

Thematic Report on Mountain Ecosystems

Please provide the following details on the origin of this report.

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Please provide summary information on the process by which this report has been prepared, including information on the types of stakeholders who have been actively involved in its preparation and on material which was used as a basis for the report.

This report has been prepared in consultation with the federal Interdepartmental Committee on Biodiversity, and with input from Parks Canada, Environment Canada and Agriculture and Agri-food Canada. Material used in the report came from comments received during the consultation period and from research on the subject.

Mountain Ecosystems

1. What is the relative priority your country accords to the conservation and sustainable use of biological diversity in mountain ecosystems?					
a) High		b) Medium	X	c) Low	
2. How does your country assess the resources available for conservation and sustainable use of biological diversity in mountain ecosystems, both domestic and international?					
a) Good		b) Adequate		c) Limiting	X
3. Has your country requested financial assistance from GEF for funding the activities for conservation and sustainable use of biological diversity in mountain ecosystems?					
a) no					X (not applicable)
b) yes, please provide details					

Assessment, Identification and Monitoring

4. Has your country undertaken any assessment of direct and underlying causes of degradation and loss of biological diversity of mountain ecosystems?	
a) no, please specify the reasons	
b) yes, please specify major threats and their relative importance, as well as gaps	X (see Further Comments below)
c) If yes, please specify the measures your country has taken to control the causes of loss of mountain biodiversity	X (see Further Comments below)
5. Has your country identified taxonomic needs for conservation and sustainable use of biological diversity of mountain ecosystems?	
a) no, please specify the reasons	X (see Further Comments below)
b) yes, please specify	
6. Has your country made any assessment of the vulnerability or fragility of the mountains in your country?	
a) no, please specify the reasons	
b) yes, please specify the results and observed impacts on mountain biodiversity	X (see Further Comments below)
7. Has your country made any assessment important for conservation of biological diversity of mountain ecosystems at the genetic, species and ecosystem levels? (You may wish to use the Annex I of the Convention for categories of biodiversity important for conservation)	
a) no, please specify the reasons	
b) yes, some assessments or monitoring undertaken (please specify)	X (see Further Comments below)
c) yes, comprehensive assessments or monitoring programmes undertaken (please specify where results can be found, and opportunities and obstacles, if any)	

Regulatory and Information System and Action Plan

8. Has your country developed regulations, policies and programs for conservation and sustainable use of biological diversity in mountain ecosystems?	
a) no	
b) yes, please specify sectors	X (see Further Comments below)
9. Has your country applied the ecosystem approach (adopted at COP 5) in the conservation and sustainable use of biological diversity in mountain ecosystems?	
a) no	
b) yes, please provide some cases or examples	X (see Further Comments below)
10. Does your national biodiversity strategy and action plan cover mountain biological diversity?	
a) no, please specify why	X (see Further Comments below)
b) yes, please give some information on the strategy and plan, in particular on mountain biodiversity	
11. Has your country disseminated the relevant information concerning management practices, plans and programmes for conservation and sustainable use of components of biological diversity in mountain ecosystems?	
a) no	
b) yes, please provide details where information can be retrieved concerning management practices, plans and programmes	X (see Further Comments below)

Cooperation

12. Has your country undertaken any collaboration with other Parties for conservation and sustainable use of biological diversity in mountain ecosystems at the regional level or within a range of mountains?	
a) no	X (see Further Comments below)
b) yes, please specify the objectives of this collaboration and achievements	
13. Has your country signed or ratified any regional or international treaty concerning mountains?	
a) no	X
b) yes, please specify which treaty and provide as much as possible a report on the progress in the implementation of the treaties, including any major constraints in the implementation of the treaties	

