Sustainable Skiing:
A North American Environmental Program Evaluation

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A thesis submitted to
The Faculty of Graduate Studies and Research in
partial fulfillment of the
requirements for the degree of

Master of Arts

Department of Geography and Environmental Studies
Carleton University

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ISBN: 0-612-98961-5

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ISBN: 0-612-98961-5

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ABSTRACT

The ski industry is increasingly under pressure to balance the recreational needs of the skier and the commercial interests of the industry with environmental stewardship. In response, the ski industry has launched: Sustainable Slopes: the Environmental Charter for Ski Areas (NSAA, 2000). The charter provides a framework from which the industry can take action to improve environmental performance and mitigate environmental impacts. This study evaluates the North American ski industry's progress in implementing Sustainable Slopes.

This study found that the industry is making progress and ski areas are implementing some of the principles and practices of the charter while continuing to investigate ways to improve in the future.

The evaluation shows distinguishable differences in implementation rates. Most importantly, environmental ethics appear to play a crucial role in distinguishing those resorts which are demonstrating industry environmental leadership with a higher implementation rate, and ethics are a crucial component of sustainable skiing.

ACKNOWLEDGEMENTS

I wish to thank my advisors Dr. Michael Brklacich and Dr. Edward Manning who provided consistent, enthusiastic, and at times, humorous assistance throughout the duration of this study.

I sincerely wish to thank my family for their endless support and their continued unconditional love. I am eternally grateful for the confidence and the strength of character that you bestowed upon me. Without you, I would not be the person I am today and as a result, this study would never have come to fruition.

Without the enthusiastic and professional assistance from the following people, this study would not have been possible. Gratitude is extended to Auden Schendler, Geraldine Link, Rick Lofaro, Stephen Kanipe, and Lee Cassin.

Special thanks to Amanda for providing emotional support throughout this process and her relentless support of all that I do.

Thanks are also extended to Brendan for taking on the role of 'research assistant' and providing support in so many ways.

Finally, I wish to thank my son Sabin, for providing me with the motivation to succeed, to complete this study, and to continue working for the environment.

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CHAPTER 1: Introduction

1.1 Introduction

The ski industry and the many environmental impacts associated with its activities are increasingly under scrutiny by conservation groups and other interested parties. If one considers the nature and the severity of the associated impacts, it comes then as no surprise that a growing industry has spawned growing public concern over industry activities. Ski resorts are increasingly becoming known as the 'new eco-enemy' (Cole, 1999), joining the ranks of other environmentally destructive industries such as forestry and mining. As a result of changed public perceptions and the green tourism movement, the ski industry is increasingly under pressure from environmental groups to balance the recreational needs of the skier and the commercial interests of the industry with the conservation of fragile alpine and mountain ecosystems. "As the tourist industry moves into the twenty-first century it will face the increasing problem of achieving not growth but rather a quality of tourist experience that is consistent with sustaining both the physical and social environments" (Ryan 1991 as cited in Hudson, 2000: p. 121).

One group that has taken steps to improve the environmental record of the ski industry is the National Ski Areas Association (NSAA). The NSAA (U.S.A.) is the trade association for ski area owners and operators. The association represents 322 North American alpine resorts, including many in Canada, that account for over 95 percent of

the snowboarder/skier visits annually. The NSAA also represents over 400 supplier members who provide goods and services to the ski resort industry.

In keeping with the belief that “the environment is the ski area’s number one asset” (NSAA, 2000: p. 1) and in response to public and industry concerns, the NSAA in partnerships with government and conservation groups developed Sustainable Slopes: The Environmental Charter for Ski Areas, launching the charter in the spring of 2000. Sustainable Slopes contains a set of voluntary environmental principles that address all aspects of resort operation, including planning, design, construction, operations, education and outreach. Associated with each principle is a range of ‘options for getting there’ so that resort operators can choose practices that are most appropriate and realistic for their operation. Sustainable Slopes provides a framework from which resorts can implement best practices, assess environmental performance, and set goals for improvements. The commitment to environmental stewardship is formalized when ski areas endorse the charter.

During the 2000-2001 season, the Sustainable Slopes inaugural year, 170 resorts endorsed the environmental charter (over 95% of ski resorts by # of skier visits annually), and since then an additional 3 ski areas have made endorsements. While this endorsement is commendable, NSAA recognizes that endorsement alone is not the only step necessary in the sustainability process. NSAA recognizes the importance of monitoring and reporting on environmental practices and achievements, as well as environmental failures. In order to fulfill their monitoring and reporting commitment (as detailed in Sustainable Slopes) and to track the industry’s progress towards sustainability, NSAA has compiled a series of annual reports. The reports detail the industry’s progress

in implementing the environmental principles documented in Sustainable Slopes, highlights the contributions of partnering organizations, and sets goals for the future.

As stated by Michael Berry, National Ski Areas Association President (NSAA, 2001), “We have succeeded in taking the first steps toward proactive environmental stewardship”. It is this success that is echoed in the Sustainable Slopes Annual Report 2001 (NSAA, 2001). While this sentiment is replicated in the Sustainable Slopes Annual Report 2002, and Sustainable Slopes Annual Report 2003, it is the intention of this study to take a closer look at the reported accomplishments of the industry.

Many critics of the ski industry and the Sustainable Slopes program argue that the industry has endorsed the charter simply to alleviate public pressure for industry environmental responsibility, while at the same time using the program as a marketing tool to appeal to the ‘green’ tourist. Daniel Glick (2001), author of Powder Burn: Arson, Money, and Mystery on Vail Mountain sums up critical sentiments by stating “Recycling the Perrier bottles at [Vail Mountain’s] Two Elks Restaurant somehow doesn’t cut it” (as cited in Clifford, 2002:p. 187). In the end, these critics argue that by adopting this environmental program, the industry is simply ‘greenwashing’ a complex issue. This is to say that they are simply not taking the necessary actions to make the industry sustainable despite their reports to the contrary. “This view may be a cynical one, but the ski industry has become a very environmentally unfriendly business that invites such cynicism by actively attempting to deceive skiers about its record and practices” (Clifford, 2002: p. 187). It is the intention of this study to explore whether the ski industry is or is not applying the tenets of the Sustainable Slopes program to their

management approach; to understand whether the ski industry is in fact using the Sustainable Slopes program to make sustainable skiing a reality.

1.2 Purpose and Objectives of this study

The overall objective of this study is to conduct an environmental program evaluation. Given the Sustainable Slopes program is only three years old, this study provides an evaluation of progress. This paper analyzes the extent to which the program is being implemented, as well as whether this program is having any effects on ski area management and planning relative to the sustainable skiing framework provided by Sustainable Slopes: The Environmental Charter for Ski Areas. This study will also explore differences in program implementation rates and will examine explanations for these differences. For the purpose of this study, the research question is the following:

Is the North American ski industry making progress in implementing the NSAA's Sustainable Slopes: the Environmental Charter for Ski Areas (2000)?

In order to satisfy the study's purpose, the thesis will:

1. Review and define sustainable tourism – particularly as it applies to the ski industry,
2. Present Sustainable Slopes and define sustainable skiing,
3. Conduct an environmental program evaluation of the NSAA's Sustainable Slopes, and
4. Conduct a case study of a major ski facility (Aspen Skiing Company) in order to highlight environmental initiatives, to provide a dialogue on the reasons for differences in the implementation rates for Sustainable Slopes, and to provide a benchmark for the ski industry progress evaluation and implementation analysis (the methodology for this case study is detailed at length in chapter 3).

Current thinking in the area of sustainable tourism has moved from broad theory for industry wide sustainability to a developing focus on specific sectors, locations, and issues within the industry. This study will add to the developing field of knowledge concerning sustainability and specific sectors of the tourism industry. This is significant as the field of sustainable tourism and environmental program evaluation are relatively new fields and little work has been completed that applies the tenets of environmental program evaluation to sustainable tourism programs.

CHAPTER 2: Theoretical Research Framework: Sustainable Tourism

The tourism industry, like many other human activities, results in pollution and environmental disturbances. One of the many studies commissioned to address these challenges states it simply:

“The case against tourism is well known – that it pollutes and disfigures, corrupts traditional cultures, and overburdens local resources. Man [sic] has been destroying his own leisure habitats, never mind those of the animal kingdom, and the destruction of habitat leads to the destruction of species” (Hughes, 1994 as cited in Hughes, 2002: p. 461).

As environmental issues become increasingly more important, environmental policies and agendas are becoming commonplace within the public and private sectors. The combination of changing environmental attitudes and policies has influenced travel and tourism like it has many other industries. The key question is no longer if business will be affected by environmental concerns, but when, to what extent, and how quickly they will be driven to take action.

Until recently, the travel and tourism industry was not actively involved in the environmental policies vital to its own interests, but a shift to more environmentally intelligent policies and activities has been identified by a multitude of stakeholders (NSAA, 2000, WTO, 2004) as a critical need for the industry. In addition, there was a need to broaden the discussion and ensure environmental concerns were also portrayed as a marketing tool to further secure the industry’s interests, reduce operational costs, and promote quality images that will attract tourists to green destinations. In response to this

need, sustainable tourism has emerged as a recognized discipline that contributes much to the areas of tourism and the environment.

This study will be presented in the broad context of sustainable tourism. The principles of sustainability will be drawn from contemporary literature concerning sustainable development and the tourism industry. When sport and recreation are coupled with economic development, this is commonly referred to as tourism (Sidaway, 1993: p. 163). Tourism has many definitions and it serves this study well in defining skiing as tourism. As skiing can be considered the 'sport or recreational' pursuit, and the ski resort the 'economic development', skiing can then be classified under the designation of tourism. This designation can be specified even further by stating that skiing, ski destinations, and winter adventure can all be classified to one degree or another as winter tourism, adventure tourism, or more fittingly, sports tourism (Hudson, 2000: p. 6, Chernushenko, 1994: p. 215). It then seems fitting that the ski industry be examined in the theoretical context of sustainable tourism.

2.1 Understanding Sustainable Tourism

Although the tourism industry has been relatively slow to adopt environmental policies, "there is certainly considerable evidence that the global tourism industry is becoming more concerned with its relationships with the environment" (Healy, 1996, as cited in Hall & Lew, 1998: p. 43). As a result of increased concern, a new field of study has emerged in the last few decades. The study of sustainable tourism has expanded and evolved from trade group operated research centres such as the World Travel and Tourism Environment Research Centre, to being part of the curriculum of many university undergraduate programs. This movement and the continued interest in issues

of environment demonstrate the commitment not only by scholars and the tourism industry, but also by the general public to address sustainability.

The origins of sustainable tourism can be traced back to 1979 and the first institutional recognition of tourism related environmental issues when the World Tourism Organization (WTO) established its Environment Committee. The WTO has since produced many documents that detail the links between tourism and the environment and as a result the WTO has been instrumental in the development of sustainable tourism.

“However, it was probably the exhortations on sustainable development of the Bruntland Report (WCED 1987) and ‘Agenda 21’ (UN 1993), that gave momentum to the specific emergence of sustainable tourism...” (Hughes 2002: p. 461).

In keeping with the Bruntland (WCED 1987) definition of sustainable development, tourism has attempted to reconcile economics and conservation by emphasizing the need to conserve resources for future generations. In the case of tourism, the challenge has been to reconcile the competing interests of the tourist, the resident, the industry, the environment, and future generations. The product of this reconciliation was the development of contemporary definitions of sustainable tourism.

Defined by Victor T.C. Middleton and Rebecca Hawkins (1998: ix) in Sustainable

Tourism: a marketing perspective:

“Sustainable tourism means achieving a particular combination of numbers and types of visitors, the cumulative effect of whose activities at a given destination, together with the actions of the servicing businesses, can continue into the foreseeable future without damaging the quality of the environment on which the activities are based”.

Middleton and Hawkins (1998) expand upon this definition and emphasize the need to maintain the impacts resulting from destination operations, visitor usage, and the

associated destination activities below the threshold at which the local regenerative resources necessary to maintain the environment are no longer capable of doing so.

Middleton and Hawkins' definition presents sustainable tourism in such a way that the unique structure of the tourism industry is accounted for. Critics of this definition argue that although acknowledging the uniqueness of the industry is crucial in defining sustainable tourism, the environment is in fact not the only area that needs attention where sustainability is concerned.

In 1995, at the World Conference on Sustainable Tourism in Lanzarote, Canary Islands, Spain, a more holistic framework for sustainable tourism emerged. In the document entitled Charter For Sustainable Tourism (World Conference on Sustainable Tourism, 1995) developed at the conference, this holistic framework for sustainable tourism development can be found. Guided by the principles set forth in the Rio Declaration on the Environment and Development (United Nations Environment Programme, 1992) and the recommendations that emanate from Agenda 21 (United Nations Division for Sustainable Development, 2000), this charter states the following:

“Tourism development shall be based on criteria of sustainability, which means that it must be ecologically bearable in the long term, as well as economically viable, and ethically and socially equitable for local communities. Sustainable development is a guided process which envisages global management of resources so as to ensure their viability, thus enabling our natural and cultural capital, including protected areas, to be preserved. As a powerful instrument of development, tourism can and should participate actively in the sustainable development strategy. A requirement of sound management of tourism is that the sustainability of the resources on which it depends must be guaranteed” (World Conference on Sustainable Tourism, 1995: p. 1).

This statement and the accompanying principles found within the Charter for Sustainable Tourism (World Conference on Sustainable Tourism, 1995) provide an

inclusive framework for sustainable tourism; one that incorporates environmental factors as well as social-economic and cultural factors. While this document provides a solid framework for sustainable tourism, it does not provide a distinct definition of sustainable tourism.

In keeping with the tenets of sustainable development as presented in the Bruntland Report (WCED, 1987), the World Tourism Organization (WTO), an international intergovernmental organization, presents a definition of sustainable tourism that accounts for both the unique nature of the industry and the environment on which it depends, as well as important factors such as social, cultural, and economic issues. The WTO defines sustainable tourism as follows:

“Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social, and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems (World Tourism Organization, 2003: p. 1).

It is the WTO's definition of sustainable tourism that is most often cited in contemporary literature concerning tourism and sustainability. This definition is thorough in that it is in keeping with the Bruntland definition for sustainable development, it is inclusive, and it accounts for the unique nature of the tourism industry.

Although the WTO definition is the contemporary definition of sustainable tourism, it is beyond the scope of this study to examine all aspects of sustainable tourism detailed in this definition. While the author recognizes the importance of a holistic definition, one that includes environmental, cultural, social, and economic factors, and one that details their role and interactions in the sustainability process, logistics and

funding limit the examination of all factors. For the purpose of this study the environmental factors alone will be examined in depth. Other factors will be considered and their interactions with the environmental factors, where suitable, will be included. In order to accomplish this task, the Middleton and Hawkins (1998: p. ix) definition of sustainable tourism will form the working definition for the purpose of this study. This definition provides a simplified and environment-specific definition of sustainable tourism, and as such, fits well with the environment-specific theme of this study.

Once again the definition is as follows:

“Sustainable tourism means achieving a particular combination of numbers and types of visitors, the cumulative effect of whose activities at a given destination, together with the actions of the servicing businesses, can continue into the foreseeable future without damaging the quality of the environment on which the activities are based” (Middleton and Hawkins, 1998: ix).

In order to summarize the key characteristics underlying sustainable tourism a working definition must first be identified (as above). Based on the working definition of sustainable tourism used in this thesis the following criteria can be extrapolated:

- ✓ Acknowledgement that the environment is a crucial component of the working tourism framework,
- ✓ The creation of a formal environmental policy,
- ✓ Presence of a management strategy that keeps tourist numbers below a threshold where environmental damage becomes cumulative,
- ✓ Maintenance, preservation, and protection of essential ecological processes,
- ✓ Inclusion of tourism stakeholders in the decision making process concerning a destination. This may include servicing businesses, community members, conservation groups, and local government, and
- ✓ The development of a monitoring and reporting infrastructure to ensure compliance with environmental policies and frameworks.

The list of sustainable tourism criteria is not limited to the above. The criteria identified for sustainable tourism are based on the working definition of sustainable tourism used in this thesis and as such are limited to sustainability criteria exclusive to

the environment. As such, criteria that pertain to social, ethical, and cultural criteria have not been included per se. The reasons for this have been discussed in earlier sections of this chapter.

In order to further develop sustainable tourism theory and illustrate its direct applications to sub-sectors of the tourism industry or tourism destinations the following sections have been included. These sections will highlight several industry frameworks for sustainability. The chapter will conclude with a detailed presentation of the ski industry's first framework for sustainability: Sustainable Slopes: The Environmental Charter for Ski Areas (NSAA, 2000). It is the progress towards this charter's goals that will be evaluated in subsequent chapters.

2.2 Frameworks for Sustainability

As the study of sustainable tourism evolves, many 'green' frameworks have emerged for managing destinations. These frameworks have become increasingly important as more and more tourism sectors are faced with environmental pressures.

The three most commonly referred to frameworks for sustainability in the tourism industry include the World Travel and Tourism Council Environmental Guidelines (1998), Agenda 21 for the Travel and Tourism Industry (WTTC, 2001), and The Charter for Sustainable Tourism produced at the World Conference on Sustainable Tourism in 1995. Presented in Table 2.1, these frameworks provide a solid base from which tourism operators can begin to make their operations more sustainable. The frameworks detail such areas as energy efficiency, education, and water management.

Table 2.1: A Comparison of Themes Within Three Frameworks for Sustainable Tourism

<u>Principle or Guideline Theme</u>	<u>WTTC Environmental Guidelines</u>	<u>Agenda 21 for the Travel and Tourism Industry</u>	<u>Charter for Sustainable Tourism</u>
Healthy living/active lifestyles		✓	
Conservation/ stewardship/restoration/protection	✓	✓	✓
Resource Management	✓	✓	✓
Monitoring		✓	✓
Environment is central to issues of development, operations, and management	✓ <u>ONLY</u> development addressed	✓ <u>ONLY</u> development addressed	✓
Democratization (involving stakeholders in decision making processes)		✓	✓
Partnerships		✓	✓
Product responsibility	✓	✓	✓
Respect of environmental laws		✓	
Diversity/equity/access			✓
Leadership/education		✓	✓
Setting measurable targets towards sustainability		✓	
Regard for local culture, religion, population, economy, history and future	✓		✓
Identify and minimise operational environmental problems	✓	✓	✓
Conducting sustainable management in a global context		✓	✓
Ensuring tourist satisfaction in the sustainability process			✓
Green pricing			✓
Promotion of alternative tourism that is more sustainable			✓

✓ Theme covered in principles or guidelines

The list of principle and guideline themes is an all inclusive list that was extracted from all three frameworks.

Commonalities that link these frameworks are evident when each integrated framework is considered (see Table 2.1). Common to the presented frameworks are factors relating to the following:

- Resource conservation and protection,
- Operator and industry responsibility,
- Resource management,
- Environmental ethics,
- Operations, and
- Democratization

These sustainable tourism frameworks provide an industry blueprint from which tourism operators can address issues relating to sustainability. Where these frameworks excel is that they can be applied to any sector of the tourism industry. They transcend tourism industry boundaries and can be used as a framework for sustainability for any destination or as a framework from which sub-sectors of the tourism industry can create their own unique policies.

