical area and the soils, minerals, water and biota that comprise this area. In essence, land is the basis of ecosystems, the life support system of the earth and is essential to both environmental sustainability and the economy. For this reason, land management is crucial to sustainable development.

Land resources are increasingly scarce as a result of population growth and rapid economic development. Land and associated resources are often the subject of competition and conflict. Frequently these resources are viewed in a fragmented manner as economic, social or environmental resources. This type of fragmented view leads to environmental degradation, social conflict and economic losses.

Sustainable use of these natural resources requires integrated, long-term planning that aims to link social, economic and environmental interests in sustainable land and land based resource use planning. Sustainable land management involves preventing and mitigating land degradation by rehabilitating land that has been damaged by mining and other activities and promoting the development of environmentally friendly practices in these sectors while also increasing access to land and security of tenure, and protecting ecosystems and biodiversity.

Land Management in Asia

In Asia, population growth poses a significant land management issue. In this part of the world the urban population increases by approximately 140, 000 people a day. Most of these people are absorbed on the urban fringe slowly expanding development into surrounding regions. This results in the destruction of the environment, traffic problems, and often poverty. With proper land management policies people could be encouraged to settle in concentrated central locations therefore having less impact on the environment and greater access to urban amenities.

A number of international agreements address land management issues including Chapter 10 of Agenda 21, the UN Convention to Combat Desertification (CCD), the UN

Convention on Biological Diversity (CBD), the UN Framework Convention on Climate Change (UNFCCC) and the Habitat Agenda adopted by the UN conference on Human Settlements in 1996.

TO LEARN MORE...

[Canada's Report Re; Agenda 21 - Land Management Planning for Sustainable Use of Land Resources - FAO](#)
[Land Resources – Now and for the Future](#)
[UNFPA State of the World Population](#)

3.9 MOUNTAINS

Mountains are vital sources of freshwater, biological and cultural diversity. They provide 30 to 60 percent of downstream fresh water in humid areas and up to 70 to 95 percent in semi-arid to arid environments. They are also well known sources of biological diversity. There are many types of

Bhutan

The Buddhist [Kingdom of Bhutan](#) nestled in the middle of the Himalayas is struggling to protect its unique culture and natural heritage.

In order to do this they have committed to maintaining 60% forest cover, slow development, mandatory national dress, the promotion of cultural events and minimal tourism.

plants and animals that are uniquely adapted to mountainous conditions. Potatoes, many types of fresh fruit and many types of animals all originated in mountains. Lastly, these relatively isolated areas are home to many culturally distinct peoples.

The unsustainable use of mountain resources is likely to result in inadequate water for drinking, a great decline in biological diversity that may threaten global food security and the loss or assimilation of many unique cultures. In fact, the United Nations has determined that the degradation of mountain ecosystems directly affects nearly half the world's population. For this reason, mountains were identified as one of the most critical natural resource issues in Agenda 21. The UN has declared 2002 as the [International Year of Mountains](#) in order to promote sustainable mountain development.

There are many complex issues facing mountain resources. Erosion from over-exploitation of forest resources or poor land management can result in the permanent loss of soil and vegetation. Development pressures may threaten cultural traditions in many upland communities resulting in a loss of cultural heritage. Poverty in mountain regions may augment tensions over scarce natural resources and lead to conflict.

Over the last few years there have been significant international efforts to promote sustainable mountain development. The most significant international document on the subject is Chapter 13 of Agenda 21. The Food and Agriculture Organization (FAO) was appointed task manager for Chapter 13 and in 1994, the Organization established the Inter-agency Group on Mountains.

TO LEARN MORE...

[Agenda 21 - Mountains](#)

[UNU – Sustainable Mountain Development](#)

[Why Mountains? A Slideshow](#)

[Mountain Forum](#)

[Who are the Mountain People? \(Taiwan\)](#)

[Management of Mountain Commons in the Hindu Kush Himalayas](#)

3.10 OCEANS AND COASTAL AREAS

Oceans and coastal areas cover nearly 71% of earth's surface. They provide vital natural resources and natural services. They provide habitat for most of the world's fisheries, and provide many marine products that are crucial to the food industry. In addition to these, ocean ecosystems such as coral reefs are home to great biological diversity that is both a tourist attraction and a valuable area for research. Coastal areas are also valuable sources of sand and gravel used for beach construction and urban building. Coastal and open water areas are also known to contain many valuable mineral deposits. Perhaps most significantly, they are elements of global weather systems and they have significant impact on world weather and long-term climate change.