Relevant thematic areas and cross-cutting issues

14. Has your country taken account of mountain ecosystems while implementing thematic programmes of work on agricultural; inland waters; forest; and dry and sub-humid lands biological diversity?	
a) no	X
b) yes – but in only one or two thematic programmes of work	
c) yes, included in all programmes of work	
d) if yes, please specify details	
15. Has your country taken any measures to ensure that the tourism in mountains is sustainable?	
a) no , please specify why	
b) yes, but in early stages of development (please specify the reasons)	
c) in advanced stages of development (please specify the reasons)	
d) relatively comprehensive measures being implemented (please specify the reasons)	X (see Further Comments below)
16. Has your country taken any measures to protect the traditional knowledge, innovations and practices of indigenous and local communities for conservation and sustainable use of biological diversity in mountain ecosystems?	
a) no	
b) not relevant	
c) yes, but in early stages of policy or programme development	X
d) yes, in advanced stages of development	
e) some programmes being implemented	
f) comprehensive programmes being implemented	
17. Has your country developed any programmes for the protection of natural and cultural heritages in the mountains?	
a) no	
b) yes, please provide some information in the programmes	X (see Further Comments below)
18. Has your country established protected areas in mountains?	
a) no	
b) yes, please specify the percentage of mountains under protected areas out of total mountain areas in your country	X (see Further Comments below)
19. Has your country undertaken any activities to celebrate the International Year of Mountains and Eco-tourism?	
a) no	
b) yes, please specify	X (see Further Comments below)

Case-studies

Please provide case-studies made by your country in conservation and sustainable use of biological diversity in mountain ecosystems.

The *Yellowstone to Yukon Conservation Initiative* (Y2Y) is a joint Canadian-U.S. network of over 340 organizations, institutions, foundations, and conservation-minded individuals who have recognized the value of working together to restore and maintain the unique natural heritage of the Yellowstone to Yukon region and the quality of life it offers (www.rockies.ca/y2y/).

The Initiative dates to late 1993, when a group of top scientists and conservationists met near Calgary, Alberta, to talk about the possibility of applying the principles of conservation biology to the Rockies of Canada and the northern U.S. The discussion continued off-and-on for the next three years, with an ever-expanding group of participants. In 1996, the group declared itself an operative network and hired a coordinator. A small office was opened in Canmore, Alberta, in January 1997.

Today, scientists, conservationists and others are working together to promote the Yellowstone to Yukon mission and to enable, energize, and inspire the efforts of individuals, grassroots organizations and communities who support that mission. By creating new tools to support conservation work, and by fostering the exchange of ideas and the coordination of action among its network participants, Y2Y opens new possibilities for ensuring the continued presence of North American wildlife and wildlands.

The mission statement for Y2Y is as follows:

Combining science and stewardship, we seek to ensure that the world- renowned wilderness, wildlife, native plants, and natural processes of the Yellowstone to Yukon region continue to function as an interconnected web of life, capable of supporting all of the natural and human communities that reside within it, for now and for future generations.

Ours is a vision for the future of the wild heart of North America. Aware that the Yellowstone to Yukon region constitutes the world's last best chance to retain a fully functioning mountain ecosystem, we envision a day:

- *when a life-sustaining web of protected wildlife cores and connecting wildlife movement corridors has been defined and designated for the Yellowstone to Yukon region*
- *when that life-sustaining web is embraced as a source of pride for all those who live within it, and is acknowledged as a living testimony to the society wise enough to recognize the need for such a web, altruistic enough to create it, and prudent enough to maintain it;*
- *when all natural and human communities in the Yellowstone to Yukon region co-exist in a healthy mountain ecosystem of clean air and water, abiding beauty, and abundant wildlife and wilderness;*
- *when all residents of the Yellowstone to Yukon region take it for granted that their long-term personal, spiritual, and economic well-being is inextricably connected to the well-being of natural systems;*
- *when land-use decisions in the region are based first and foremost on ecological principles; and*
- *when natural resources in the region are managed with the goals of ecosystem integrity and long-term economic prosperity in mind"*

Further comments

Re. 4 b)

In 1994, the Government of Canada launched the Banff/Bow Valley Study which identified severe environmental stresses in Banff National Park and raised questions concerning the health of other mountain parks (<http://www.worldweb.com/parkscanada-banff/bveng.pdf>).