While these frameworks provide a solid encompassing sustainability framework for tourism, their holistic nature does not address the unique operations inherent in each tourism sector. Diversity and uniqueness after all, are a major component of what defines the tourism industry. Sustainable tourism frameworks provide broad overviews and statements but no management strategies are suggested for operators at diverse destinations such as ski areas or coastal villages.

The Charter for Sustainable Tourism (World Conference on Sustainable Tourism, 1995) goes so far as to acknowledge the importance of activity specific frameworks for sustainable tourism but does not provide the means to do so. The charter states:

The travel industry, together with bodies and NGOs whose activities are related to tourism, shall draw up specific frameworks for positive and preventative actions to secure sustainable tourism development and establish programmes to support the implementation of such practices. They shall monitor achievements, report on results and exchange their experiences” (World Conference on Sustainable Tourism, 1995: p. 4).

The frameworks for sustainability presented in Table 2.1 provide a blueprint upon which tourism sectors can base their own unique sustainable tourism frameworks as suggested in The Charter for Sustainable Tourism (World Conference on Sustainable Tourism, 1995).

2.3 Sustainable Skiing

The National Ski Areas Association in partnership with conservation groups, government agencies, and environmental consultants, builds on tourism industry frameworks for sustainability by moving beyond broad statements and strategies to provide a more ski industry-specific framework for sustainability with the Sustainable Slopes charter. Like the other frameworks for sustainable tourism presented, this framework for sustainable skiing covers all of the principles or guidelines detailed in Table 2.1, with the exception of healthy living/active lifestyles and regard for local culture, religion, population, economy, history, and future. Sustainable Slopes: The Environmental Charter For Ski Areas (NSAA, 2000) details sustainability principles and provides detailed practices for action. The translation of principles to practices is essential in the sustainability process.

Unique to this framework are a set of principles and practices that transcend broad tourism definitions to account for the unique structure, activities, needs, and environments of the ski industry.

2.3.1 Sustainable Slopes: The Environmental Charter for Ski Areas

Launched in the spring of 2000, Sustainable Slopes contains a set of voluntary environmental principles that address all aspects of ski resort management, including planning, design, construction, operations, education and outreach. These principles are meant to go beyond compliance with federal and provincial/state laws in areas where improvements make both environmental and economic sense.

Following each principle is a range of ‘options for getting there’, or simply stated ‘practices’, so that ski destination operators can choose actions that are the most

appropriate and realistic for their operations. In this way, the charter not only addresses the unique challenges that the ski industry faces in the sustainability process but it also addresses the unique challenges that are present or arise at each individual ski area. It is the intention of the NSAA that Sustainable Slopes provide a framework from which the ski industry can become a sustainable sub-sector of the tourism industry. The charter's principles and practices are presented in Table 2.2 on page 17.

Sustainable Slopes provides a tangible framework for sustainable skiing while recognizing that sustainability is not an end state but a process. The NSAA gathers annual feedback from program participants that is then used to make modifications and improvements to the charter. In this way, the program continues to evolve and improve upon its existing framework for sustainable skiing.

Unique to this ski specific framework for sustainable tourism, is that Sustainable Slopes provides provisions for monitoring, auditing, and reporting on progress towards sustainability objectives. The auditing process is a self-assessment based on the goals of the charter. Monitoring and reporting is done by the NSAA in conjunction with environmental and statistical consulting groups. The WTTC frameworks provide no such provisions, and as such NSAA must be commended for taking additional steps to make the ski industry accountable for their actions.

Table 2.2: Sustainable Slopes Principles and Practices

	Principle	Options for Getting There (examples)
1	Planning, Design and Construction	<ul style="list-style-type: none"> Respecting outstanding natural resources and carrying capacities of the local ecology in planning new projects Minimizing road building where practical
2	Water Use for Snowmaking	<ul style="list-style-type: none"> Installing water storage facilities to recapture snowmelt runoff for reuse Using appropriate technology and equipment to optimize efficiency
3	Water Use in Facilities	<ul style="list-style-type: none"> Installing water efficient equipment in facilities Educating guests about the benefits of efficient water use
4	Water Use for Landscaping and Summer Activities	<ul style="list-style-type: none"> Using drought tolerant plants in landscaped areas Timing watering to minimize evaporation
5	Water Quality Management	<ul style="list-style-type: none"> Participating in watershed planning, monitoring and restoration efforts Applying state-of-the-art or other appropriate stormwater management techniques
6	Wastewater Management	<ul style="list-style-type: none"> Monitoring wastewater quality Re-using treated wastewater/greywater for non-potable uses
7	Energy Use for Facilities	<ul style="list-style-type: none"> Auditing current usage levels, and targeting areas for improvement Investing in cleaner or more efficient technologies for power generation
8	Energy Use for Snowmaking	<ul style="list-style-type: none"> Use high efficiency snow guns and air compressors for snowmaking operations Purchasing green power from energy providers
9	Energy for Lifts	<ul style="list-style-type: none"> Use renewable energy sources Upgrade diesel motors or converting them to alternative clean sources
10	Energy Use for Vehicle Fleets	<ul style="list-style-type: none"> Provide shuttles or transportation for guests and employees Use alternative fuel or hybrid electric engines in ski area fleet vehicles
11	Waste Reduction	<ul style="list-style-type: none"> Purchasing recycled products Educating guests and employees about reducing wastes generated on site and following the Leave No Trace™ Principles such as ‘pack it in, pack it out’
12	Product Reuse	<ul style="list-style-type: none"> Using washable or compostable tableware and silverware in lodges Exploring opportunities for reusing products (building materials, lift parts, office supplies)
13	Recycling	<ul style="list-style-type: none"> Setting purchasing specifications to favour recycled content and specifying a portion of new construction to require recycled content Partnering with local governments on recycling in remote communities where recycling programs are not readily available
14	Potentially Hazardous Waste	<ul style="list-style-type: none"> Safely storing and disposing of hazardous materials Recycling waste products such as used motor oil, electric batteries, and tires
15	Fish and Wildlife Management	<ul style="list-style-type: none"> Siting and designing trails and facilities to include gladed skiing areas, linkage of ungladed areas to maintain blocks of forested corridors and inter-trail islands to reduce fragmentation where appropriate
16	Forest and Vegetative Management	<ul style="list-style-type: none"> Limiting disturbance to vegetation during summer activities Revegetating roads as quickly as possible after disturbance
17	Wetlands and Riparian Areas	<ul style="list-style-type: none"> Limiting snowmaking and grooming equipment access to wetlands and riparian areas if snow cover is inadequate to protect them
18	Air Quality	<ul style="list-style-type: none"> Reducing air pollutants and greenhouse gas emissions from buildings, facilities and vehicles through clean energy and transportation-related measures identified in the Principles
19	Visual Quality	<ul style="list-style-type: none"> Minimizing ridgeline development Designing lifts and buildings to blend into the natural backdrop or complement the natural surroundings
20	Transportation	<ul style="list-style-type: none"> Providing employee transportation benefits, including shuttles, bus passes or discounts, van pools and ride-share incentives Working with travel agents to market “car-free” vacation packages
21	Education and Outreach	<ul style="list-style-type: none"> Training employees and informing guests about the surrounding environment Creating funding mechanisms for environmental outreach projects

Sources: NSAA 2000, and NSAA 2001

The NSAA has developed an environmental auditing program to assess the effectiveness of the principles and practices contained in Sustainable Slopes. The Assessment Tool (NSAA, 2000b) contains evaluation tool forms that address issues related directly to each of the 21 Sustainable Slopes principles. Ski areas complete these forms and submit them to the NSAA so that the results can be compiled and reported in their annual reports.

To date, the NSAA has released 3 Annual Reports (2001, 2002, 2003) detailing the information collected from endorsing resorts. The purpose of the monitoring, auditing, and reporting processes is to allow the NSAA to report on ski industry progress towards sustainability and highlight areas that are in need of improvement. These reports form a crucial component of 'sustainable skiing'.

While the NSAA (2000) provides no formal definition of sustainable skiing, the association provides its view of sustainability in Sustainable Slopes: The Environmental Charter For Ski Areas. Geraldine Link (personal communication, April 28, 2004), Director of Public Policy for the NSAA, states that "In drafting the Charter, we started with the basic definition of sustainability "meeting the needs of the present without compromising the ability of future generations to meet their own needs". Link also reported that the charter elaborates on what sustainability from a ski operator's view point is. The charter (NSAA, 2000: p. 1) includes reference to the following:

- Environmental ethics,
- Consideration of future generations and environments,
- Resource management,
- Resource conservation and protection,
- Waste reduction, and
- Air and visual quality.

Auden Schendler (personal communication, April 28, 2004), Director of Environmental Affairs at the Aspen Skiing Company confirmed the researcher's observations that no formal definition of sustainable skiing exists. When asked to comment on reasons for its absence Schendler stated "I don't think the industry is reluctant, it's just that people have trouble defining it". When asked to define sustainable skiing Schendler responded with the following: "We define it as: being able to stay in business forever".

Though not necessary for the function of the Sustainable Slopes program or the ski industry itself, a formal definition of sustainable skiing is a useful framework from which evaluations can be constructed. For this reason as well as to meet the objectives of this study, the researcher has defined sustainable skiing below. Keeping with contemporary definitions of sustainable tourism (Middleton & Hawkins, 1998, WTO, 2003, WTTC, 1998, 2001, World Conference on Sustainable Tourism, 1995) and the sustainable skiing framework provided by the NSAA's Sustainable Slopes (2000), sustainable skiing may be defined as follows:

Sustainable skiing means achieving a particular combination of numbers and types of visitors, the cumulative effect of whose activities at a given ski destination, together with the actions of the ski resort and servicing businesses, can continue into the foreseeable future without damaging the quality of the environment on which the activities are based.

In order to further expand this definition the following must also be stated:

Formal environmental policies and management plans must be created, and monitoring and reporting systems must be in place in order to track progress towards the goals of the management plan. Plans and policies must include provisions for the maintenance, preservation and protection of ecological processes as well as the inclusion of stakeholders in the decision and reporting processes at ski destinations.

While this definition does not provide provisions for other dimensions of sustainability such as culture, religion, economics, and social dimensions, this definition is based on the ecological foundations of sustainable development, the same foundations upon which this study is built and conducted. For this reason, the working definition of sustainable skiing presented is not inclusive. Ideally, the definition should be expanded to include other dimensions of sustainable tourism such as culture and religion, but for the purposes of this study, this definition works well as it is limited to the ecological foundations of sustainable tourism definitions. The next step in 'sustainable skiing' may then be to frame the concept with an inclusive definition.

The definition of sustainable skiing presented, as well as the broad theoretical foundations of sustainable tourism presented in previous sections, form the theoretical research framework for this study.

CHAPTER 3: Research Methodology

In order to evaluate the degree to which Sustainable Slopes is having an impact on the environmental management of the ski industry, this study draws on program evaluation techniques. Environmental program evaluation forms the methodological basis of this research undertaking.

3.1 Program Evaluation Foundations

The process of assessing the impacts of environmental programs has proven quite complex in practice. Although environmental program evaluation is a relatively new application, program evaluation is not a new concept. German sociologist Max Weber is arguably the founder of the field of evaluation research. In his work in the social sciences, Weber argued: “The question of the appropriateness for achieving a given end is undoubtedly accessible to scientific analysis...” (Weber, 1949, p: 54). Weber’s argument has become the foundation for modern program evaluation. In Rutman and Mowbray (1982, p: 12 as cited in Knapp and Kim, 1998: p. 4) program evaluation is defined as “the use of scientific methods to measure the implementation and outcomes of programs, for decision making purposes”. Knapp and Kim (1998, p: 24) develop this definition further by stating the following:

“The focus of evaluation research or program evaluation is to assess the significance of a particular program or policy initiative. Moreover, program evaluation is concerned with assessing the effectiveness of particular interventions and with documenting costs and benefits of particular initiatives”.

Stated simply, program evaluations are performed for several reasons which include the following: to facilitate improved program management, to aid in the decision making process regarding whether to continue or terminate a program, or to compare the efficacy of several programs (Rossi and Freeman, 1993).

3.2 Environmental Program Evaluation

Program evaluation emerged as a field of research in the 1960s (Knapp and Kim, 1998), since which time, program evaluations have become common in the fields of education, health care, welfare, criminal justice, and government (Rossi and Freeman, 1993) in order to improve the performance of existing programs. Despite the use of program evaluation in many policy areas, evaluations of environmental programs are comparatively less common.

Knapp and Kim (1998: p. 4) argue that there are many explanations for the lack of systematic evaluations of environmental programs, the first of which is timing. Environmental programs in general are relatively new and have only recently reached the stage when evaluation is appropriate. The second explanation is that environmental program evaluation is faced with the difficult task of articulating well-defined goals. Reducing crime rates, improving infant mortality rates, or reducing child hunger are all relatively easy to express in quantitative terms, whereas improvements to ecosystem health and species diversity are not. Concepts such as these are very difficult to quantify and evaluate, and as a result, program evaluation has been slower to mature in the field of environment.

One way in which the difficulties of environmental program evaluation can be mitigated is by the use of indicators. As previously stated, it is very difficult to measure

species diversity, but given the right set of indicators a researcher can attempt the task. Although there is some disagreement among program evaluation scientists about whether or not indicators that provide meaningful measures of environmental quality can be identified (Knapp and Kim, 1998: p. 8), indicator based research has become commonplace in the area of environment (Hughes 2002, Hunter, 2002). Knapp and Kim (1998:p. 7) argue that “Environmental indicators are a key component of environmental program evaluation; they provide necessary data for measuring the effectiveness of environmental programs”.

Figure 3.1: Definitions of ‘Environmental Indicator’

“...a measurable feature which singly or in combination provides managerially and scientifically useful evidence of environmental and ecosystem quality, or reliable evidence of trends in quality”.
(U.S. ITFMWQ, 1994: TF-1)

“...characteristics of the environment, both abiotic and biotic, that can provide quantitative information on ecological resources”.
(U.S. Environmental Protection Agency, 1993: p. 28)

An indicator is a measure of the attributes of the habitat, the degree of stress, and either the level of exposure to the stressor or the response to that exposure.
(Hunsaker and Carpenter, 1992)

Although vast differences exist in terms of defining the indicator concept (Figure 3.1), environmental indicators have become a measuring tool for researchers studying impacts in many different environmental fields. In particular, indicators have been receiving increasing attention by government agencies interested in the state of the environment (USEPA, 2003, 2002, Jameson et al., 1998, Environment Canada, 1999, 2000, Swedish EPA, October 2002, December 2002, Canadian Council of Ministers of the Environment, 1994), and by researchers in the field of sustainable tourism (Manning, 1998, Manning et. al., 2001, Hughes, 2002, Gustavson et. al., 1998). The focus of this

research has been the task of identifying measurable indicators in order to research and report on an environmental problem. For example, Environment Canada (1999) devised a set of indicators to assess and report on the Great Lakes Basin ecosystem, the stresses on the ecosystem, and the human responses to those stressors. Dr. Harvey Shear (Environment Canada, 1999, p:1), Advisor to Environment Canada, Ontario Region illustrates the usefulness of indicator research by stating that:

"By using a set of easily understood indicators it will become easier to assess how far we've come and how much farther we have to go to fully address the complex problems facing the Lakes".

In their work on sustainable tourism indicators, Manning, et. al., (2001) identified key indicators for Ugljan-Pasman, an island tourism destination in Croatia. The main focus of the workshop and subsequent report was to demonstrate the process by which the identification, evaluation and use of indicators for sustainable tourism development can be applied to a case study destination. In a personal communication with Edward Manning (2004), he stated that "I think that one of the key advantages to indicators lies in their requirement for clarity – which really helps to define exactly what attributes are likely to be important". This statement is indicative of the usefulness of indicators for the evaluation of case study destinations as well as for broader evaluations, as indicators by nature force clarity and precision in a study.

Although contemporary indicator based research is rarely identified as program evaluation in the field of sustainable tourism, the link between the two is clear. The use of indicators as a building block for the assessment of the environment or the significance of an environmental program is a useful application and, as such, environmental program evaluation forms the methodological basis of this research undertaking. This study

identifies measurable indicators and a methodology for analysis in order to research and report on the progress towards the goals of an environmental program.

3.3 Indicators Used in This Thesis

In order to collect, organize and analyse the data specific to this study, a matrix (See Table 3.5) has been developed that is in keeping with contemporary environmental program evaluation techniques. The matrix identifies measurable indicators in order to satisfy the study's purpose: to evaluate the progress towards Sustainable Slopes.

The key criteria and indicators identified in Table 3.1 are ski-environment specific and they are based on the 21 principles and the accompanying practices or 'options for getting there' presented in Sustainable Slopes: the Environmental Charter for Ski Areas (NSAA, 2000). Knapp and Kim (1998: p. 7) state "The issue of what variable to measure must be based on a conceptual model of how the program might affect the environment". The Sustainable Slopes program principles provide the 'model' and the programs 'options for getting there' are the actions intended to affect the environment positively, and so, following the logic of the Knapp and Kim definition, these 'options for getting there' become measurable indicators.

Indicated in Table 3.1, several indicators may be used in order to evaluate progress. For all indicator dimensions aggregated ski area implementation rates will be used, and where other indicator data exists, it will be presented and discussed in the subsequent analysis chapters of this study. These key indicators are useful to this study because they employ a dichotomous observation and reporting system whereby the researcher can observe whether or not the criteria (see Table 3.1) have been implemented by the industry or the case study destination.

Also, these indicators have been selected for several additional reasons, including the ease of data collection, organization, and analysis. As stated, the indicators correspond to the principles and practices outlined in Sustainable Slopes and as such, data regarding these indicators have been reported in the NSAA's Annual Reports (2001, 2002, 2003). As the data has already been collected, aggregated, and reported, the cost and time allocated for data collection in this study have been reduced.