Unfortunately, oceans and coastal areas have been significantly degraded by human activities. The majority of the world's population lives in coastal areas. Human encroachment on shorelines often results in the destruction of valuable coastal wetlands, mangrove forests and other important ecosystems. Technological developments and growing demands have resulted in the rapid decline of many fish stocks. Billions of metric tons of silt, sewage, industrial waste, and chemical residues are discharged into the world's oceans resulting in large-scale water pollution. Lastly, global climate change may be bleaching ocean coral and changing ocean circulation patterns resulting in large scale global weather change. For these reasons, oceans and coastal areas have

been protected by international law and there are many local, national and international efforts to address the human impact on these environments.

United Nations Convention on the Law of the Sea sets provides standard guidelines for the protection and sustainable development of marine and coastal environments and their resources.

TO LEARN MORE...

[Agenda 21 - Oceans](#)

[Latest News about Oceans](#)

[Canada and the Oceans \(DFAIT\)](#)

[UN Atlas of the Oceans](#)

[Ensuring the Sustainable Development of Oceans and Coasts: A Call to Action](#)

[The Coral Reef Alliance](#)

3.11 TOXIC CHEMICALS

Toxic chemicals are used in countless industrial processes that make up our modern economy. With environmentally sound management, these chemicals can be used with little to no harm to people or the environment. Historically, however, limited scientific information on chemical risks, limited resources for chemical controls and limited knowledge of alternatives have led to the misuse of these chemicals.

The resulting chemical contamination has had significant impacts on human health, genetic structures, reproductive systems, and the environment. Given the potential risk involved with chemical uses and large-scale damage that has resulted, many international organizations are working to promote chemical safety. For example, the United Nations Environment Programme (UNEP), the International Labour Organisation (ILO) and the World Health Organization (WHO) are working together on the International Programme on Chemical Safety (IPCS). This program is designed to expand and accelerate international assessment of chemical risks, harmonize the classification and labelling of chemicals, promote information exchange on toxic chemicals and chemical risks, establish risk reduction programmes, strengthen national capabilities and capacities for the management of chemical and prevent illegal trafficking of toxic chemical and chemical products.

TO LEARN MORE...

[Canadian Decision-making and Toxic Chemicals](#)

[United Nations Environment Programme: UNEP & Chemicals](#)

[Toxic Chemicals and Health](#)

[WWF Global Toxics Initiatives](#)

[CBS News Story: Toxic Air We Breathe](#)

3.12 WASTE AND HAZARDOUS MATERIALS

The extraction, processing, transportation and distribution of natural resources often result in the production of hazardous waste. This waste, if improperly managed, can contaminate land, water and air resources resulting in adverse human health and ecosystem impacts. Therefore proper waste management is essential to sustainable development.

Effective control of the generation, storage, treatment, recycling and reuse, transport, recovery and disposal of hazardous wastes is a crucial aspect of natural resource management.

There are many international agreements and programs aimed at preventing the generation of hazardous waste and rehabilitating contaminated sites. Many of these programs address hazardous waste in an integrated fashion with other natural resource issues.

TO LEARN MORE...

[Canadian Decision-Making: Waste and Hazardous Materials](#)

[Hazardous Materials Management: North American Online Publication](#)

[Disposal of Household Hazardous Materials](#)

[Nuclear Waste Disposal](#)

[Waste Management in Africa](#)

[Environmental Justice and Nuclear Waste](#)

4. OUR CHALLENGE

As this article has shown, it is impossible to overlook concerns about the depletion, degradation, mistreatment, and maldistribution of natural resources in our surrounding environment. Not only does the future of our natural resource base affect every aspect of our lives, but the decisions we make as individuals ultimately have effects on our neighbours across the street *and* across the world. While natural resources have always been integral to our daily functioning as members of society, in order for us to keep benefiting from them we must also recognize the need to be sustainable in our practices.

Several examples from this article illustrate how Canadians can positively contribute to managing natural resources more sustainably. For example, the cumulative effect of Canadians reducing our consumption of water and making informed decisions about where our forest-based products originate can help alleviate future problems with shortages in our natural resource base. You can start today by signing on to Youth Agenda 2002's Consumption Challenge. [Click here](#) to find out more.