The 1997 State of the Parks Report

(http://www.parcscanada.gc.ca/library/DownloadDocuments/DocumentsArchive/SOP_e.pdf) examined stresses on all national parks in Canada. While the assessment did not focus exclusively on mountain parks, the study included many examples from mountain parks. It examined stresses that affect biodiversity and ecosystem function, based on a questionnaire done in 1992 and repeated in 1996. The questionnaire identified 29 major threats to biodiversity and their relative importance. Teams of three to five experts, including one or more members from outside Parks Canada, completed the questionnaire on a consensual basis.

For each of the 29 stresses, the expert panel responded to the following questions.

Was the stress occurring in the region?

What is the origin inside or outside the park?

What is the spatial scale?

What are the ecological impacts, if any?

Is the stress tending to increase or decrease?

What is the expected recovery time from the impacts?

A stress was only considered significant if: (1) it had a definite ecological impact; (2) the scale of the impact was greater than the local scale of one square kilometer; and, (3) the trend in its intensity either increasing or stable. The questionnaire identified significant stresses originating inside the park, within the region, or outside the park.

Among the stresses originating solely inside the park, 19 parks reported difficulties arising from park management practices. In particular, fire suppression has led to losses of fire-maintained habitats, encroachment of woody vegetation into grasslands and an altered forest age-class structure. Parks Canada is actively pursuing a fire restoration program across Canada to address this problem. Another internal stress - development of park infrastructure - was considered significant in 11 parks.

Most stresses were considered regional, occurring both within and outside parks. In order of frequency (numbers of parks reporting), these were: visitor/tourism facilities (26), transportation/utility corridors (25), urbanization (24), exotic vegetation (21), sport fishing (19), dams (19), solid waste (15), human disturbance (15), petrochemical pollution (15), pesticides (14), sewage (14), exotic mammals (12), exotic birds (12), exotic fish (9), poaching (8), commercial fishing (7), climate change (7), exotic invertebrates (7), vehicle/wildlife collisions (6), acidic precipitation (5), exotic micro-organisms (3), ground-level ozone (2), and heavy-metal pollution (2).

Four types of stresses originated exclusively outside parks: forestry (20), agriculture (17), mining (16), and sport hunting (11).

The high frequency of regional stresses (originating both inside and outside park boundaries) emphasized the high degree of interconnection between a park and its surrounding region. Most frequently mentioned were:

- transportation and utility corridors cutting through parks;

- urbanization adjacent to, and inside, parks; and
- tourism and visitor facilities.

Efforts have been under way in some parks to introduce new measures to manage the high number of visitors. For example, Lake O'Hara in Yoho National Park and the West Coast Trail in Pacific Rim National Park have both set capacity limits. Following a recommendation of the Banff/Bow Valley Task Force, the Minister of Canadian Heritage determined in 1997 that no further expansion of the Banff town site within Banff National Park would be allowed.

Higher levels of urban development and visitation were correlated with other impacts, such as invasion of exotic plant species and pollution from solid waste and sewage. Exotic plant invasions can result from physical disturbance of the land and high levels of seed transport by cars, people and pets. Sewage management continues to be a problem in parks with town sites, including Banff, Jasper, Yoho, and Riding Mountain. Initiatives are under way to upgrade sewage treatment in these parks.

High levels of visitor use and growing urbanization in and around parks were reported to be causing significant human disturbance to wildlife. For example, white-water rafting on mountain rivers has been shown to disturb and affect the nesting success of harlequin ducks in Jasper National Park. And high levels of back-country use in and around Banff National Park has been shown to displace grizzly bears from preferred foraging sites.

Sport fishing was reported to be negatively affecting fish populations, and causing changes in genetics and the structure of fish communities. Parks Canada has addressed this problem by setting more restrictive catch limits and closing some areas to fishing. Parks Canada has also stopped stocking fish, recognizing it may involve introduction of exotic species and reduced genetic variation of native species.