Table 3.1: Sustainable Skiing Indicators

<u>Indicator Dimension</u>	<u>KEY CRITERIA SAMPLE*</u>	<u>INDICATOR</u>
Planning	<ul style="list-style-type: none"> • Incorporating green building principles, such as using energy, water and material efficiency techniques and sustainable building practices • Engaging stakeholders collaboratively on the siting of improvements and the analysis of alternatives • Using long-life, low maintenance materials in building 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (example: on average, ski areas are reporting that some progress has been made in implementing the charter – numerical scale value = 3) • % of reporting resorts who are actively implementing the key 'planning' criteria
Water	<ul style="list-style-type: none"> • Installing water storage facilities to recapture snowmelt runoff for reuse • Using appropriate technology and equipment to optimize efficiency • Installing water efficient equipment in facilities such as low-flow faucets and toilets • Conducting water use audits and investigating methods and alternatives technologies to reduce water consumption • Watering at appropriate times to minimize evaporation • Using drought tolerant plants in landscaped areas • Participating in watershed planning, monitoring and restoration efforts • Connecting septic systems to municipal wastewater systems 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (scale value 1-5) • % of reporting resorts who are actively implementing the key 'water' criteria • Gallons of water for consumptive uses conserved per year • Gallons of water conserved for snowmaking annually
Energy	<ul style="list-style-type: none"> • Purchasing green power, such as wind-generated power from energy providers • Auditing current usage levels, and targeting areas for improvement • Using high efficiency snow guns and air compressors for snowmaking operations • Using on mountain reservoirs and ponds to gravity feed snowmaking systems where possible • Using renewable energy sources • Providing shuttles or transportation for guests and employees • Using energy efficient vehicles 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (scale value 1-5) • % of reporting resorts who are actively implementing the key 'energy' criteria • kWh per year of electric energy conserved.
Waste	<ul style="list-style-type: none"> • Conducting an audit of waste production to establish a baseline and track progress toward reduction • Using washable or compostable tableware/silverware in cafeterias and lodges • Composting food wastes, grass clippings, and woody debris for use in landscaping and revegetation areas 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (scale value 1-5) • % of reporting resorts who are actively implementing the key 'waste' criteria • Waste diversion rate, % of total waste

<u>Indicator Dimension</u>	<u>KEY CRITERIA SAMPLE*</u>	<u>INDICATOR</u>
Environmental Management	<ul style="list-style-type: none"> • Recycling office paper, cardboard, newspaper, aluminium, glass, plastic and food service waste • Safely storing and disposing of potentially hazardous materials such as solvents, cleaning materials, pesticides and paints 	<ul style="list-style-type: none"> • Total waste in Tons diverted.
	<ul style="list-style-type: none"> • Supporting and participating in research of fish and wildlife populations and their interactions with ski areas • Revegetating disturbed areas as quickly as possible following disturbance • Provide signage to inform guests of sensitive vegetation areas • Engaging in restoration, remediation and protection projects • Inventorying and monitoring wetland and riparian areas 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (scale value 1-5) • % of reporting resorts who are actively implementing the key 'environmental management' criteria
	<ul style="list-style-type: none"> • Reducing air pollutants and greenhouse gas emissions from buildings, facilities and vehicles through clean energy and transportation related measures 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (scale value 1-5) • % of reporting resorts who are actively implementing the key 'air' criteria • Total pounds of CO₂ emissions reductions from all energy, waster, and transportation reduction measures annually.
	<ul style="list-style-type: none"> • Designing lifts and buildings to blend into the natural backdrop or complement the natural surroundings 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (scale value 1-5) • % of reporting resorts who are actively implementing the key 'aesthetics' criteria
	<ul style="list-style-type: none"> • Supporting and participating in transit initiatives in the community and region • Offering and promoting carpooling incentives for guests such as discounts or preferred parking 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (scale value 1-5) • % of reporting resorts who are actively implementing the key 'transportation' criteria
Education	<ul style="list-style-type: none"> • Partnering with local school systems, businesses, and the public on initiatives and opportunities for protecting and enhancing the environment • Dedicating personnel to environmental concerns and incorporating environmental performance measures and expectation into departmental goals 	<ul style="list-style-type: none"> • Aggregated ski area implementation rate (scale value 1-5) • % of reporting resorts who are actively implementing the key 'education' criteria

*A variety of criteria for measurement are provided by Sustainable Slopes but these criteria are a sample of the key ones.

The list of key criteria are a sampling of 'options for getting there' from Sustainable Slopes: The Environmental Charter for Ski Areas (NSAA, 2000).

3.4 Program Evaluation Methodology

While identifying a set of measurable indicators is crucial to an environmental program evaluation, choosing the most appropriate evaluation design is a difficult and arduous process whereby one must carefully consider a number of important factors such as budget, program construction, and time since the program was activated. Arguably the most important part of the evaluation process is selecting the strongest and most appropriate evaluation strategy.

There are multiple approaches to program evaluation and all of them have strengths and drawbacks. The challenge is to develop an evaluation framework that is consistent with the stated needs of the evaluation as well as other considerations such as the availability of baseline data and the time since the program was implemented. In addition, it is often useful to employ multiple evaluation methods in order to substantiate results especially when there are high levels of uncertainty associated with the evaluation process and the data quality.

The data used for this evaluation report on the outcome of the program. This is to say that there is no pre-program measurement available from which a comparative study can be conducted. While it is not safe to assume that before Sustainable Slopes there was an absence of environmental programs, sewage treatment, waste management, etc., it remains that there was no 'blanket' program that addressed the environmental management of ski areas. As a result, building a comprehensive baseline would be beyond the scope of this study. As a result of this constraint, the absence of a baseline becomes one of the main evaluation strategy selection criteria. Other criteria include the practicability of implementation and the availability of data. Threats to validity and

credibility can be mitigated and the selection criteria can simultaneously be addressed by using several different evaluation techniques in combination to substantiate the findings of the evaluation. The following sections will detail the techniques that will be employed.

3.5 The Evaluation Design Used in This Study

For the purpose of this study the one-program-after-only time series design has been selected as the most appropriate and useful evaluation design. This design is used when only after-program exposure data is available for evaluation. It has been chosen as it meets the requirements or limitations of the selection criteria detailed in previous sections. Weaknesses found in the evaluation design have been mitigated by using a multiple method approach to evaluation. The result is an evaluation design that not only is the most appropriate given the study's limitations, but also is the strongest based on the selection criteria and the mitigation of weaknesses. This method, presented in Table 3.2 will be used to evaluate the implementation progress of the North American ski industry.

Table 3.2: The Evaluation Design for the North American Ski Industry

<i>Program Indicators</i>		<i>Self-Assessed Reported Values (Aggregated)</i>		
		2001	2002	2003
1	Planning	Values derived from NSAA Annual Reports, 2001, 2002, 2003		
2	Water			
3	Energy			
4	Waste			
5	Environmental Management			
6	Air			
7	Aesthetics			
8	Transportation			
9	Education			

*The North American Ski Industry control group includes 173 resorts that have endorsed the Sustainable Slopes Environmental Charter to date. These resorts represent more than 72% of the North American ski industry by skier/snowboarder visits. (NSAA, 2003)

For reasons of methodology and confidentiality within the Sustainable Slopes program, only aggregate data are available for each of the 21 program principles (Table 2.2). As a result, the reported data will reflect only the aggregated measurements reported by the NSAA. The 21 program principles have been aggregated into 9 program dimensions. They are presented in Table 3.2 and also in Table 3.1.

3.6 Methodology

The environmental program evaluation process requires that the methodology for conducting the evaluation be carefully considered. The methodology selected for this study is based on a best-fit model whereby it is selected based on its suitability to the study, applicability to the data itself, and the credibility of the method.

The methodology selected for this study is based on a goal attainment model approach to program evaluation (Kiresuk, 1968, Franklin and Thrasher, 1976). While all of the goal attainment models have been constructed for the evaluation of health care programs, their applicability to program evaluation transcends health care boundaries. In particular the Goal Attainment Scaling model (GAS) has been used widely as a program evaluation tool. Developed by Thomas J. Kiresuk Ph.D. (1968) for the purpose of evaluating community health programs, it is used to measure progress toward multiple goals. GAS allows for the aggregation of findings, and as a result, facilitates the evaluation of overall program effectiveness. For each goal, attainment levels are detailed in gradients of expected outcomes. The outcomes are represented by numeric and qualitative values in Table 3.3.

This method is best suited for this study as each time series data point is a measurement of progress towards the goals (21 principles of Sustainable Slopes) of each

of the 9 program dimensions (Table 3.1). For each dimension a value has been assigned based on the progress towards that goal that has been achieved.

The GAS values used in this study are presented in Table 3.3. These values correspond directly to the evaluation scale used in the NSAA's Assessment Tool (2000) and Annual Reports (2001, 2002, 2003).

Table 3.3: The Evaluation Values Used in This Study

Value	Scale Qualitative Value
1	No action taken/Not yet started
2	Has endorsed the Sustainable Slopes Charter/Investigating, but no actions implemented
3	Showing some initiative – but further action is required to stay on target with the Sustainable Slopes Charter/Some actions implemented
4	On target with the Sustainable Slopes Charter/Significant progress made
5	Principles implemented/Demonstrating leadership

3.7 North American Ski Industry Data Collection

In order to get broad industry perspective on the ways in which Sustainable Slopes is having an effect on management, planning, and ski area operations, North American ski industry sustainable skiing data have been collected. The majority of measurable data have been collected from the NSAA Annual Reports (2001, 2002, 2003). The reports contain the only data available on the North American ski industry's environmental performance, as well as their progress towards the goals of the Sustainable Slopes charter.

Annually, each endorsing ski area is required to complete the Assessment Tool (June 2000b) in order to meet the requirements of the Sustainable Slopes program. In doing so, the ski industry is not only monitoring its own progress, but it is also able to produce an annual report that provides information on sustainable skiing, ski resort progress, and an aggregated industry report on sustainability in North America.

The Annual Reports (NSAA, 2001, 2002, 2003) are a compilation of the annual assessments of reporting resorts. The reports present the data in an aggregated format whereby industry averages are presented. Data provided in these reports have been used to conduct a progress evaluation in this study. These data have been supplemented with other industry data made available through individual resorts, interest groups, conservation authorities, and the NSAA itself.

There are several issues concerning the validity of the NSAA data being assessed that must be addressed (also discussed in Chapter 4). The validity of the data may be questioned for the following reasons:

- 1) Ski area employees completing the self-assessment may have a limited knowledge of environmental issues (the data may reflect environmental ignorance),
- 2) The data may reflect the bias of the self-assessor or may reflect the ski area's agenda (e.g. to improve their environmental image, to gain a competitive edge over other ski areas, etc.),
- 3) The reports represent less than 25% of North American ski areas,
- 4) The data may contain reporting errors and mathematical miscalculations,
- 5) The data is aggregated and the original self-assessments are unavailable due to privacy agreements.

In order to mitigate these validity concerns, the author has employed multiple methods of data collection in order to verify and triangulate the contents of the NSAA's Annual Reports. In addition, the author has identified the validity issues and makes no claims that the data is free of bias, absent of reporting or mathematical error, or that the data itself is representative of the whole of the North American ski industry. The aggregation of the data has been the greatest hurdle to overcome, but by supplementing the data contained in the Annual Reports with additional data sources, the aggregated data is strengthened and an evaluation made possible. As the NSAA's reports contain the only data available on the environmental performance of the ski industry, the data has

been used 'as is', the concerns over validity have been identified, and multiple methods of data collection have been performed in order to mitigate the concerns. Other data has been collected from literature reviews and field research in order to substantiate the NSAA's aggregated data. These additional data sources though limited, provide additional validation of the data contained in the Annual Reports.

The data used to evaluate the North American ski industry have been compiled and are presented in subsequent chapters using an evaluation matrix (Table 3.6). Numeric values presented in this study in reference to the North American ski industry are a direct representation of the numeric values contained within the NSAA's Annual Reports.

3.8 The Case Study

The measurement of progress made towards the goals of Sustainable Slopes by the North American Ski Industry will be based on the data provided in the NSAA's Annual Reports (2001, 2002, 2003). While the researcher began with the North American ski industry, it quickly became apparent that further data was required to expand the study and conduct a thorough evaluation. For this reason, the case study, Aspen Skiing Company (ASC) has been included as an additional source of data and as a benchmark for comparison with the rest of the North American ski industry.

The purpose of including a case study is to further verify the information gathered and evaluated for the North American ski industry. The evaluation design, techniques, and methodologies used to evaluate the case study, ASC, will be the same as those used to evaluate the North American ski industry in this study.

Detailed annual data is not available for ASC, though another study conducted in 2002 (Green Snow: Sustainability and the Ski Industry, Donohoe) provides a measure of post program exposure for comparison. The value scale used in this previous study is the same as that used for this study (Table 3.3). The data from this previous study of ASC will be presented in the evaluation matrix.

Unlike the North American ski industry, three data sets are not available for analysis. Instead, two time series data sets have been collected and as a result, the evaluation design has been modified accordingly. The evaluation matrix used to evaluate ASC is the same as that presented in Table 3.2 with the exception that there are 2 sets of data gathered after program exposure and not three as presented. The evaluation matrix used to evaluate ASC is detailed in Table 3.4.

Table 3.4: The Evaluation Matrix Used to Evaluate Aspen Skiing Company

<i>Program Indicators</i>	<i>ASC ASSESMENT</i>	
	2002	2003
1	Values derived from previous study (Donohoe, 2002)	Values derived from authors field estimates
2		
3		
4		
5		
6		
7		
8		
9		

In this case, the use of only two time series comparison points will not further limit the study. The purpose of including a case study is to provide a comparison. The evaluation of ASC will be used as comparison with the North American ski industry as well as to further validate the findings of the North American ski industry evaluation.

3.9 Case Study Indicator Data Collection

In order to build on, verify, and add depth to the data reported in a previous study (Donohoe, 2002) and the NSAA Annual Reports (2001, 2002, 2003), additional case study data have been collected and analysed. Program evaluation methodology is pluralistic by nature, combining qualitative and quantitative methods (Kitchen & Tate, 2000) which will facilitate a more rigorous examination of the research question at hand. As proposed, a case study of Aspen Skiing Company (ASC) has been included and both quantitative and qualitative research methods have been employed in order to acquire data regarding this major North American ski destination.

In order to collect indicator information, pluralistic methods of research, data acquisition and analysis have been employed. In keeping with environmental program evaluation methodology (Knapp and Kim, 1998: p. 310), this multiple methods approach allows the strength of one research method to mitigate the weakness of another (Smith 1988). The research methods for data collection that form the basis for this case study evaluation include on-site participant observation, literature review, semi-structured interviews with qualified key people, and the review of ASC Sustainability Reports (2001-2002a, 2002-2003). These methods of data acquisition enable the program evaluation process by providing a unique combination of both qualitative and quantitative indicator data from which inferences can be made.

In order to clarify the interview process, the interview questionnaires have been included as Appendices A3-A6. The questionnaires were slightly different for each interviewee as each had a different knowledge and data set to impart. The questionnaires were based on the sustainable skiing criteria and indicators. Respondents were selected

after extensive research and email communications with several City of Aspen and Colorado State officials, as well as the Director of Environmental Affairs at ASC. From this, several key people were identified as sources of data for this study. These individuals represent the most qualified people in their field and geographical location. They also represent a diverse range of community, environment and/or ski company stakeholders. As such, they were able to provide discourse on the sustainable skiing indicators, the environmental behaviour of ASC, and the degree to which environmental leadership is being demonstrated by ASC. The interviews were conducted with the following key people:

- 1) Auden Schendler
Director of Environmental Affairs
Aspen Skiing Company
Aspen, Colorado
- 2) Rick Lofaro
Water Quality Co-ordinator
Roaring Fork Conservancy
Basalt, Colorado
- 3) Lee Cassin
Director Environmental Health Department
City of Aspen
Aspen, Colorado
- 4) Stephen Kanipe
Director Renewable Energy Mitigation Program
Chief Building Official
City of Aspen
Aspen, Colorado
- 5) Geraldine Link
Director of Public Policy
National Ski Areas Association (NSAA)
- 6) Phyllis Woodford
Administrator, Environmental Leadership Program
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All key people contacted about the study were eager to participate, but scheduling and geographical conflicts limited the number of participating key people to a total of five. For several participants scheduling conflicts were impossible to overcome, but

geographical conflicts were mitigated by delivering questionnaires through email. Responses were collected in the same manner. Overall, all of those key people who were identified were eager to share their knowledge of ASC, the ski industry, and local environmental efforts.

On-site participant observation entailed observing evidence or lack thereof, of Sustainable Slopes implementation. In order to observe environmental action relating directly to the program's principles and practices, the researcher travelled all over ASC's four mountains recording the implementation status of the key criteria identified in Table 3.1. In order to observe many of the key criteria, it was necessary to ride the ski lifts, ski a diverse sampling of the terrain, tour the facilities, and participate in educational tours, etc. Observations were recorded using a dichotomous system of observation and reporting based on a yes/no scale. If the key criteria were observed as implemented a yes was ascribed, and if it was not, a no was recorded. An ascribed 'no' did not necessarily mean that the key criteria had not been implemented; simply that it was not observed during field research. The purpose of conducting on-site observations was to further verify the findings of the literature review, as well as the data gathered in personal interviews. The observation framework has been included as Appendix A7.

3.10 Report on Progress

As detailed previously, the North American ski industry and case study data have been collected and arranged in the evaluation matrix. The evaluation matrix used to organize these data is presented in Table 3.5.

The combined evaluation matrix forms the evaluation tool for this study. Using this methodology, the study will provide a data set, a progress evaluation, as well as a comparative analysis of the North American ski industry and ASC.

Table 3.5: The Evaluation Matrix Used in This Study

Program Indicator Dimension		Program Indicator	Reported Values:			Observed Values	
			Self Assessed Progress Level				
			North American Ski Industry				
			2001	2002	2003		
1	PLANNING	Planning, design, construction	Values derived from NSAA Annual Reports 2001, 2002, 2003			Values derived from Author's field estimates	
2	WATER	Water use for snowmaking					
		Water use for facilities					
		Water use for landscaping and summer activities					
		Water quality management					
		Wastewater management					
3	ENERGY	Energy use for facilities					
		Energy use for snowmaking					
		Energy use for lifts					
		Energy use for vehicle fleets					
4	WASTE	Waste reduction					
		Product reuse					
		Recycling					
		Potentially hazardous waste					
5	ENVIRONMENTAL MANAGEMENT	Fish and wildlife					
		Forest and vegetative management					
		Wetlands and riparian areas					
		Air quality					
6	AIR	Visual quality					
7	AESTHETICS	Transportation					
8	TRANSPORTATION	Education and outreach					
9	EDUCATION						

CHAPTER 4: North American Ski Industry Evaluation Results

4.1 Sustainable Slopes and the North American Ski Industry

As the demand for quality recreational experiences and environmentally sustainable tourism continues to increase, the National Ski Areas Association (NSAA) has recognized that the ski industry must respond to and be accountable for its response to these demands. As a result, the NSAA created Sustainable Slopes: The Environmental Charter for Ski Areas. The NSAA states that the purpose of the charter is as follows:

“In order to continue to offer quality recreational experiences that complement the natural and aesthetic qualities that draw these visitors to the mountains, NSAA and its member resorts have committed to improving environmental performance in ski area operations and management. (NSAA, June 2003: p. 1-1).”

The NSAA represents 322 North American alpine resorts that account for over 95 percent of all skiing and snowboarding visits annually. To date, 173 resorts have endorsed the Sustainable Slopes Environmental Charter. The endorsing resorts represent 54% of all NSAA member resorts, as well as over 72 percent of all North American ski resorts by skier visits (NSAA, June 2003: p. i).