Among the stresses originating outside park boundaries, the most significant were from forestry, mining, and agriculture (agriculture is probably less significant in mountain parks). Reported impacts from external forestry and agriculture involved population declines of individual species, associated with habitat loss and fragmentation. These break up populations into smaller functional units, each with a lower probability of survival. Parks Canada is working with external land managers to address these issues through ecosystem-based approaches. Several parks are involved in partnerships with forestry companies and the provinces to minimize the effects of forestry adjacent to parks. However, integrating the park's objectives of biodiversity conservation into a larger region dominated by industrial forestry and agriculture remains a large challenge.

Some interesting points emerged in comparing results of the 1992 and 1996 questionnaires. The origin of stresses (> 85% regional in scope) and their scale (> 75% occurring on a scale of over 10 square kilometers) remained unchanged. The 1996 questionnaire reported increases in the following stresses: mining, utility corridors, urbanization, climate change, human disturbance, sport fishing, solid waste, pesticides, sewage, park infrastructure and park management practices.

The reasons for these increases varied. Some were undoubtedly due to increased urbanization around certain parks. In other cases, the increases reflected better information. For instance, recent studies of older national-park golf courses (e.g. Banff, Riding Mountain) reported high levels of mercury residues from pesticides. New findings of long-distance transport of persistent organic pollutants have increased awareness of threats to high-elevation lakes in the Rocky Mountains. Other increases were due to new scientific certainty about an issue. For example, climate change was reported as causing significant impacts in seven parks in 1996.

The 1996 results also indicated increasing recognition of problems associated with historic fire suppression in national parks. Forest age-class distributions show an abnormal distribution in many parks, with few young forests created in the last 50 to 70 years. Younger forests are more productive and have more food available for a variety of animals. Buffaloberry (*Shepherdia canadensis*) is a common shrub in lodgepole pine forests in Banff National Park and a key food for grizzly bears. As these forests age, berry production declines and the older forests have very little forage value.

In some cases, fire-adapted vegetation types may disappear altogether. Another study in Banff National Park showed that in the absence of fire, aspen communities would disappear by 2045. Aspen communities historically burned on a 20 year cycle. In the absence of fire, grasslands are gradually encroached by woody shrubs and trees. The need for fire to maintain and restore grasslands has been recognized for Riding Mountain, Jasper, Banff and Kootenay National Parks.

Re. 4 c)

In June 2002, the federal government committed to a five year, federally funded wildlife ecology research chair at the University of Calgary, which will focus on improving our understanding of land use change impacts on wildlife, integrating and communicating knowledge to the public and conservation agencies, and developing landscape tools to assist decision makers in conserving mountain habitat and wildlife. Emphasis is being placed on the eastern slopes of the Rocky Mountains and adjoining ecosystems.

Some measures being taken by Parks Canada to control the causes of loss of mountain biodiversity were identified in the *1997 State of the Parks Report*, discussed above. Additional measures were recommended in the *Report of the Panel on the Ecological Integrity of Canada's National Parks* (<http://parksCanada.pch.gc.ca/EI-IE/report.htm>), which was endorsed by the Minister of Canadian Heritage in April 2000. In October 2002, the Government of Canada announced an action plan (http://parksCanada.pch.gc.ca/apps/newsreleases/release_e.asp?id=636&andor=nr) that will help implement the recommendations in the *Panel* report.

Detailed recommendations regarding threats to biodiversity can be found in Chapter 5 of the *Panel* report, entitled "The Need for Active Management and Restoration". Sections of this chapter deal with

- Changing Ideas, Changing Approaches (An Adaptive Management Approach);
- Restoring Fire – Righting 50 Years of Active Suppression;
- Species Restoration – Species at Risk;
- Site Restoration;
- Dealing with Alien Species;
- Harvesting (e.g., sport fishing); and
- Managing Hyperabundant Species (e.g., resulting from dysfunctional predator-prey systems).

Re. 5 a)

There has not been a specific focus in Canada on taxonomic needs related to mountain ecosystems. There are taxonomic needs for mountain ecosystems in Canada, similar to all other ecosystems in Canada.

The taxonomy of vertebrate animals, certain invertebrate groups (e.g., butterflies, dragonflies),

and higher plants found in Canada's mountains is well known. However, the vast majority of invertebrates, fungi and microorganisms are poorly known.

While some high-profile mountain endemic species are at risk in Canada (e.g., Vancouver Island marmot, Banff Springs snail), Canada has a lower percentage of endemic species in mountains than countries found at lower latitudes.

Federal government departments and agencies in Canada recently completed a biosystematics needs assessment that identified deficiencies in human resources (taxonomists and diagnosticians), facilities to house natural history collections, information technologies, and related areas. Addressing these broader taxonomic needs would likely also address needs specifically related to biodiversity of mountain ecosystems. The Government of Canada (Agriculture and Agri-Food Canada) is in the process of hiring four new taxonomists in insects, plants and fungi - an important first step in reversing the trend of declining taxonomic capacity.

Re. 6 b)

See above discussion of studies done by Parks Canada.

Re. 7 b)

Parks Canada, the Environment Canada and non-governmental groups in Canada are conducting assessments and monitoring of biodiversity in mountain ecosystems. In addition to the Parks Canada assessments discussed above, monitoring programs are generally in place for species at risk that occur in mountain areas. For example, the status Vancouver Island marmot, North America's most critically endangered mammal species, is being intensively monitored. There are only 24 individuals left in the wild, but there have been recent captive breeding successes (see <http://www.islandnet.com/~marmot/>).

Environment Canada's Prairie and Northern Region office has begun investigations into aquatic biodiversity of alpine aquatic ecosystems. As for non-governmental assessments and monitoring, groups across Canada contribute to the annual spring count as part of the Audubon Society's international bird surveys.

In recent years there has been a focus on mountain forests (outside parks) that are managed for timber production. Forest harvesting operations in western Canada have moved into higher elevations. This has created new challenges such as reconciling timber supply and wildlife habitat objectives (e.g., preventing further decline of mountain caribou or spotted owl populations in interior British Columbia), and ensuring post-harvest tree regeneration in relatively harsh climates.

Some research programs have monitored ecosystem processes (e.g., regeneration and productivity of commercial tree species) in response to varying silvicultural regimes in mountain forests. Relevant work can be found on the Montane Alternative Silvicultural Systems web site (http://www.pfc.forestry.ca/silviculture/mass/index_e.html).

It is important to note that assessments that have been conducted in Canada are at the species and ecosystem levels, but not at the genetic level. More research is needed in the area of analyzing genetic relationships (genetic relatedness, erosion, drift, population extinction) existing across geographic areas using molecular techniques.

Re. 8 b)

Parks agencies - federal, provincial, and territorial - have numerous regulations, policies and programs that address conservation of biological diversity in mountain ecosystems.

Other measures apply in areas of public land outside parks. For ecotourism operators in British Columbia, incentives have been created, such as lower taxes or public land concessions at lower rates, that promote environmentally-sensitive land use. In Ontario, regulatory requirements ensure that resource stewardship agreements are established between the State and tour operators working within an area covered by the agreement, to preserve natural areas of high tourism value. This approach reserves the most pristine areas for ecotourism operations. Tourisme Quebec is establishing a specific legal framework, clearly separating adventure tourism activities and ecotourism, with an objective of avoiding a severe impact upon natural assets. These regulations are intended to stimulate proper ecotourism in sensitive and valuable natural areas with a high potential. They apply generally, as opposed to being specific to mountain areas.

Provincial and territorial natural resources ministries have developed regulations and policies that restrict timber harvest on steep slopes or in buffer zones adjacent to mountain streams.

Re. 9 b)

Recommendations of the *Report of the Panel on the Ecological Integrity of Canada's National Parks* address most aspects of the ecosystem approach as recommended at COP5.

Sustainable forest management in mountain areas could also be considered as an analogue of the ecosystem approach. Provincial agencies and forest companies have placed a strong emphasis on adaptive management, for example.