Upon endorsing the Sustainable Slopes Environmental Charter, each resort has identified an environmental contact person, they have assessed (self-assessment) their policies and operations against those detailed in the Sustainable Slopes Environmental Charter, and they have committed to taking steps towards environmental performance improvements. In order to formalize this process, an assessment is conducted annually at

each endorsing resort. This assessment is voluntary and not every resort has the resources and/or the means to complete the assessment.

During the inaugural year (2000), 88 of the 170 endorsing resorts completed the assessment report (NSAA, June 2000b). This number increased to a total of 90 resorts out of 173 endorsing resorts in 2002. In 2003, the number of endorsing resorts did not change and the number of resorts completing the assessment declined to 79, lower than those reporting in the first year of the program. Geraldine Link (Personal communication, March 9, 2004), the Director of Public Policy for NSAA speculated as to why this decline occurred when she stated:

“It is difficult to determine why we have fluctuations in the number of resorts responding to the Sustainable Slopes Assessment Tool. The number of questions asked of resorts (over 200) certainly could be a factor in the decline in the number of respondents. Another possibility is that after three years of completing this self-assessment, resorts know where they stand in terms of their progress judged against the 21 Principles. For that reason, this year we changed the Assessment Tool significantly to focus on quantitative measurements. Resorts will still be able to individually judge their progress using the qualitative assessment, but it will no longer be part of the tool or the Annual Report.”

Over the last three years, the apparent trend has been that fewer than 50 percent of all endorsing resorts have completed the annual assessment process. This means that fewer than 25 percent of all NSAA member resorts represented by the NSAA are represented in the Annual Reports (NSAA, June 2001, June 2002, June 2003). As a result, the statistics and testimonials presented in the Annual Reports represent less than 25% of the North American Ski Industry. While the reports are nonetheless a useful compilation of environmental performance monitoring statistics, it remains that the reports account for less than 25% of all North American ski resorts which consequently raises questions regarding sample representation. The NSAA's Annual Reports do not

identify the reporting resorts as a sample of a larger population, and as such this has been identified as a major weakness of the assessment and environmental performance monitoring and reporting portion of this environmental program.

Nonetheless, the information provided in the Annual Reports will still allow an assessment of ski industry progress towards to the goals of Sustainable Slopes to be completed. In evaluating these data, the researcher has kept in mind that the data contained in the NSAA's Annual Reports represent less than 25 percent of all North American ski resorts and as such, conclusions can not be made for the whole of the ski industry. Instead, the researcher will report only on those resorts which are included in the sample.

4.2 The Assessment Tool

The NSAA Sustainable Slopes Assessment Tool (NSAA, June 2000b, March 2002) contains 24 forms to be completed by endorsing resorts. Each of the first 21 forms corresponds to each of the 21 principles outlined in the Sustainable Slopes Environmental Charter. The 23rd form requests that resorts report on a set of environmental indicators that include water savings, electric energy conservation, waste management, and transportation demand reduction. The remaining two forms are provided in order for resorts to provide a written paragraph summary of their environmental accomplishments and/or failures, as well as to give NSAA written consent to use the data collected in the assessment.

For each one of the 21 principles found in Sustainable Slopes there is a corresponding assessment form found in the Assessment Tool. For each principle, the

corresponding assessment form presents the program principles and requests that the resort report on the following items:

1. Actions – The actions contained in this list correspond to the ‘options for getting there’ for the principle being evaluated. The ‘options for getting there’ are a set of practices suggested by NSAA for resorts to take action in order to implement the Sustainable Slopes principle. There is room supplied on the form for resorts to report actions taken that have not been suggested by NSAA.
2. Overall Status – This area allows resorts to assess their overall level of implementation in meeting the intent of each principle. Their overall implementation is reported on a scale of 1 to 5, 1 being not yet started and 5 being principles implemented.
3. Priorities for Improvement – If resorts reported a 3 or less in the Overall Status section they are asked to evaluate the benefits of implementing the principles. On a scale of 1 to 3, 1 being the lowest positive outcome and 3 being the highest they are asked to rate the following:
 - ✓ Increased Monetary Savings,
 - ✓ Reduced Environmental Impacts,
 - ✓ Reduced Regulatory Liability, and
 - ✓ Increased Positive Public Image.
4. Principles in Action – Resorts are asked to highlight examples of successful principle implementation. This may include resort environmental projects or programs. Resorts are asked to provide a yes or no answer. If they answer yes, they are to provide a short summary of the accomplishment on a separate page.

The NSAA requests that the environmental contact person at each resort complete the assessment. In most cases the environmental contact person named by the endorsing resort is also the person responsible for area operations, maintenance, or administration. As very few environmental management positions exist within the ski industry this means that the annual assessments are being completed by employees who are not necessarily familiar with the tenets of Sustainable Slopes or the theories of environmental management. As a result the most qualified employee to complete these forms may not

in fact be the person who completes the assessment. This weakness has been identified by the NSAA and this study as it has the potential to affect the data reported to the NSAA by endorsing resorts. For example, if an area maintenance employee has been identified as the environmental contact person they may well be the best person to report on energy use for lifts, but not necessarily the best person to complete the assessment on education and outreach, air quality, or transportation.

As there is the possibility that the data acquired from the NSAA Annual Reports may reflect varying degrees of environmental awareness among ski area environmental contacts, the accuracy and the validity of the data may be affected. As with the example provided above, a named environment contact person with little to no environmental experience or knowledge may not accurately report environmental data. As a result, the validity of the data is subjective, and the aggregated data may not reflect the true environmental picture at endorsing resorts. The researcher has identified this as a weakness inherent in the data. The NSAA has also identified this as a weakness in the reporting process and as such, the association is in the process of making adjustments for future reporting. For the purpose of this study, this weakness has been identified, and will be discussed once again in subsequent chapters.

4.3 The Annual Reports

The NSAA's Annual Reports provide a complex presentation and interpretation of the progress and challenges arising when implementing the Sustainable Slopes Environmental Charter. The data is presented as a numerical value that corresponds to the qualitative assessment tool. For example, there is no measure provided that reports how many resorts are using long-life, low maintenance materials for building in order to

address the planning, design and construction principle of Sustainable Slopes. Instead, the report lists the most and the least implemented principle overall as well as the rate at which these principles are being implemented. In this way, the NSAA can identify areas that are in need of improvements while also highlighting areas where improvements have occurred.

In addition to reporting the most and least implemented principles, the NSAA reports on the overall principle implementation status of each of the charter's 21 principles. These data are based on the answers provided by resorts in the overall status section of the assessment. For every principle, the resort was required to estimate their overall level of implementation in meeting the guidelines provided by the Sustainable Slopes principles. Resorts estimated their progress based on the following scale:

- 1) Not yet started,
- 2) Investigating, but no actions implemented,
- 3) Some actions implemented,
- 4) Significant progress made, and
- 5) Principles implemented.

Annually, each endorsing resort submits a self assessment value based on the above scale. For each indicator or principle, a scale value that qualitatively assesses the overall principle implementation is provided by resorts. This information is then aggregated by arithmetically calculating the industry average and presented in the NSAA's Annual Reports (2001, 2002, 2003). The NSAA scale values are consistent with the evaluative scale used in this study (Table 3.3).

The purpose of the following sections of this chapter is to report and discuss the data provided by the NSAA's Annual Reports for the years 2001, 2002, and 2003.

Using the evaluation matrix, the researcher will organize the data and provide a critical analysis of the NSAA's Annual Reports.

4.4 Principle Implementation Status

The data provided by the NSAA's annual reports has been compiled and presented in the evaluation matrix presented in Table 4.1.

For ease of analysis, the Sustainable Slopes principles have been grouped into 9 dimensions. For each year, individual principle values have been reported. For each dimension a compiled value has been calculated for each reporting year. This value is simply an aggregated value (arithmetic mean) based on the self assessment reports submitted by endorsing resorts (left column for each year), and further aggregated (arithmetic mean) into dimensions for the ease of reporting (right column for each year).

The assessment tool assumes that actions were taken by endorsing resorts in order to improve the environment. If a ski area power generator was replaced with a more energy efficient model because it was in need of replacement and the new model made more sense financially this may be reported as an environmental achievement. While the energy savings are an environmental achievement, the assessment tool does not provide the reporter room to elaborate on the motives, causes and outcomes of this action. In reference to Table 4.1, this becomes apparent when one examines the data for potentially hazardous waste. This indicator is the highest ranking indicator for three consecutive years. Resorts on average are reporting that significant progress has been made to implement hazardous waste principles. While this is commendable, most states and provinces have laws that govern the disposal and treatment of potentially hazardous waste. As a result, ski areas must comply with these laws or risk penalty, or closure in

the case of non-compliance. The numbers reported in Table 4.1 then are affected by other factors. This means that the reports of 'significant progress made' may not be a result of the Sustainable Slopes program but instead, they are influenced by outside factors such as federal, state or provincial laws. This is a problem not accounted for in the Sustainable Slopes Assessment Tool (2001) and the Annual Reports. Overall, this may in fact not be overly significant to the NSAA's reporting and to this study, as both are reporting on progress rather than judging the attribution of progress to the program itself, but it remains that this must be identified by the researcher in order to avoid misrepresentation concerning motivation for action by resorts.

Table 4.1 (pg. 48) contains the aggregated North American ski industry data extracted from the NSAA's annual reports.

Table 4.1: Program Indicator Reporting

Exposure to Program	Sustainable Slopes Program Dimension	Sustainable Slopes Program Indicator	Measurement After Exposure North American Ski Industry									
			2001		2002		2003					
			3.63	3.63	3.74	3.74	3.91	3.91	3.91	3.91	3.91	3.91
June 2000	1	PLANNING	3.43	3.43	3.75	3.75	3.67	3.67	3.67	3.67	3.67	3.67
	2	WATER	3.09	3.09	3.17	3.17	3.36	3.36	3.36	3.36	3.36	3.36
		Water use for landscaping and summer activities	3.16	3.16	3.52	3.52	3.72	3.72	3.72	3.72	3.72	3.72
		Water quality management	3.59	3.59	3.74	3.74	3.73	3.73	3.73	3.73	3.73	3.73
		Wastewater management	3.59	3.59	3.36	3.36	3.43	3.43	3.43	3.43	3.43	3.43
	3	ENERGY	3.07	3.07	3.17	3.17	3.38	3.38	3.38	3.38	3.38	3.38
		Energy use for facilities	3.41	3.41	3.35	3.35	3.31	3.31	3.31	3.31	3.31	3.31
		Energy use for snowmaking	2.56	2.56	2.69	2.69	2.73	2.73	2.73	2.73	2.73	2.73
		Energy use for lifts	3.04	3.04	3.08	3.08	3.25	3.25	3.25	3.25	3.25	3.25
		Energy use for vehicle fleets	3.29	3.29	3.34	3.34	3.48	3.48	3.48	3.48	3.48	3.48
	4	WASTE	2.74	2.74	2.82	2.82	3.06	3.06	3.06	3.06	3.06	3.06
		Product reuse	3.28	3.28	3.32	3.32	3.43	3.43	3.43	3.43	3.43	3.43
		Recycling	4.03	4.03	4.01	4.01	4.12	4.12	4.12	4.12	4.12	4.12
		Potentially hazardous waste	3.45	3.45	3.28	3.28	3.52	3.52	3.52	3.52	3.52	3.52
	5	ENVIRONMENTAL MANAGEMENT	3.63	3.63	3.51	3.51	3.65	3.65	3.65	3.65	3.65	3.65
		Forest and vegetative management	3.58	3.58	3.44	3.44	3.78	3.78	3.78	3.78	3.78	3.78
	6	AIR	3.32	3.32	3.28	3.28	3.45	3.45	3.45	3.45	3.45	3.45
		Wetlands and riparian areas	3.71	3.71	3.74	3.74	3.79	3.79	3.79	3.79	3.79	3.79
	7	AESTHETICS	3.22	3.22	3.38	3.38	3.43	3.43	3.43	3.43	3.43	3.43
		Visual quality	3.03	3.03	3.09	3.09	3.39	3.39	3.39	3.39	3.39	3.39
	8	TRANSPORTATION	3.03	3.03	3.09	3.09	3.39	3.39	3.39	3.39	3.39	3.39
		Transportation	3.03	3.03	3.09	3.09	3.39	3.39	3.39	3.39	3.39	3.39
	9	EDUCATION	3.03	3.03	3.09	3.09	3.39	3.39	3.39	3.39	3.39	3.39
		Education and outreach	3.03	3.03	3.09	3.09	3.39	3.39	3.39	3.39	3.39	3.39
Aggregated Annual Evaluation Values			3.35		3.40		3.54					

*Reported figures are the arithmetic means of normative data.

*For the year 2001, 88 resorts reported on program indicators where applicable. As a result the data reported in the table reflects approximately 88 observations for each program indicator during this year.

* In 2002, 90 resorts reported on program indicators. As a result the data reported in the table is an arithmetic mean of 90 observations for each indicator.

*In 2003, 79 resorts reported on the program indicators. The data reported in the table thus reflects the mean of 79 observations for each indicator during this year.

*For all years some resorts did not provide indicator data where not applicable, meaning that each value does not reflect the mean of all reporting resorts. As a result, some indicator data may reflect fewer observations than expected.

* Aggregated Annual Evaluation Values represent the arithmetic mean of all dimension values for that year.

4.5 Estimated Rates of Change

In order to further evaluate the progress of the North American ski industry in implementing the Sustainable Slopes charter it becomes necessary to estimate rates of change. Based on the aggregated values presented in Table 4.1, an estimated rate of change may be calculated for the three year time period after the creation of Sustainable Slopes (2000). This is to say a numerical change in the aggregated values over time can be estimated. The estimated rate of change is a numerical representation (based on the change in reported aggregated data over three years) of the number of resorts reporting increases or decreases in implementation values. Figure 4.1 (pg. 51) presents the formulas for calculating an estimated rate of change. It is impossible given the limitations of the data to determine a precise calculation of change. Though not precise, this estimate of change will facilitate an evaluation of the changes in reported implementation values for the North American ski industry. These calculations will be used extensively throughout this chapter in order to convey the magnitude of the changes in implementation progress since the Sustainable Slopes inaugural year.

Figure 4.1: Estimating Change

North American Ski Industry			
Aggregated Evaluative Value (2001)	Aggregated Evaluation Value (2002)	Aggregated Evaluation Value (2003)	*Estimated Rate of Change
3.35	3.40	3.54	➤ For every increase of 0.012 in the aggregated evaluation value, one resort reports an increase of 1 in one program indicator dimension (R1) ➤ For every decrease of 0.012 in the aggregated evaluation value, one resort reports a decrease of 1 in one indicator dimension (R2).
88 resorts reporting	90 resorts reporting	79 resorts reporting	
On average, 86 resorts reported annually			

***ESTIMATED RATE OF CHANGE**

The rate of change is a calculated value based on the following formulas:

This calculation assumes that no resorts reported a decrease.

R1 = [(Aggregated Annual value x Average # of reporting resorts + 1 (represents an increase value of 1 in one principle dimension)/ Average # of reporting resorts] – Aggregated Annual Value
 For all years, when the formula is applied the resulting value is 0.012.

Assuming no resorts reported an increase.

R2 = [(Aggregated Annual value x Average # of reporting resorts - 1 (represents a decreased value of 1 in one principle dimension)/ Average # of reporting resorts] – Aggregated Annual Value
 For all years, when the formula is applied the resulting value is - 0.012.

Based on this value, we can determine that for every 1 resort that reports an increase of 1 (the resort would jump a category improving their implementation rate) in any 1 principle dimension the aggregated annual value increases by 0.012. The same can be said for resorts reporting a decrease of a value of 1 (the resorts would decrease a category, for example from 3 to 2) in any 1 principle dimension, the result is a decrease of 0.012 in the aggregated annual value.

In order to estimate the # of resorts reporting an increase of one over three years, assuming that no decreases were reported is calculated using the following formula:
Estimate 1 = Aggregated Annual data (2003) – Aggregated Annual data (2001)/0.012
 Though we know that there were in fact reported decreases over the course of the three reporting years, this calculation allows an estimate of progress to be reported.

To estimate the % of resorts reporting an increase of 1 in one program dimension, the following formula was used:
Estimate 2 = (Estimate #1/Average #of reporting resorts) x 100

In order to estimate the # of resorts reporting a decrease of one over three years, assuming that no increases were reported is calculated using the following formula:
Estimate 3 = Aggregated Annual data (2003) – Aggregated Annual data (2001)/0.012
 Though we know that there were in fact reported increases over the course of the three reporting years, this calculation allows an estimate to be reported.

To estimate the % of resorts reporting an decrease of 1 in one program dimension, the following formula was used:
Estimate 4 = (Estimate #4/Average #of reporting resorts) x 100

In the following sections, a broad description of each program dimension in turn will be included, the estimated rate of change will be presented, followed by a discussion of the findings.

4.6 Program Indicator Dimension: Planning

“In planning and designing trails, base areas and associated facilities, ski areas have the opportunity to explore ways of integrating our operations into natural systems and addressing short and long-term environmental impacts to natural resources. There may also be opportunities to address past disturbances from historical uses that have occurred in the area and mitigate the unavoidable impacts from future ones” (NSAA, 2000: p.8).

In Sustainable Slopes: The Environmental Charter for Ski Areas, the NSAA (2000) lists a number of ‘options for getting there’. These options are a set of practices that are provided as examples of ways in which ski areas can take action to implement the planning, design and construction principle. Examples of these options include:

- ✓ Designing trails with less tree removal and vegetation disturbance where feasible,
- ✓ Minimizing road building where practical,
- ✓ Using long-life, low maintenance materials in building, and
- ✓ Using simulation or computer modeling in planning to assist with analysing the effects of proposals on key natural resources and viewsheds such as visual modeling or GIS (NSAA, 2000: p. 8).

When asked to evaluate their progress towards the planning, design and construction principle implementation on average, resorts reported that some actions have been implemented (see Table 4.1 pg. 48).

The Annual Report (NSAA, 2003: pp. 2-6 and 2-9) indicates that resorts in the Northeast as well as larger sized resorts were having greater success at implementing this dimension of the charter, the reader is referred to Appendices A1 and A2. Overall though, North American ski areas are implementing the planning, design, and

construction dimension of the charter and since its inception, increasing numbers of resorts are taking action (see Table 4.2).

Examples of planning, design and construction actions at North American ski areas include the following:

- In 2001, Aspen Skiing Company constructed Up 4 Pizza which boasts passive solar orientation, daylighting, composting toilets, educational displays, recycling, and a heating system that is powered by the heat output overflow of the pizza oven itself. (NSAA, 2001: p. 2-11), and
- Copper Mountain Resort minimizes impacts associated with ski area construction by utilizing GIS and GPS to identify sensitive ecosystems and habitats in order to provide planners with the tools to avoid impacts associated with ski area construction. (Copper Mountain Resort, 2004: p. 1).

In the year 2001, 76% of respondents reported that they had designed trails with less tree removal and vegetation disturbance where feasible, and 83% reported that they had applied sound on-mountain construction practices, such as over-snow transport techniques, stormwater control, or phasing of activities to minimize disturbance to natural habitats. In the same year, 50% of reporting ski areas cited increased monetary savings as the lowest potential benefit of implementing this principle and reduced environmental impacts as the highest.

In 2002, planning, design and construction was listed as one of five most implemented principles. In 2003 this principle was listed once again as one of four most implemented principles. In 2003, resorts reported that reduced environmental impacts was their primary incentive for taking action to implement this principle. Increased positive public image was also reported as a significant benefit resulting from principle implementation.

Table 4.2: Trend Analysis: Planning Dimension

<i>Sustainable Slopes Program Dimension</i>		<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
1	PLANNING	0.28	23	27.1%

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

Calculations assume that no decreases were reported.

In 2001, on average, the majority of reporting resorts reported that they have taken some action to implement this principle. Over the course of three years, this number has improved. While the reported industry mean value still falls within the designation of ‘some actions implemented’ it is 0.09 from moving into the ‘significant progress made’ category (refer to Table 4.1). This is evidence that progress is being made in the area of planning, design, and construction. In addition to this, the calculations presented in Table 4.2 indicate that 27.1% of reporting resorts have reported an increase in reported implementation values for the planning dimension of Sustainable Slopes. These calculations, when considered with the other evidence presented are indicative of progress in the planning dimension of the Sustainable Slopes program.

In addition to this progress, ski areas continue to report that the potential benefit of fully implementing this principle is reduced environmental impacts. Based on the evidence available, progress can not be ascribed entirely to the Sustainable Slopes program, but the evidence supports the claim that resorts are responding to the program and they are using it as a framework to reduce environmental impacts at their ski areas where planning, design, and construction are concerned.

4.7 Program Indicator Dimension: Water

“Water is an important resource for ski areas as well as the surrounding natural environments and communities, and should be used as efficiently and effectively as possible” (NSAA, 2000: p. 9).

Water is a crucial dimension of ski area management. Many ski area operations are dependent on the amount of snowfall and the amount of water available for snowmaking. For this reason, the management of water resources should be a crucial component of ski area management.

In order to implement the water principle component of Sustainable Slopes, the following ‘options for getting there’ have been provided by the NSAA (2000: p. 10):

- ✓ Installing water storage facilities to recapture snowmelt runoff for reuse
- ✓ Using appropriate technology and equipment to optimize efficiency.
- ✓ Conducting water use audits and investigating methods and alternative technologies to reduce water consumption
- ✓ Participating in watershed planning, monitoring and restoration efforts
- ✓ Monitoring wastewater quality.

When participating ski areas were asked to report their progress towards the implementation of the principles that address water, they reported that on average some actions have been implemented (see Table 4.1). This means that some of the ‘options for getting there’ provided by the NSAA in Sustainable Slopes have been adopted and put into practice in some North American ski areas. Though the actions implemented are not limited to the ‘options for getting there’ suggestion list, this implies that progress is being made where water management is concerned. It also implies that the Sustainable Slopes program is providing a framework for resorts to begin implementing water management practices.

Table 4.3: Trend Analysis: Water Dimension

<i>Sustainable Slopes Program Dimension</i>		<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
2	WATER	0.21	17.5	20.4%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

When one examines the aggregated scores for water in Table 4.1 and the calculations presented in Table 4.3, a progressive trend can be identified. This trend is indicative of progress in implementing the water dimensions of the charter. A different trend emerges for some indicators when each program indicator is examined individually. For instance, water use for snowmaking declined by 0.08 from 2002 to 2003. This implies that an estimated 7 resorts reported a decrease in value by 1 for water use for snowmaking. While this decline is identifiable, when all principles of the water dimension are considered, little change has occurred overall and the change has been marginal.

One indicator that is showing a trend that is very different from all other water indicators is wastewater management. Over three years fluctuations have occurred in the reported data. Although the number has recovered somewhat, the 2003 data is still below the data reported in the inaugural year; there is a difference of 0.16. This translates into approximately 13 resorts that have reported a decline of 1 when reporting implementation values for the wastewater management. This decline becomes significant when it translates into 15% of reporting resorts.

This decline implies one of two things:

1. Resorts may have reported in an optimistic or overly positive manner and then, after realizing that these reports were being published and that they actually meant something were more careful in reporting in subsequent years, or
2. Resorts are having difficulty implementing some actions where wastewater is concerned.

When examining Appendix A1, it becomes quite clear that smaller sized resorts are experiencing greater difficulties implementing the wastewater dimension of the charter. The aggregated findings for resorts with fewer than 100,000 skier visits annually report that on average, these resorts are investigating but to date, no action has been taken to address wastewater. In addition, Table A2 demonstrates that resorts in Canada and the Sierra region are having the greatest difficulty implementing the wastewater dimension of the charter. These resorts are also reporting that they are investigating but no action has been taken. In comparison, resorts in the Southeast region are reporting almost a full numerical point above all other North American resorts. This may result from difficulties building and maintaining wastewater treatment ponds in areas where permafrost is present. For the resorts of the Southeast, permafrost may not hinder wastewater treatment.

Regardless of the reason for the decline and/or difficulties implementing wastewater management, it is necessary to monitor this indicator to ensure that resorts continue to implement actions towards sustainable water management. It may be possible that in the case of wastewater management, the Sustainable Slopes charter may not provide enough direction for resorts to improve their wastewater management practices or that implementing sound wastewater management practices are costly and

hard to implement. It is interesting to note that in 2001 wastewater management was identified as one of the most implemented principles.

Other water indicators have improved drastically. Water use for landscaping and summer activities has improved by over one half a point over three years indicating that near 50% of reporting resorts are reporting improvements in implementation rates. This is a significant improvement as reporting resorts are increasingly reporting that they are taking action to manage water use in the off season.

Overall, the water program indicator dimension has improved over three years. While the improvement is marginal it implies that an increasing number of ski areas are now taking action to improve their water management policies and practices (see Table 4.3).

Some examples of actions taken by North American ski areas in the area of water include the following:

- Water Conservation Program: Converted restrooms to motion controlled, low flow toilets and auto shut-off sink faucets (Mt. Hood Meadows Ski Resort, 2004: p. 1, NSAA, 2001: p. 2-12).
- Beaver Creek Resort in Colorado has an ongoing water quality monitoring system that monitors levels of nitrogen, phosphorous and mercury in area streams. (Beaver Creek Resort, 2004: p.3, NSAA, 2001: p. 2-12).
- Sunday River Ski Resort has implemented erosion control measures and on-mountain wastewater treatment (NSAA, 2001: p. 2-2-13).

In addition to the commendable practices highlighted above, the NSAA reports that during 2001 85% of responding ski areas used appropriate technology and equipment to optimize water efficiency, 85% of ski areas were installing water efficient equipment in facilities, 71% were watering at appropriate times during the summer months in order to minimize evaporation, 79% were participating in watershed planning, monitoring and

restoration efforts, and 67% were monitoring wastewater quality (NSAA, 2001: pp. A-3 – A-7).

While these efforts are positive, it is important to also highlight areas where ski areas can make efforts to implement sustainable practices into their management policies. In the same year, the NSAA reports that only 29% are taking advantage of their opportunity to educate guests and employees about the benefits of efficient water use, 36% are not using efficient water irrigation and water recycling technologies, 70% are not re-using greywater, and only 42% have connected septic systems to municipal wastewater systems.

The purpose of including examples of where the program is falling short of implementation is to highlight practices that are not being implemented by participating ski areas. While these suggested ‘options for getting there’ are suggestions only, it becomes evident that some options are more practical and feasible for participants to implement for a multitude of reasons that include need, time, development stage of infrastructure, and cost.

Overall, resorts are identifying reduced environmental impacts as the number one potential benefit of implementing the water principles of Sustainable Slopes. In the case of water quality management, reduced liability has also been identified as a benefit. In the case of wastewater management, reduced environmental impacts, reduced regulatory liability, and increased positive public image have been identified by participating resorts as being the priority for improvement. For all of the water indicators, increased monetary savings was not identified as the priority for improvement. This is interesting as it may reflect the general abundance of water in North America. In geographical areas where

water is abundant, free or low cost, implementing the water dimension of the charter will not result in accrued monetary savings for resorts. In those areas where water is scarce, it becomes more costly to extract and consume, and so increased monetary savings may become more important. As a result, differences in the reasons for implementing the water dimension of the charter may vary by region.

Overall, as North American ski resorts are reporting that little to no monetary savings can be associated with the water principle implementation, it may become difficult for some ski areas to take action. While reduced environmental impacts are crucial to the success of this program, it remains that the cost of implementation and the amount of monetary savings associated with implementation play a key role in ski area management.

Overall implementation of the water dimension of Sustainable Slopes is currently at 3.58, meaning that some actions have been implemented by the reporting North American ski areas. Although taking action and moving towards sustainability is a crucial component of the Sustainable Slopes program, and this may be considered a success only three years after the programs inception, it remains that there are aspects of the water dimension that are still in need of implementation.

4.8 Program Indicator Dimension: Energy

“Ski areas can be leaders in implementing energy efficiency techniques and increasing the use of renewable energy sources within their operations to conserve natural resources, reduce pollution and greenhouse gases and reduce the potential impacts of climate change” (NSAA, 2000: p. 10).

In Sustainable Slopes: The Environmental Charter for Ski Areas there are four principles that address energy use directly. These principles are as follows:

- ✓ Energy use for facilities,
- ✓ Energy use for snowmaking,
- ✓ Energy use for lifts,
- ✓ And energy use for vehicle fleets.

This study has grouped these principles together for the ease of reporting on the energy dimension of the Sustainable Slopes program. While these indicators have been aggregated in Table 4.1, each indicator will be discussed individually.

Examples of some of the actions taken by endorsing ski resorts to address energy dimensions include the following:

- Keystone Resort in Colorado has invested in renewable energy by purchasing wind energy to power its ski lift (Vail Resorts Management Company, 2004, NSAA, 2001: p. 2-13).
- In 2002 Aspen Skiing Company switched their snowcat fleet from diesel burning to bio-diesel reducing hydrocarbon emissions by 20% and CO₂ and particulate emissions by 10% (ASC, 2003)
- Sugarbush Resort (VT) has performed lighting retrofits in many buildings so that lighting now meets energy efficiency standards (NSAA, 2001: p. 2-14, Sugarbush Vermont, 2003).

In addition to the actions taken by several individual resorts, in the year 2001, 90% of resorts were using high efficiency snow guns and air compressors for snowmaking operations, 85% were providing shuttles for guests and employees, and 74% of participating resorts were auditing current usage levels and targeting areas for improvement.

When endorsing ski areas were asked to evaluate their progress towards the energy principles of the Sustainable Slopes program, on average, reporting resorts reported that some progress has occurred since the inception of the program in 2000. Overall, resorts report an improvement of 0.15 over three years of program implementation. While this number seems indicative of some small improvement, it remains that the majority of reporting resorts have implemented some actions in response

to energy principles, but to date, the majority of resorts have yet to report that significant progress has been made. Instead, an estimated 14.5% of reporting resorts have indicated an increase of 1 when reporting on progress implementing the energy dimension of Sustainable Slopes. Table 4.4 details the trends in progress over three years for energy.

Table 4.4: Trend Analysis: Energy Dimension

<i>Sustainable Slopes Program Dimension</i>		<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
3	Energy	0.15	12.5	14.5%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

Overall, the trend analysis implies that resorts are making slow but steady progress towards the energy dimension goals of Sustainable Slopes. While this may in fact be true, it remains that a decline has occurred over three years in the area of energy use for snowmaking. As illustrated in Table 4.1, the decline has been steady over three years and now accounts for a decline in value of 0.1. This decline translates into an estimated 8 resorts or approximately 9.6% of resorts who have reported a decline of 1 in this area.

Resorts are making improvements where energy is concerned but improvements are occurring very slowly. In 2001 only 6% of resorts reported that they were purchasing green power, 7% using solar heating or geothermal heat pumps for heating air and water, and only 46% of resorts were developing an energy management plan that addresses short and long term goals, staffing, and schedules for new and retrofit projects. At this time it becomes difficult to determine what resorts are making these efforts. The data provided by the NSAA's reports (2001: p. 2-5) suggest that resorts in the Southeast

(this includes Virginia, West Virginia, North Carolina, South Carolina, Tennessee, and Georgia) have been making disproportionately more efforts than other geographical areas to implement energy principles with the exception of energy use for snowmaking. In addition the reports suggest that medium sized resorts with skier visits ranging between 250,000 and 500,000 have been outperforming larger resorts where energy is concerned. In fact, those resorts with fewer than 250,000 skier visits have also been outperforming resorts with over 500,000 skier visits annually when energy principle implementation is considered. This data implies geographical differences as well as operational differences in implementation rates.

In the years 2001, 2002, and 2003, no single energy principle made the NSAA's list of most implemented principle overall. Instead, for all reporting years energy use for lifts and energy use for vehicle fleets made the overall least implemented principles list. In addition, in 2003 energy use for snowmaking joined the list of four least implemented principles. With only 4 energy related principles in the program, 3 of those made the top 4 least implemented in 2003. While the data reported in Table 4.1 and the trend analysis provided in Table 4.4 imply an improvement where energy implementation is concerned, and despite the improvements made by some endorsing resorts, it remains that one can not conclude that resorts are making significant progress towards implementing the energy principles contained within Sustainable Slopes. While progress is being made in some areas of the energy dimension, it remains that declines are occurring, and progress overall is slow.

Possible explanations for the lack of significant progress where energy is concerned may include the cost associated with upgrading motors, lifts, lighting, and

other energy systems. It may also have to do with the life process of some instalments. When contacted by email in an exchange about energy use for lifts, Geraldine Link (March 10, 2004), Director of Public Policy for NSAA stated:

“I think more and more resorts are looking at different options for saving energy with lifts. The best opportunity comes when a resort is installing a new lift of course, and those opportunities come about every 15-20 years!”.

While some energy improvements can be made over a shorter time period, the investment required to update lifts is substantial and as a result, lifts are replaced every few decades. This explains why a significant percentage of resorts are reporting that they are investigating, but no action has been implemented where energy use for lifts is concerned. Energy use for lifts is the least implemented principle of all 21 principles in the program. It has held this position for three consecutive years.

This same line of reasoning can be used to justify the lack of progress in areas such as energy use for snowmaking, facilities and vehicle fleets. The investment required to upgrade many of these systems is feasible only when the systems are in need of repair or replacement because of the life cycle of the equipment. It would be unrealistic to expect resorts to replace their vehicle fleets with natural gas powered trucks or electric buses in the three years since the program's inception. The investment required to convert is enormous.

While converting existing systems may be unfeasible to many ski areas, investing in renewable energy is an action that is accessible to all ski areas. While wind energy is only slightly more expensive (American Wind Energy Association, 2001, Heartland Institute, 2003) , purchasing wind energy from the local energy provider would not only have direct positive environmental impacts (Energy Educators of Ontario, 1993,

Heartland Institute, 2003) it would also put the ski area in a position to report that some actions have been taken to implement energy principles. If a fraction of all ski areas purchased a fraction (1%) of their energy from wind or other renewable energy sources the positive environmental impacts would accumulate quickly, the Sustainable Slopes energy principle implementation process would reflect the change, and ski areas could advertise their environmental improvements.

In the meantime, there is significant room for energy use improvements at North American ski areas especially where lifts and vehicle fleets are concerned. Energy use is an area in which ski resorts must begin to adopt energy management systems, begin energy efficiency upgrades, and adopt renewable energy practices in order to implement the principles contained within Sustainable Slopes and continue to make improvements where the environment is concerned.

4.9 Program Indicator Dimension: Waste

“...philosophy of waste management to help ensure materials are being used efficiently and disposed of only after consideration is given to reusing or recycling them. Reducing waste helps protect natural resources, reduce pollution, greenhouse gases and energy use by decreasing the need to produce new materials, and minimizes disposal cost” (NSAA, 2000: p.12).

Waste management is an important area for ski resorts to incorporate into their environmental management systems simply because of the sheer amount of waste generated during one season at any one ski area. Compounding this problem are the enormous resources required to remove the waste from on-hill facilities. Additional snowcats must be purchased to make the trip up and downhill to remove waste from mountain-top lodges and washroom facilities. The energy and monetary resources required to undertake such a task are substantial. As a result, a solid waste management

plan cannot only provide ski areas with increased monetary savings, but the reduced environmental impacts are significant.

Table 4.5: Trend Analysis: Waste Dimension

<i>Sustainable Slopes Program Dimension</i>		<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
4	Waste	0.18	15	17.4%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

Overall reporting ski areas are reporting that some actions have been implemented where waste is concerned. Table 4.1 and Table 4.5 indicate that improvements have occurred in the case of all four waste indicators. Product re-use has had the greatest improvement with an increase of 0.32. This improvement is significant because the improvement has forced the indicator to jump evaluation categories from ‘2 – investigating, but no actions implemented’ to ‘3- some actions implemented’. It is also significant because it represents an increase in reported values by 31% of reporting resorts.

In 2001 (NSAA: p. 2-1) product reuse was listed as one of four overall least implemented principles. While it remains on the list for both 2002 and 2003, the improvement is indicative of significant progress being made and progress yet to come. The improvement implies that product re-use is a principle that resorts are making efforts to implement slowly but surely.

Examples of some of the actions taken by endorsing resorts to address the waste dimension of Sustainable Slopes include the following:

- Keystone Resort has a resort-wide recycling program that recycles over 1500 tons annually accounting for 1 pound per guest (NSAA, 2001: p. 2-16, Vail Resorts Management Company, 2004),
- Jackson Hole is recycling fluorescent light bulbs and they have switched to benign cleaners (NSAA, 2001: p. 2-17, Jackson Hole Mountain Resorts, 2004),
- Aspen Skiing Company re-uses old employee uniforms through the Refugee Direct Partnership Program. Uniforms are donated to refugees overseas (NSAA, 2001: p. 2-16).

In 2001, 78% of endorsing resorts reported that they were purchasing recycled products, 83% were purchasing produce in bulk to minimize unnecessary packaging, 81% were exploring opportunities for re-using products, 85% were recycling office paper, cardboard, newspaper, aluminium, glass, plastic, and food service waste, and 100% were safely storing and disposing of potentially hazardous materials, such as solvents, cleaning materials, pesticides, and paints.

Hazardous waste has appeared on the NSAA's most implemented principles list for all three reporting years. It is the highest scoring indicator in 2003, and the data contained within the Annual Reports suggests that resorts are going above and beyond the principles and practices of Sustainable Slopes to manage potentially hazardous waste. For example, in 2001, 99% of all resorts reported that they were recycling waste products, such as motor oil, electric batteries, tires, and unused solvents, 100% were properly managing fuel storage and handling, 100% were maintaining or upgrading equipment to prevent leaks, and 93% were educating employees on the requirements for properly handling hazardous wastes.