There has not been a specific effort to examine the definition, principles and operational guidance developed at COP5 in the context of either park management or forest management in mountain areas.

Re. 10 a)

Most aspects of biodiversity conservation and sustainable use in mountain ecosystems are covered by general provisions of the Canadian Biodiversity Strategy.

Re. 11 b)

Relevant information can be found on the web sites of Parks Canada and Natural Resources Canada/Canadian Forest Service, as well as their sister agencies in provinces and territories. Some of these websites can be found in this report.

Re. 12 a)

There is a considerable degree of cooperation between Canada and the United States regarding trans-boundary conservation planning in the Rocky Mountains. In 1932, Glacier National Park, in the United States, and Waterton Lakes National Park, in Canada, were designated as the Waterton-Glacier International Peace Park. Glacier and Waterton Lakes have both been designated as Biosphere Reserves and together were recognized, in 1995, as a World Heritage

Site.

Re. 15 d)

Canada is recognized world-wide for the exceptional tourism opportunities both within and outside its mountain parks. The Canadian Tourism Commission has developed a number of guides for public and private sector agencies that can help ensure that tourism in mountains is sustainable (http://www.canadatourism.com/en/ctc/ctc_index.cfm). These include

- Adventure travel and ecotourism best practices tour 2000: Leading Ontario and Quebec operators share their exemplary practices (2000)
- Catalogue of exemplary practices in adventure travel and ecotourism (1999);
- On the path to success: Lessons from Canadian adventure travel and ecotourism operators (1999);
- Risk management and insurance guide for the adventure, ecotourism and alpine skiing industries (2001)
- Best practices in Canada's tourism industry.(2001).
- Best practices in natural heritage collaboration: Parks agencies and outdoor tourism operators (2001)
- A breath of fresh air: A business strategy for outdoor tourism product development in Canada (2002)
- On route to sustainability: Best practices in Canadian tourism (1999).

Re. 17 b)

In addition to programmes in Canada's national parks, a number of provinces and territories (British Columbia, Yukon, Alberta, Quebec, etc.) have developed protected areas programmes that help protect natural and cultural heritage in the mountains.

Re. 18 b)

Regrettably, a precise estimate is not available.

Re. 19 b)

The World Ecotourism Summit was held in Quebec City (May 19-22, 2002). Canadians were active in providing case studies and formulating recommendations in all four thematic working groups. For example, a presentation on "Ecotourism planning systems in federal and provincial parks" in Canada was made to the working group on "Ecotourism policy and planning: the sustainability challenge." In the working group on "The regulation of ecotourism: institutional responsibilities and frameworks," an example of regulation and control of ecotourism was provided for Quebec. Canadians also made a presentation on "International guidelines for monitoring costs and benefits" in the working group on "Monitoring costs and benefits of ecotourism: ensuring equitable distribution among all stakeholders."

Following the Summit, an international group of delegates from 14 different ecotourism hotspots issued the Chutes Montmorency Declaration, setting the stage for local action as part of their work with The International Ecotourism Society (TIES). The Chutes Montmorency Declaration, completed on May 24, is intended to facilitate sound ecotourism planning and policies in each of their regions

The 8th Annual EcoTourism and Adventure Tourism Conference will be held at the Leslie M. Frost Natural Resources Centre in Dorset, Ontario, November 14-16, 2002.

The Banff Centre, in conjunction with Environment Canada/Canadian Wildlife Service, recently hosted a conference on Ecological and Earth Sciences in Mountain Areas, September 8-10, 2002.. This was the second in a series of mountain conferences at the Banff Centre. Next year's conference will be on the theme of Sustainable Mountain Communities, and is scheduled to take place June 14-18, 2003. The Banff Centre hosts many other events related to mountain culture, including the Banff Mountain Summit (October 27-29, 2002; co-hosted with Parks Canada), the Banff Mountain Book Festival, and the Banff Mountain Film Festival (both October 30 - November 3, 2002).