Disproportionately higher numbers of ski areas are reporting implementation of the hazardous waste principle. This implies that the Sustainable Slopes program is in fact the cause, when in fact there are extensive federal and state/provincial laws that govern the handling use and disposal of potentially hazardous waste (Toxic Substances Control

Act, U.S. EPA, 1976). If ski areas are found to be breaking these laws not only do penalties occur but the reputation of the ski area is damaged irrevocably. For this reason the program can not take the credit for legislative compliance.

On the matter of regulatory compliance and hazardous waste Auden Schendler (March 10, 2004), the Environmental Director for Aspen Skiing Company states the following:

“Hazardous waste is federally regulated in the US, so all resorts must manage it by law. That's why you see it being reported in the annual report. As I may have pointed out, it's nothing special to do this, it's the law. Progressive companies are working to eliminate hazardous waste, through the use of water-based parts washers in vehicle shops, primarily, and a move away from oil based paints”.

In the case of hazardous waste principle implementation, significant progress has been made, but the reasons for implementation may simply be a result of legislation governing hazardous materials. For this reason, the Sustainable Slopes program can not claim to have been motivation for implementation. Instead, where the program does prove to be useful is that it goes beyond compliance and suggests ways in which ski areas can continue to improve where hazardous waste is concerned. These suggestions include: purchasing non-hazardous products for use when effective and installing sediment traps in parking lots (NSAA, 2000: p. 14).

Overall the implementation of waste principles is extensive. In areas such as product re-use where implementation is low ski areas are investigating ways in which they can improve. Despite regulatory liability for hazardous waste, ski areas are indicating that they are moving beyond compliance and beginning to approach hazardous waste in a different way. They are implementing actions that reduce the amount of hazardous products used and the amount of hazardous waste generated. Ski areas are

also taking steps to educate both their employees and guests about the potential risks associated with hazardous waste and the ways in which these risks can be reduced.

Overall, waste dimension implementation is improving and ski resorts are staying on track to implement waste related principles.

4.10 Program Indicator Dimension: Environmental Management

“Ski areas recognize the importance of stewardship in managing the forests and vegetation that support ecosystems and allows for public recreation opportunities. Sound forest and vegetative management can benefit fish and wildlife habitat, water quality, and viewsheds and reduce erosion, pollution, and greenhouse gases” (NSAA, 2000: p.15).

In order to evaluate the three principles associated with wildlife and ecological management, these principles have been aggregated into the environmental management dimension. Each of the following principles will be evaluated:

- ✓ Fish and Wildlife,
- ✓ Forest and Vegetative Management,
- ✓ Wetlands and Riparian Areas.

In Table 4.6 the trend analysis is provided for the environmental management dimension of Sustainable Slopes.

Table 4.6: Trend Analysis: Environmental Management Dimension

<i>Sustainable Slopes Program Dimension</i>		<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
5	Environmental Management	0.10	8.3	9.7%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

In the case of environmental management, reporting resorts overall report an improvement since the programs inception. While this small improvement (0.10) is likely not significant in and of itself, it becomes logically significant when the data for 2002 is interpreted.

In 2002, for all three indicators, resorts indicated a small decline in the implementation of environmental management principles. In the case of fish and wildlife, the decline is the greatest, whereby an estimated 14 resorts reported a decline of 1. The improvements recorded in 2003 indicate that despite the decline in 2002, resorts overall reported that improvements were made and that these improvements were not only an improvement over the 2002 implementation reports, but they also increased beyond the numbers reported for the inaugural year. For this reason the improvements in implementing these principles becomes significant because, despite a decline in 2002, resorts are making significant efforts to continue to address the principles relating to environmental management.

When contacted about the decline in implementation rates for 2002, Geraldine Link (March 11, 2004), Director of Public Policy for the NSAA stated that:

“...there are many variables that could explain it. First, there are 170 endorsers and 80-90 resorts (roughly) filled this out over the past 3 years. One explanation is that a different set of resorts is reporting each year! Another is that a number of the reporting resorts did projects in these areas in 2003 and hence their scores were boosted”.

There are many ways in which resorts have taken action to implement the environment management dimension principles of Sustainable Slope. Examples of these implementation actions include:

- In 2003, Sunday River Ski Resort (Maine) reported that a partnership had been formed with a registered forester to develop a forest management plan for its land holdings. The plan assures the health of its forests (NSAA, 2003: p 2-38).
- Mont Tremblant; Quebec reported in 2003 that they were taking steps to protect the Diable River basin by participating in a regional grouping of golf courses (NSAA, 2003:p. 2-40).
- Whistler Blackcomb (BC) has created the Bear Family Sponsorship program whereby funding is provided to local researchers to study black bears and their habitats in and around Whistler Mountain (Whistler Blackcomb, 2004).

In addition to individual resort implementation actions, achievement can be reported in the following areas:

- In 2003, 90% of reporting resorts were maintaining stream vegetative buffers to improve natural filtration processes and protect aquatic habitat,
- 88% are conducting activities and construction with sensitivity to seasonal wildlife patterns and behaviour,
- 97% are revegetating disturbed areas as quickly as possible,
- 94% are inventorying and monitoring wetland and riparian areas,
- and 89% are engaging in restoration, remediation, and protection projects for wetlands and riparian areas.

In 2003, the wetlands and riparian areas principle made the overall most implemented principle list. It could simply reflect the ongoing efforts of ski areas to manage wetlands but it may also reflect the compliance rate to federal and provincial/state laws regarding wetlands and riparian areas (U.S. Clean Water Act Section 404, U.S. EPA, 1977, Ontario Water Resources Act, Government of Ontario, 1990).

Overall, responding ski areas are reporting that they have taken some action to implement the environmental management principles contained in Sustainable Slopes. Slight improvements have been made since the program's inaugural year but it remains difficult to determine whether these improvements are a result of the program or simply a

reflection of ski area compliance with laws and regulations governing wetlands, forests, fish, and wildlife.

4.11 Program Indicator Dimension: Air

“Ski area guests and operators value fresh air as an integral part of the skiing experience. Although there are many sources in and around the community that, combined, may compromise air quality, ski areas can do their share to help minimize impacts. Some of the many benefits of cleaner air and reduced air pollution include enhanced visibility and lessening human influences on climate change, which is of particular concern to ski areas given their location.” (NSAA, 2000: p. 16).

Air quality, though not an obvious concern for ski areas is an issue of great importance that trickles down from a global scale to a more meaningful local scale where ski areas are concerned. While global air quality issues such as climate change and ozone depletion are crucial, local air quality continues to grow as a major issue in ski communities. Ski area communities are particularly vulnerable to changes in air quality because of their location in valleys and mountainous regions where temperature inversions are common (APEC Tourism Working Group, 1996: p. 2-15). These conversions often trap air pollution in the valley. In communities where wood burning is common or particulate pollution from cars and other sources is an issue conversions can compound the air quality problems in mountain or valley communities (APEC Tourism Working Group, 1996: p. 2-15).

Resorts were asked to evaluate their actions towards the implementation of the air quality principle of Sustainable Slopes. While most of the actions or ‘options for getting there’ being evaluated deal directly with air quality issues at the local scale, global air quality issues will be addressed separately following a discussion of the data reported in Table 4.7 and Table 4.1.

Table 4.7: Trend Analysis: Air Dimension

<i>Sustainable Slopes Program Dimension</i>		<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
6	Air	0.13	10.8	12.6%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

Overall, reporting ski areas are reporting that some actions have been implemented where air quality is concerned. An improvement of 0.13 over three years of program implementation has occurred. This translates into approximately 12.6% of resorts reporting an increase of 1 when assessing their implementation progress towards the goals of the air dimension of Sustainable Slopes. While a decrease occurred in 2002, the decrease was very slight (0.04, with fewer than 4% of resorts reporting a decrease of 1) and this value has since improved above the numbers reported in 2001. The same explanation provided by Geraldine Link (March 11, 2004), Director of Public Policy for NSAA in the case of environmental management can be applied to air quality reporting and data. The decline in 2002 may also be a result of a different sample of resorts reporting for that year. As a result, the data would reflect the reports of the sample ski area population. If this is in fact the case, the decline for the year 2002 would be considered insignificant because of the very small numerical value associated with the decline, and the fact that the decline may simply be a result of a different reporting sample for that year.

Examples of some of the actions taken by endorsing ski resorts to address air quality include the following:

- In 2003 Alpine Meadows Ski Resort (CA) reported that they had taken action to educate their guests about climate change. They had the National Weather Service deliver presentations to ski area guests about the causes and effects of climate change and global warming (NSAA, 2003: p. 2-19)
- Blue Mountain Resort in Ontario created an alternative transportation education program for employees entitled “hike, bike, or hitchhike to work”. The program is designed in conjunction with carpooling initiatives to reduce the amount of air pollution resulting from transportation (NSAA, 2003: p. 2-22).
- Jackson Hole Mountain Resort participated in ‘Trees for Travel’, a program to offset carbon dioxide emissions that are created by travel to and from the resort annually (NSAA, 2003: p. 2-29).
- Durango Mountain Resort (CO) installed a state-of-the-art air quality monitoring system which measures the air quality before, during and after project development and construction (NSAA, 2004).

Although air quality did not make the NSAA’s overall most implemented principles list it remains that the NSAA and its endorsing resorts are making attempts to implement this principle. In addition to taking action to address local air quality issues the North American ski industry has begun the process of addressing global scale air quality issues.

Scientists are now warning that climate change may have potentially devastating effects on ski areas (United Nations Environment Program, 2001, International Panel on Climate Change, 2001). Ski resorts are particularly vulnerable because of their direct dependency on weather patterns and annual snowfall (Goeldner, 1994, 2002, Stone, 1992: p. 372).

Examples of possible impacts of climate change on ski areas have been compiled in Table 4.8. Based on the warnings from the scientific community, air should become a primary focus for ski areas managers.

Table 4.8: Possible Impacts of Climate Change on Ski Areas

- Reductions of alpine snow cover by 50% at 1500m (Breiling & Charamza, 1999: p. 4).
- Low altitude ski resorts near urban centers or in marginal areas will be eliminated (Breiling & Charamza, 1999: p. 13, Canadian Institute for Climate Studies, 1996: p. 2).
- Access to resorts will become more difficult and more expensive (Breiling & Charamza, 1999: p. 13).
- The number of 1-day skier visits will decline sharply (Breiling & Charamza, 1999: p. 13).
- Reduction of ski season length (Scott & McBoyle, 2001: p. 161, Government of British Columbia, 2002: p. 3, Canadian Institute for Climate Studies, 1996: p. 2).
- Reduction of ski season length by 50 – 70% in Quebec, Canada (International Institute for Sustainable Development, 1997: p. 9, Green & Gold, 2001: p. 1).
- Insufficient snow for peak ski season – Christmas holidays and March break (International Institute for Sustainable Development, 1997: p. 9, Green & Gold, 2001: p. 1).
- Increase in the number of ski area closure days (Scott & Boyle, 2001: p. 159).
- Economic costs of adaptation (Scott & McBoyle, 2001: p.167, International Institute for Sustainable Development, 1997: p. 10-11).
- Regional economic infrastructures will be threatened in areas surrounding ski areas (Koenig & Abegg, 1997: p. 46).
- Insufficient water, money and time for snowmaking (International Institute for Sustainable Development, 1997: p. 10).
- Profit lines of some ski areas would be severely threatened (Koenig & Abegg, 1997: p. 46).
- Loss of income for ski industry dependent businesses and individuals (Behringer, Buerki, & Fuhrer, 2000: p. 331, International Institute for Sustainable Development, 1997: p. 11).
- Change in tourist destination demand and resulting loss of revenue (Lise & Tol, 2002: p. 429).
- Increase rate of conflict over resources between ski areas, communities, industry, and other stakeholders (International Institute of Sustainable development, 1997: p. 11).

In response to warnings and research findings regarding climate change and ski areas, the whole of the ski industry has approached this complex and uncertain issue by creating a policy on climate change. Adopted under the auspices of Sustainable Slopes (NSAA, 2000), the NSAA is setting a tourism-wide example with the implementation of their climate change policy: The NSAA (2000: p. 6) states the following:

“Given the ski industry’s dependence on weather, climate changes that produce weather patterns of warmer temperatures or decreased snowfall could significantly impact the industry. Accordingly, the industry is committed to better understanding the actual and potential impacts of climate change, reducing its own, albeit limited, emission of greenhouse gases, and educating its customers and other stakeholders about this issue”.

Although the policy does advocate the advancement of adaptive technologies, the NSAA does not address ways in which the ski industry can adapt to climate change. Adaptation strategies are crucial to the future not only of the ski industry, but also the

security and sustainability of the related industries and businesses that skiing supports, the individuals and families who depend on the industry for their livelihoods, and the communities that are based on the skiing culture.

Although climate change impacts are/will be variable from region to region, there remains a set of fundamental adaptation strategies that ski areas can rely upon to ease the strain of climate change impacts. These strategies include:

- The introduction of relative humidity snowmaking to lengthen the ski season (dependent on minimum temperatures) (Gajic-Capka, 2001: p. 227).
- Including a meteorological analysis, one that includes climate change simulation models, in the planning, development, and management of ski areas (Gajic-Capka, 2001: p. 227).
- Assume a leadership role in raising awareness and encouraging climate change solutions (NSAA, 2004a: p 2)

The NSAA's (2003b) climate change policy is designed to raise awareness about climate change, the environmental impacts of winter tourism on the environment, to raise policy maker awareness of the dependence of the ski industry on a healthy ecosystem, advocate the reduction of greenhouse gases, support science- based solutions to climate change, and partner with organizations to reduce ski area contributions to global greenhouse gas emissions.

The strengths of this policy lie in its prevention foundations. The policy focuses on the reduction of greenhouse gases and the development of new technology to further reduce emissions. This approach follows with the integrated framework for climate change as presented by the Intergovernmental Panel on Climate Change (2001: p. 3). The NSAA's climate change policy is the ski industry's response to climate change, a way in which the industry can mitigate the emissions of greenhouse gases, and begin to adapt to climate change impacts.

In addition to this industry policy, a new climate change program was launched by the NSAA in 2003. The “Keep Winter Cool” campaign is designed to highlight corporate environmental policy and educate resort guests (NSAA, 2004e, 2004f, 2004g). Resorts are provided the opportunity to highlight their climate change actions while simultaneously encouraging resort guests to also take action to reduce their contributions to greenhouse gas emissions. This new program has generated a significant amount of attention on and off the slopes (Ski Area Management Magazine, April 2004, Ski Press World, December 5, 2003) and as a result will continue to have an impact on climate change by educating guests and influencing behaviours. Table 4.9 highlights some of the ways in which ski areas are taking action on climate change as part of the ‘Keeping Winter Cool’ campaign.

Table 4.9: North American Ski Industry Climate Change Action

- In Ontario, Canada, Blue Mountain Resort rewarded the first 100 vehicles with 3 or more passengers a free BBQ lunch on Sustainable Slopes day. In addition, The Canadian Centre for Pollution Prevention and the Office of Energy Efficiency (OEE) provided information to guests on incentive programs that make homes more energy efficient, such as Energy Efficiency Retrofit Grants and tax rebates on the purchase of energy star appliances.
- Mount Hood Meadows in Oregon, in conjunction with Green Mountain Energy and 3 Phases Energy, helped sign up guests for wind power in their homes. Guests signing up for green power will receive a voucher worth \$20 off their next lift ticket purchase at Meadows.
- Sugar Bowl's "Environmental Spotters" gave raffle tickets to passengers in vehicles with four or more riders and shuttled bus riders from 8 a.m. to 12:30 p.m.
- In Colorado, Arapahoe Basin kicked off its new Climate Club. For \$20, a resort guest may receive discounts at A-Basin as well as cut global warming pollution. By joining the club, a purchaser buys Emission Reduction Credits, which are generated by renewable energy companies. Membership credits account for a one-ton reduction in global warming pollution. Members also can receive discounted lift tickets including a \$15 lift ticket on Sustainable Slopes Day and Earth Day.

NSAA, 2004e

Overall, the implementation of air quality actions has improved since the Sustainable Slopes inaugural year. The lack of climate change and global air quality actions or ‘options for getting there’ provided to resorts in Sustainable Slopes has been mitigated by the creation of the Ski Industry Climate Change Policy (NSAA, 2003b) and

the Keeping Winter Cool program. Like the policy itself, monitoring of the implementation of the climate change policy at North American ski areas is in its infancy but at this time the ski industry (NSAA, 2003: p. 2-46) is reporting a reduction of the following:

- 45,831,344 pounds of CO₂ emissions from electrical energy conservation,
- 29,838,237 equivalent pounds of CO₂ emissions from waste reduction and recycling,
- 146,938,788 equivalent pounds of CO₂ emissions from transportation demand reduction,
- 222,608,369 total pounds of CO₂ emissions from all energy, waste, and transportation reduction measures.

A future study of the impacts of the Ski Industry Climate Change Policy (NSAA, 2003b) and the Keeping Winter Cool program on public perception, ski area environmental management, and on climate change would be a useful undertaking in understanding the role of these policies in affecting change where climate change is concerned.

4.12 Program Indicator Dimension: Aesthetics

“Scenic values are critical to surrounding communities and the experience of guests. Although ski area development is a part of the visual landscape in many mountain areas, it can be designed and maintained in a manner that complements the natural setting and makes the natural setting more accessible to guests. Where opportunities for collaboration exist, ski areas should also consider working with appropriate partners in the protection of open lands that help define the visual landscape in which their guests recreate.” (NSAA, 2000: p. 16).

The aesthetic quality of a ski destination is a very important component of the guest experience. Ski area managers are well aware of the ways in which the visual quality of their resort influences tourist spending. As a result, on site ski area aesthetics become an integral component of ski area management. This fact is evident in the data reported by endorsing resorts in Table 4.1.

When endorsing ski areas were asked to evaluate their progress toward the aesthetic dimension of Sustainable Slopes, on average, reporting ski areas reported that some progress had occurred. Although the difference in reported overall values is very small, 0.08, the fact remains that approximately 7 more resorts than in 2001 have reported progress amounting to an increase in reported values by 1. It also remains, that overall resorts are reporting that some actions have been taken to implement the aesthetic dimension of Sustainable Slopes, and implementation progress, though insignificant when compared to progress in other dimensions, is steady.

Table 4.10: Trend Analysis: Aesthetic Dimension

<i>Sustainable Slopes Program Dimension</i>		<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
7	Aesthetics	0.08	6.7	7.8%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

The lack of significant improvement may in fact be due to already existing operational policies related to on-site aesthetics. Many of the ‘options for getting there’ provided by the NSAA deal with such matters as keeping parking lots free of debris and garbage, planting trees and or other vegetation to improve visual quality, and planning with landscape scenic values in mind. Many of these options are actions already being performed by ski areas, as in most cases, they are basic operations for managing ski area aesthetics. If this is in fact the case, and on average North American ski areas are already implementing the aesthetic dimension of the charter, then it is not surprising that there was little change in implementation rates since the programs inception. For most, values in the range of 3.71 -3.79 imply that these resorts were already doing something and that

they continued to do so over the course of three years. This is further supported by the following indicator data (NSAA, 2001: p. A-23, NSAA, 2003:p. 2-4):

- ✓ 76% of responding resorts reported that they were designing lifts and buildings to blend into the natural backdrop or complement the natural surroundings,
- ✓ 98% were planning with scenic values in mind,
- ✓ 97% were keeping parking lots free of debris and garbage,
- ✓ 92% were placing existing and new utility lines underground to reduce visual impacts, and
- ✓ 87% are planting trees or other vegetation to improve visual quality.

The NSAA is reporting that larger scale resorts are making more progress towards implementing the visual quality dimension of Sustainable Slopes. In addition to this, the NSAA is reporting that significant progress is being made by resorts in Canada, the Mid-Atlantic region, and the Northern Rockies region (Appendices A1 and A2). Reasons for these regional and operational differences are unknown at this time, but they may relate directly back to the fact that aesthetics are crucial for ski destinations to maintain, especially for larger destinations that require large numbers of visitors to make budget ends meet.

Examples of some of the actions taken by endorsing resorts to improve visual quality include:

- Arapahoe Basin (CO) has taken action to minimize visual impacts by using earth tones for building and structure coloring. In addition, ridgeline development has been minimized in order to sustain the scenic qualities of its terrain and protect the views in the surrounding areas (NSAA, 2004b),
- Stowe Mountain Resort (VT) reduced visual impacts on the Haselton Hiking Trail by relocating a proposed lift (NSAA, 2004c),
- Aspen Skiing Company's Little Nell Hotel directs two dollars from each customer's bill to support the Aspen Valley Land Trust. The land trust protects vistas as well as other environmental features and lands (Schendler, February 2, 2004).

For all reporting years, visual quality made the NSAA's list of most implemented principles. Based on the evidence supporting the claim that ski areas have made efforts to improve visual quality in order to satisfy tourist destination demands and to increase positive public image, it becomes difficult to determine that actions are the result of the Sustainable Slopes program. In fact the opposite can be concluded, that ski areas are primarily taking action to improve aesthetics in order to increase positive public image and to satisfy tourist demands. While reducing environmental impacts is a motivating factor reported by endorsing resorts, it is secondary to other priorities. As a result, one cannot conclude that actions taken to improve visual quality at North American ski resorts were motivated entirely by the Sustainable Slopes program. Although the motivation to improve ski area aesthetics was not driven purely by environmental motives, it remains that the program was astute in promoting aesthetic principles and actions which made sense to endorsing resorts from many different perspectives. As a result the program can report success in implementing the aesthetic dimension of Sustainable Slopes, regardless of the driving force for these changes.

4.13 Program Indicator Dimension: Transportation

“Travel to and within ski areas has unavoidable impacts. Through transportation initiatives, ski areas can do their part to help ease congestion and impacts to air quality and improve the ski area experience”. (NSAA, 2000: p. 17).

When asked to evaluate their progress towards the transportation dimension of Sustainable Slopes, on average, endorsing resorts reported an improvement of 0.21 over 2001 (see Table 4.11). While the aggregated value remains in the ‘some actions implemented’ range, it is indicative of program implementation. The calculated change over three years translates into approximately 18 more resorts that have reported an

increase of 1 when reporting on progress implementing the transportation dimension of Sustainable Slopes.

Table 4.11: Trend Analysis: Transportation Dimension

<i>Sustainable Slopes Program Dimension</i>	<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
8 Transportation	0.21	17.5	20.4%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

Reporting resorts on average, have yet to report that significant progress has been made in implementing the transportation principle three years after the program's inception (see Table 4.1). Though reported values continue to remain in the 3 range, it remains that progress is being reported and observed where transportation is concerned.

Examples of some of the actions taken by endorsing resorts to address the transportation dimension include the following:

- Jackson Hole Mountain Resort funded bus passes for employees and season pass holders (NSAA, 2003: p. 2-29),
- The Canyons Resort in Utah contributed to the development of two shuttle services that were used by 175,000 passengers for the year ending April 2003 (NSAA, 2003: p. 2-24),
- Vail Mountain encouraged carpooling in the 2001-2002 season by giving 10\$ food vouchers to vehicles that contained 4 or more passengers (NSAA, 2003: p. 2-18).

In addition to the highlighted individual ski area efforts to reduce the environmental impacts associated with transportation and to implement the transportation dimension of Sustainable Slopes, the NSAA's Annual Reports deliver the following:

- In 2002 and 2003, 90% of resorts are providing shuttles or transportation for guests and employees, and
- In 2001, 35% of resorts were working with travel agents to market and promote 'car free' vacation packages.

The transportation dimension of Sustainable Slopes is inextricably linked to the air quality and climate change dimensions of the same program. Efforts made to implement the transportation principle directly improve air quality by reducing the number of cars on the road that produce particulate pollution and other emissions. When resorts were asked to indicate which potential benefit of transportation dimension implementation was of the greatest importance, reduced environmental impacts and increased positive public image scored equally in 2001. In 2002 and 2003, increased positive public image slipped ahead of reduced environmental impacts by a small fraction, but these two benefits still remained the most important to endorsing resorts.

In the case of transportation, resorts are reporting some progress towards the goals of Sustainable Slopes. While endorsing resorts are reporting an improvement in implementation rates in 2003 over 2001, it remains that the improvements are small (0.21) and overall resorts have yet to report significant progress (a scale value of 4). This small change, though indicative of improvement is still a very slight increase over reports in the program's inaugural year. This seems to imply that where transportation is concerned resorts are slow to take action to implement the transportation principle. To date, resorts are not reporting that any significant progress has been made towards implementation. This may in fact be due to the costs associated with funding transportation initiatives such as shuttles and bus passes, but it may also have to do with the complexity of creating or improving an infrastructure that was either absent, poorly built, or dependent on environmentally unfriendly resources such as diesel. Ski resorts with no existing transportation infrastructure other than roads and parking lots must make efforts to encourage carpooling if resources are unavailable to fund public transportation.

Interestingly, the NSAA (2003, pp. 2-6 and 2-9) is reporting that the most success in terms of transportation dimension implementation is being reported by larger scale resorts (Appendices A1 and A2). Again, this may be due to existing infrastructure or larger operating budgets.

Overall a slight improvement has been observed in implementing the transportation principle over three years. While the improvement can be observed, the numerical representation of this change is small. As a result it is difficult to determine whether Sustainable Slopes is providing enough guidance and incentives to ski areas to implement transportation related improvements.

4.14 Program Indicator Dimension: Education

“Because of their setting in an outdoor, natural environment and the clear connection between that natural environment and the guest experience, ski areas have an excellent opportunity to take a leadership role in environmental education and in enhancing the environmental awareness of their guests, surrounding communities, and employees”. (NSAA, 2000: p. 18).

When endorsing ski areas were asked to evaluate their progress towards the education principle of the Sustainable Slopes program, on average, reporting ski areas reported that progress has occurred since the inception of the program in 2000. Overall, resorts report an improvement of 0.36 over three years of program implementation. When all dimensions are considered, this is the greatest calculated change. This change translates into approximately 30 resorts that have improved their implementation by a value of 1 over three years, representing approximately 35% of reporting resorts.

While the overall calculated change is indicative of improvement, it remains that the majority of resorts have implemented some actions in response to the education principle, but to date, the majority of ski areas have yet to report that significant progress

has been made (a value of 4). In other words, reported values (see Table 4.1) continue to remain in the 3 range and as such, until this value increases past four, resorts can not claim to be making significant progress (based on their own evaluation methods).

Table 4.12: Trend Analysis: Education Dimension

<i>Sustainable Slopes Program Dimension</i>		<i>Calculated change* (X)</i>	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension (Y)</i>	<i>% of ski areas reporting progress* (Z)</i>
9	Education	0.36	30	34.9%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

Ski resorts are in a unique position to have an impact on North American and international guests as millions of tourists frequent North American ski areas in any one given season. The impacts of an effective environmental education program then have the potential for reaching millions of guests. In an interview conducted with Auden Schendler (January 22, 2004), Director of Environmental Affairs for Aspen Skiing Company he reports that “A benefit of the program is ski area access to guests – environmental education opportunities do exist”.

Though ski areas are in a unique position to educate guests about environmental issues and initiatives it remains that to qualify as an educator the resort must first improve their public environmental image. A resort that does not have an effective environmental management plan is not in a position to educate guests without first setting an example. For this reason, the implementation of the education principle may be lagging. As more resorts begin to take action to implement the Sustainable Slopes charter then more ski areas will find themselves in a position to advertise their efforts and educate guests. In the meantime, resorts can begin with educational programs that target employees.

Employees who are armed with an arsenal of environmental education are in a position to then suggest changes and make improvements accordingly. Changes within a ski area begin with employees and then environmental education programs can then be created from on- mountain experiences and knowledge.

Examples of some of the actions taken by endorsing resorts to address the education dimension of Sustainable Slopes include the following:

- Aspen Skiing Company in partnership with local conservation groups and environmental education centres provides naturalist-guided ski and snowshoe tours to teach guests about the areas winter ecology (NSAA, 2004d, ASC, 2003a), see Figure 4.2 for an example of ASC on-site environmental education in the forms of educational signs,
- Jackson Hole Mountain Resort developed Ske-cology handbooks, and installed an interpretive display in the children's eating area (NSAA, 2003: p. 2-29),
- Mt. Hood Meadows Ski Resort in Oregon sponsored an environmental fair during Sustainable Slopes Day that included presentations by local environmental foundations and conservancy groups (NSAA, 2003: p. 2-18).

Individual ski area efforts in the area of education and outreach have to date been creative and many resorts are reporting that their efforts have been successful. In addition to these reports 78% of North American ski areas are reporting that they are publicly demonstrating a commitment to operating in an environmentally sensitive manner by adopting Sustainable Slopes, and 68% are informing guests and educating employees about environmental principles (NSAA, 2000: p. A-26). These indicators imply that action is being taken to implement the education dimension of the charter.

Figure 4.2 Aspen Skiing Company On-Mountain Environmental Education Initiative

When these indicator values are considered in conjunction with the continued increase in the values of the aggregated data in Table 4.1 it implies that reporting North American ski areas are making improvements where education is concerned. Though improvements are slow, ski area policies and actions must improve before education programs can be fully activated. The endorsement of the Sustainable Slopes program by ski areas is a good starting point for initiating an education program for employees and guests simply because it provides a focal point from which guests can be approached. From this, ski areas can continue to build on the principles and practices provided by Sustainable Slopes to incorporate education and outreach into ski area operations.

4.15 Summary Assessment

Overall, reporting North American ski areas are reporting that 'some' progress (scale value in the range of 3) has been made in implementing the principles contained

within the Sustainable Slopes charter. Table 4.13 (pg. 88) provides a summary of the North American ski industry data.

Table 4.13: North American Ski Industry Summary Assessment Matrix

Sustainable Slopes Program Dimension		Reported Values: Self-Assessed Progress Level			Estimated # of resorts reporting an increase /estimated % of resorts reporting an increase
		North American Ski Industry			
		2001	2002	2003	
1	PLANNING	3.63	3.74	3.91	23/27.1%
2	WATER	3.37	3.51	3.58	17.5/20.4%
3	ENERGY	3.02	3.07	3.17	12.5/14.5%
4	WASTE	3.34	3.37	3.52	15/17.4%
5	ENVIRONMENTAL MANAGEMENT	3.55	3.41	3.65	8.3/9.7%
6	AIR	3.32	3.28	3.45	10.8/12.6%
7	AESTHETICS	3.71	3.74	3.79	6.7/7.8%
8	TRANSPORTATION	3.22	3.38	3.43	17.5/20.4%
9	EDUCATION	3.03	3.09	3.39	30/34.9%
Aggregated Annual Evaluation Values		3.35	3.40	3.54	

(NSAA, 2001, 2002, 2003)

5= Principles implemented/Demonstrating leadership

4= Significant Progress made/On target with Sustainable Slopes Charter

3= Some actions implemented/Showing some initiative – further initiatives required to stay on target with the Sustainable Slopes Charter

2= Investigating, but no actions implemented/has endorsed the Sustainable Slopes Charter

1= No action taken/Not yet started

The program has been in effect for three years, and to date, reporting resorts on average, are not reporting any significant progress (scale value of 4) since the programs inception. Despite the lack of significant progress to report, the program itself can be considered to be a success as the majority of reporting North American ski areas have not only endorsed the charter, but that many have moved beyond simply contemplating

environmental management to taking action in all dimensions of the charter. While the data implies that change is occurring very slowly, it is indicative of progress made towards implementing the goals of the Sustainable Slopes charter.

Figure 4.3 provides a visual representation of the North American ski industry data. The chart shows that for those program dimensions where implementation was higher than the aggregated average, these dimensions continued to remain above average over three years, and those dimensions reported to be below average remained below average as well. It is interesting to note that no program dimensions were reported to move from below average to above average since the programs inception. While this trend may be observed, it is not indicative of a lack of progress. Quite the opposite is in fact observed in Table 4.13, where all nine program dimensions were reported to have improved. It is interesting to note that those dimensions where the greatest improvements were observed included those dimensions that were both above and below the industry average in figure 4.3.

Figure 4.3: Ski Industry Assessment Results

● Sustainable Slopes Program Indicator

As a result of the data reported by endorsing resorts, and the findings of this analysis, we must conclude that the program is resulting in positive impacts on ski area environmental management. In 2003, the aggregated value for all program dimensions is 3.54, an improvement over the aggregated value of 3.35 in 2001. The calculated change over three years amounts to 0.19. This translates into meaningful estimates of change in Table 4.14.

Table 4.14: Trend Analysis: North American Ski Industry Implementation Progress

<i>Calculated change*</i> (X)	<i>Estimated # of Ski Areas reporting an increase of 1 in one program dimension</i> (Y)	<i>% of ski areas reporting progress*</i> (Z)
0.19	15.8	18.4%

Calculations assume that no decreases were reported.

*X = A (2003 Annual Aggregated value) – B (2001 Annual Aggregated Value)

*Y = 0.28/0.012

*Z = Y/Average number of reporting resorts (86) (net figure)

While the short time frame included in this evaluation limits the study's findings, it remains that there is positive evidence of implementation. This is to say that North American ski resorts have made some progress towards implementing the principles and practices of the Sustainable Slopes charter. While the magnitude of these positive impacts cannot be rigorously defined by this study, it can be said that on average, reporting North American ski areas have made efforts to implement all indicator dimensions of the Sustainable Slopes charter and as a result, it may be concluded that the North American ski industry is making progress in implementing the charter.

CHAPTER 5: Case Study: Aspen Skiing Company

“Our business depends on natural beauty, clean air, and good snow;
a healthy environment is integral to success”.

Pat O'Donnell, President/CEO Aspen Skiing Company

5.1 Introduction

As the ski industry continues to evolve and begins to embrace environmental issues, it seems only fitting to examine the ski area that many believe to be leading the way. The Times Mirror Golden Eagle Award recognizes industry-leading environmental achievements of North American ski areas. It is this industry-sponsored award that Aspen Skiing Company (ASC) has won for four consecutive years. In 1999, ASC also received the British Airways Tourism for Tomorrow Award for International Eco-Tourism and the National Environmental Education and Training Foundation Award for its environmental education program. It is such recognition (as provided by these awards and countless others), the company's unique environmental initiatives, their involvement in local, national, and international environmental programs, and their dedication to sustainability that has put ASC ahead, arguably a 'leader' in the ski industry where environmental performance is considered. It is this environmental leadership, the sheer size of the operation, and the potential impacts that ASC can have on the surrounding environments that has made ASC a suitable operation to include in this study. ASC will provide a point of reference from which the rest of the North American ski industry can

be compared. ASC's very public environmental record defines the company as the industry environmental leader. As such, this designation will be evaluated.

This chapter will provide the following:

- A brief history of ASC,
- Presentation of ASC mandates, and
- Using the evaluation framework, ASC's policies and practices will be evaluated in reference to the goals of Sustainable Slopes (using the scale values of this study and dichotomous (yes/no) methodology).

Subsequent chapters will compare the results of this chapters' evaluation to the results of the North American ski area evaluation to determine whether or not ASC is truly an industry 'sustainable skiing' leader, as well as to report on progress made towards the goals of Sustainable Slopes by the North American ski industry

5.2 Aspen Skiing Company

Aspen, Colorado, a once former mining town, has moved from its silver mining days to mining an ore of a different origin – snow. From the earlier days in 1936 when Swiss ski racer Andre Roch first mapped and cut the first ski run on Aspen Mountain, to the first 'tow', an old mine hoist and truck engine, the Aspen region has grown to be a world-class winter destination (Aspen Snowmass, September 2001). Please see Figure 5.1 and Table 5.1.

ASC was formed in 1946 and now oversees the operations of four ski areas; Buttermilk, Snowmass, Aspen Highlands, and Aspen Mountain (see Figure 5.1). Details about each operation are presented in Table 5.1. When all operations are considered as one, ASC boasts 1937 hectares of terrain, 314 trails, 39 lifts with a capacity for more than 51,000 riders/hour, and a 5-month long ski season commencing in November and ending in April (Aspen Snowmass, September 2001 a, b, c, d).

Figure 5.1: Aerial Photograph of Aspen, Colorado
(U.S Geological Survey, September 5, 1999)

8 km SW of Aspen, Colorado, United States 05 Sep 1999

Image courtesy of the U.S. Geological Survey

Table 5.1: ASC Ski Area Profiles

ASC Ski Area	Season (months)	Base elevation (m)	Summit elevation (m)	Terrain (acres)	# Of trails	Km of trails	Longest run (km)	Annual snowfall (cm)	Snowmaking (acres)	Lifts	Lift capacity (persons/hr)	Lodging bed base (at base of mountain)	Restaurants
BUTTERMILK	4	2,399	3,018	420	43	34	4.8	508	108	7	7,500	112	2
ASPEN HIGHLANDS	4	2,451	3,559	720	112	105	5.6	762	110	4	5,400	129	4
ASPEN MOUNTAIN	5	2,422	3,417	675	76	103	4.8	762	210	8	10,755	8,100	6
SNOWMASS	5	2,473	3,813	3,010	83	220	8.2	762	160	20	27,978	6,000	10

(Aspen Skiing Company, 2001, p. 1, Aspen Snowmass, September 2001a, b, c, d).

Such expansive operations have warranted the creation of a set of guiding principles in order to define ASC as a company as well as to indicate the direction in which ASC aspires to move. Recognizing that ASC is derived from a “unique collaboration of community, nature, and the collective passion of visitors and residents alike” (Pat O’Donnell, ASC, 2001-2002), the guiding principles are intended to convey the company’s purpose and values to employees, residents, and visitors alike (see Figure 5.2).

5.3 Aspen Skiing Company Guiding Principles

Though not unique to the ski industry, ASC was among the first ski areas to embrace environmental issues as part of the company’s agenda. Included as one of the company’s core values, shown in Figure 5.2, the integrity of the environment has become an integral part of the way in which ASC operates. This is reaffirmed when ASC states “Aspen Skiing Company is values-driven, owned and operated by people who share a common appreciation and respect for the pristine environment in which we live” (ASC, 2001-2002, p. 5).

ASC has created a unique set of principles that follow a comprehensive plan that strives to integrate people, employees and clients, health and well-being, personal and professional development, culture, and the environment. In this context the environment is not an isolated component of the plan. Instead each component is essential to the other. For example, practising values-based leadership cannot occur without a good and solid values base. Values such as environmental stewardship are not only essential for values-based leadership but also the main component of the final principle “Remain responsible stewards of our mountain environment”.

Figure 5.2: ASC Guiding Principles

Purpose

Renew the human spirit.

Values

Sustain the "Aspen Idea" based on the concept of the complete life where mind, body, and spirit are enriched.

Mind

- Support the concept of life long learning.
- Offer opportunities for personal and professional development.
- Practice values-based leadership.

Body

- Inspire and celebrate
- Encourage our staff to experience the challenge of our mountains.
- Promote physical and emotional wellness.

Spirit

- Uphold a company culture that fosters trust and rewards excellence.
- Provide exemplary hospitality and superior guest service.
- Remain responsible stewards of our mountain environment.

(Aspen Skiing Company, 2001-2002, p. 3).

ASC has taken a unique approach in defining the goals and values of the company in its set of guiding principles (Figure 5.2). While other ski areas may go into detail about specific areas of management or operations, ASC has chosen a more holistic approach in defining itself and the company's overall mandates. In future it may be interesting to evaluate ASC's ongoing progress towards its own guiding principles as they present interesting criteria for evaluation.

5.4 ASC Environmental Principles

The core fundamental values held by ASC have spawned other policy initiatives. In particular, a set of principles and practices have been constructed in order to emphasize the company's dedication to the environment. These principles and practices

are building blocks upon which ASC continues to evolve and lay new ‘bricks’. This is to say that these principles and the resulting practices are in a constant state of ‘construction’, where building activities are focusing on improving the existing environmental principles and adding new practices to the list of achievements. ASC’s environmental principles are presented in Figure 5.3.

Figure 5.3: Aspen Skiing Company Environmental Principles

- Promote habitat conservation and wildlife protection.
- Implement "green building" principles and practices company-wide for future developments.
- Continue developing employee transportation programs that provide viable and resource efficient options for getting to work and increase education and outreach efforts to inform employees of transportation options.
- Foster the efficient use of natural resources. In particular, improve energy efficiency and pursue the use of renewable energy sources in all our operations.
- Measure our waste stream and continue to reduce it through recycling and waste prevention.
- Reduce and recycle solid waste.
- Continue to improve outreach and our on-mountain, community and employee environmental education programs.
- Promote employee activism and volunteerism in community projects.
- Continue our corporate matching contributions to the Environment Foundation to help provide financial assistance to local environmental enhancement projects.

(Aspen Snowmass, 2001, p. 1)

ASC has evolved from its roots in the 1930s and 1940s to become an industry leader not only in mountain and ski tourism, but also in incorporating environmental concerns into the company’s guiding principles and practices. The company views the environment in a holistic sense and includes basic environmental components (air, water, etc.) along with corporate practices (transportation, energy use) in its promotion of sustainable ski resorts. ASC recognizes that the company’s bottom line and more importantly their future rests firmly on the integration of environmental management and corporate management. In fact, to ASC they are one and the same.

5.5 Case Study: Aspen Skiing Company Evaluation Results

In order to gain a deeper perspective of the ways in which Sustainable Slopes is having an effect at ski areas a case study is included in this study. Aspen Skiing Company (ASC), in Aspen, Colorado, U.S.A. has been selected for a number of important reasons. These reasons have been previously detailed. To summarize, ASC has been included for the following reasons:

- ✓ ASC is publicly recognized as a ski industry sustainability leader,
- ✓ ASC is involved in local, national and international environmental programs and initiatives,
- ✓ ASC was a partner in creating the Sustainable Slopes charter,
- ✓ ASC has moved beyond compliance to take environmental management initiatives.

Concerns regarding representation and the inclusion of ASC have been considered. By including this case study claims are not made that ASC represents the whole of the ski industry. Instead, ASC is presented as a benchmark from which progress towards the goals of Sustainable Slopes can be evaluated. The inclusion of ASC in this study provides a detailed evaluation of the ways in which one ski area is responding to Sustainable Slopes, and allows a comparison to be made with the rest of the industry. The intention of including the detailed examination of the ASC in this study is to illustrate the ways in which the ski industry is making progress towards sustainability.

The following sections of this chapter will present an evaluation of the environmental performance of ASC in relation to the sustainable skiing model outlined in the NSAA's Sustainable Slopes: The Environmental Charter for Ski Areas (2000).

5.5.1 Sustainable Slopes Principles and ASC

ASC was instrumental in aiding the National Ski Areas Association (NSAA) in creating the Sustainable Slopes charter. Working in partnership with the NSAA, the National Forest Service and other stakeholders, the Sustainable Slopes environmental charter was created in 2000. ASC has agreed to the charter, signing a voluntary agreement to strive towards sustainability, and the company is planning “to remain at the forefront of turning theory into practice” (Aspen Skiing Company, 2000: p. 19). While Aspen is considered an environmental leader within the ski industry, this evaluation will identify areas in need of improvement and areas where improvements were significant. In particular, environmental initiatives that demonstrate leadership will be highlighted.

Table 5.2 indicates the presence of an ASC principle that addresses each of the 21 principles of the Sustainable Slopes charter. While action has been taken in the areas where formal company principles do not exist, it remains that there is no formal company policy on 9 of the 21 principle areas of the Sustainable Slopes charter. Nonetheless the environmental principles for which it has no formal policies are crucial to ASC’s sustainability and sustainable skiing more broadly. While ASC has shown industry leadership in many of these areas, a formal company principle or policy that addresses these sustainable skiing indicators would not only allow ASC to better monitor their accomplishments, but it would also facilitate a more thorough environmental management system. In addition to these benefits, ASC would be setting an industry wide example by implementing the Sustainable Slopes charter in its entirety.

Table 5.2: Sustainable Slopes and ASC Principles

Sustainable Slopes: The Environmental Charter for Ski Areas Environmental Principles		ASC Principles
1	Planning, Design and Construction	√
2	Water Use for Snowmaking	X
3	Water Use in Facilities	X
4	Water Use for Landscaping and Summer Activities	X
5	Water Quality Management	X
6	Wastewater Management	X
7	Energy Use for Facilities	√
8	Energy Use for Snowmaking	√
9	Energy for Lifts	√
10	Energy Use for Vehicle Fleets	√
11	Waste Reduction	√
12	Product Reuse	√
13	Recycling	√
14	Potentially Hazardous Waste	X
15	Fish and Wildlife Management	√
16	Forest and Vegetative Management	√
17	Wetlands and Riparian Areas	X
18	Air Quality	X
19	Visual Quality	X
20	Transportation	√
21	Education and Outreach	√

√ Principle is included in ASC's Guiding Principles or Environmental Principles

X No principle dealing directly with this issue exists in ASC's guidelines or principles.
(NSAA, 2000, Schendler & Lane, Aspen Skiing Company, 2000, 2000-2001).

Where ASC falls short in constructing broad environmental principles, ASC was found to respond to this oversight by ensuring that company practices not only meet the sustainability goals set out in the company's principles and Sustainable Slopes, but engages in leadership based practices that provide example not only to other ski areas, but also to other industries. Many of these practices were observed during field research (see Chapter 3, section 3.8 for field methodology), and as such, examples are provided in subsequent sections of this chapter.

The following sections will evaluate the degree to which ASC meets the breadth objectives for sustainable skiing. In order to achieve this, ASC principles will be compared with the objectives set out in the Sustainable Slopes charter principles and ASC company practices will be evaluated. The following sections will present ASC's

principles and practices in further depth in order to gain a better understanding of the company's operations.

5.5.2 Program Indicator Dimension: Planning

"It is often true that corporate environmentalism is, in fact, tokenism: a series of minor tweaks to high-profile but superficial problems; actions that change little but public perception. I'm proud that ASC goes beyond that." (Pat O'Donnell, President/CEO ASC, 2001-2002a: p. 4)

Table 5.3: Observed Progress: Planning Dimension

NSAA	ASC	
Sustainable Slopes Environmental Charter Principle	Principle	Practice
1. Planning, Design, and Construction	Implement 'green building' principles and practices company-wide for future developments.	<ul style="list-style-type: none"> • Published and distributed "Building Sustainable Resorts: Guidelines for Environmentally Sustainable Design and Construction of Aspen Skiing Company Buildings". • Deconstructed and recycled the Sundeck Restaurant and Snowmass Lodge and Club • Constructed a 3,700-square-foot deck made from recycled materials • Windows, shades and outside walks designed to reduce light pollution • Low-toxicity paints, glues and sealants used in construction to protect indoor air quality • Construction of a Green Village at the Snowmass Club

(Aspen Snowmass, 2000: p. 1, Aspen Skiing Company, 2000, Schendler & Lane, NSAA, 2000, ASC, 2003c).

While following its own company standards, as well as those detailed in Building Sustainable Resorts (Schendler & Lane), ASC can boast many planning, design, and construction achievements, all of which are in accordance with the principles and practices detailed in the Sustainable Slopes charter. These achievements are detailed in Table 5.3. ASC is on target with those practices and principles included in the Sustainable Slopes charter; ASC is demonstrating leadership where planning, design, and construction are considered by going beyond suggested 'options for getting there' provided in Sustainable Slopes to take further 'green' initiatives.

While on-site at ASC, the construction of the Sundeck Restaurant (Figure 5.4) was examined. This building far exceeds the principles and practices outlined in the Sustainable Slopes charter. The original building was deconstructed and recycled in 1999. Working with the U.S. Green Building Council, the Sundeck restaurant was newly constructed to meet the criteria of the Leadership in Energy and Environmental Design (LEEDS) program. The goal of this program is to create certifiably 'green' buildings. In 2001, the Sundeck Restaurant became one of only 11 buildings internationally to achieve LEED certification.

In a personal interview with Stephen Kanipe (January 22, 2004), Chief Building Official and Director of the Renewable Energy Mitigation Program for the City of Aspen, he provides further evidence that "the ski company is doing the right thing" where planning and building are concerned. When asked where ASC has demonstrated environmental leadership he responded with the following:

"The Sundeck Restaurant Project and the Snowmass Club. In both cases it was a win/win. Meaning, the environmental impacts were mitigated and the projects went ahead".

This ambitious project coupled with ASC's development policies has propelled ASC far beyond the 'options for getting there' provided by the Sustainable Slopes program. The future of planning, design, and construction at ASC is now abundant in 'green' building projects, such as that currently underway at the Snowmass Club (see Table 5.3).

Figure 5.4: Sundeck Restaurant, Aspen, Colorado.

ASC is a leader in planning, designing, and constructing environmentally responsible and sustainable facilities. Not only is ASC responsible for writing and distributing the first industry manual Building Sustainable Resorts: Guidelines for Environmentally Sustainable Design and Construction of Aspen Skiing Company Buildings (Schendler & Lane), ASC is one of the few ski areas that have instituted 'green' policies for environmentally responsible development as a standard company practice (Table 5.3).

5.5.3 Program Indicator Dimension: Water

"All of the water on the earth is all there ever was and all there ever will be" (Lofaro, 2004).

Water use and management is crucial to the operations of ski areas. Water is essential for operations such as snowmaking, facilities, landscaping, and the visual quality of the ski area. While ASC acknowledges the importance of a sound water management policy, no principle has been defined to address this issue. Although it

could be argued that water issues are embraced within general statements regarding resource conservation, this seems rather limited given the potential negative impacts stemming from water withdrawals for snowmaking, and other resort operations. Despite the lack of a principle from which to base practices, ASC is making progress towards water sustainability. Table 5.4 details some of ASC's 'green' water practices.

Table 5.4: Observed Progress: Water Dimension

NSAA	ASC	
Sustainable Slopes Environmental Charter Principles	Principle	Practice
2. Water Use for Snowmaking	There are no company principles dealing with aspects of water management.	<ul style="list-style-type: none"> • Using high efficiency technology, reducing withdrawals, and timing withdrawals for minimum impacts (10-14% savings). • Expanded their fleet of fan guns (more efficient) for snowmaking. • Green building guidelines require efficient fixtures, and guests reuse linens for more than one night. • Native landscaping – planting and retaining native species reduces water needed for irrigation • 'Stream Team' help monitor local water quality with the local conservancy. • Using Snowmax, a biodegradable product to increase snowmaking efficiency
3. Water Use in Facilities		
4. Water Use for Landscaping and Summer Activities		
5. Water Quality Management		
6. Wastewater Management		

(Aspen Snowmass, 2000: p. 1, Aspen Skiing Company, 2000, NSAA, 2000, ASC, 2001-2002a: p. 19, Cassin, 2004).

In a personal interview with Rick Lofaro (January 21, 2004), the Water Quality Co-ordinator for the Roaring Fork Conservancy, a conservation group operating in the Aspen area, he identified water as the most pressing issue facing ski areas today and in the future. "The use of water, reliable sources of water, water conservation is extremely important to ski areas – especially ones that consume millions of gallons for snowmaking".

In broader terms as well as in the context of water, Rick Lofaro (January 21, 2000) confirms that "The Aspen Ski Company is leading by example". One of the ways in

which ASC is doing so was reported by Stephen Kanipe in a separate interview (January 22, 2004). Kanipe reported that many of the city's programs are based on those of the ski company. When asked to elaborate he responded with a sly smile:

“Auden [Director of Environmental Affairs, ASC] and I have a friendly competition on low flush toilets and waterless urinals and he is winning. We are trying to install them in public buildings. The Ski Company has installed them all over the mountain”.

The most recent and unique of water dimension initiatives are the halfpipe projects at Buttermilk and Snowmass. The halfpipe, a u-shaped formation made entirely of snow is now a popular fixture on ski hills. It allows skiers and snowboarders alike the opportunity to try new tricks and ‘go big’. In the past, ASC has built these snow structures entirely out of snow, consuming millions of gallons of water annually. The halfpipe is now a permanent part of the landscapes at Buttermilk and Snowmass ski areas. Constructed entirely of earth, the accrued savings resulting from these projects amounts to over 8 million gallons of water and \$30,000 in electricity (ASC, 2002-2003: p. 13). Rick Lofaro (January 21, 2004) identified this project as one of many environmental initiatives taken by ASC that are demonstrating leadership in the Roaring Fork Valley and within the ski industry.

Overall ASC is demonstrating leadership with unique projects and initiatives that amount to accrued water savings. While these practices (detailed in Table 5.4) are resulting in reductions in water use, there remains little to report on initiatives that focus on wastewater and treatment. The implementation of the following Sustainable Slopes practices at ASC would help to further progress towards the goals contained in the water dimension of Sustainable Slopes. (NSAA, 2000):

- Exploring the use of decentralized or on-site treatment technologies where appropriate,
- Monitoring wastewater quality.

Not only would these practices help to reduce water use and protect water quality, it will also provide tools for managing wastewater – an area that ASC has yet to address, while concurrently meeting the objectives found in the Sustainable Slopes charter.

Overall, it appears that ASC's water management plans are well developed for most Sustainable Slopes program water indicators, meeting or in some cases exceeding the standard outlined in Sustainable Slopes, with the exception of wastewater management. Future goals should include adopting some of the practices detailed above and those found in the Sustainable Slopes charter.

After identifying water as the most important issue facing ski areas, Rick Lofaro (January 21, 2004) stated the following “The Aspen Skiing Company works hard to address environmental issues – crucial ones”.

5.5.4 Program Indicator Dimension: Energy

“We decided that if renewable energy was important to us, we should be doing it right. Tripling our renewable energy purchases is both a statement and a major environmental benefit” (Dave Belleck, ASC Senior Vice President of Administration, 2001-2002a: p.7).

In the year 1999-2000 ASC spent over \$3,218,306.00 on energy. Not only is this cost a drain on energy resources and company finances, the energy produced 45,000 Tons of CO₂ (ASC, 1999-2000: p. 8). The pollution resulting from inefficient and excessive energy use at ASC amounts to more than ASC is pleased to report. In order to address this problem and other energy issues at ASC ski areas, the company has developed a principle (see Table 5.5) to guide the company's actions towards reducing the cost of energy use both to the company directly and to the environment indirectly.

Table 5.5: Observed Progress: Energy Dimension

NSAA	ASC	
Sustainable Slopes Environmental Charter Principles	Principle	Practice
7. Energy Use for Facilities	Foster the efficient use of natural resources. In particular, improve energy efficiency and pursue the use of renewable energy sources in all our operations.	<ul style="list-style-type: none"> • All new computers and printers purchased at ASC are Energy Star compliant and have sleep modes and automatic shut-offs • Sundeck restaurant powered by 30% wind energy • High-efficiency snowmaking equipment purchased and replacement is in progress • Cirque lift at Snowmass is the only wind-powered ski lift in the state. • Uses clean, alternative fuel for company pick-up truck fleet • 3.5% of all energy purchases are renewable. The goal is to increase this to 5% by 2004
8. Energy Use for Snowmaking		
9. Energy for Lifts		
10. Energy Use for Vehicle Fleets		

(Aspen Snowmass, 2000: p. 1, Aspen Skiing Company, 2000, NSAA, 2000, Schendler, January 22, 2004).

ASC has been an early advocate of energy management and as such, there are many examples of ASC's implementation of the energy dimension of Sustainable Slopes. For example, the Cirque lift at the Snowmass ski area is powered entirely by wind energy. The lift which transports individuals to over 12,500 feet above sea level is presented in Figure 5.5. Not only was this lift constructed to avoid impacts on wildlife and habitat, it is arguably the most environmentally sensitive ski lift in operation in North America. The lift, servicing the highest alpine peak at Snowmass keeps over 82,000 pounds of carbon dioxide out of the atmosphere annually (ASC, 2003d).

Figure 5.5 Cirque Lift

Future practices at ASC will continue to apply the tenets of energy conservation. The newest project currently being undertaken at ASC involves the generation of energy on-site at Snowmass ski area. Using the existing network of snowmaking pipes, ASC has installed a hydroelectric turbine to generate hydroelectric energy directly on the ski hill. This micro hydro project is expected to be active in the spring of 2004 (Schendler, May 5, 2004). The hydroelectric system (Figure 5.6) is expected to generate over 250,000 kWh annually, an amount equal to the energy required to power 40 homes. The generation of this “environmentally benign energy” (Klunne, 2004) is expected to prevent the emission of half a million pounds of carbon dioxide (ASC, 2003f).

In a personal interview with the Director of Environmental Affairs at ASC (January 22, 2004), Auden Schendler identifies this new micro hydro energy project as one of ASC’s greatest environmental achievements.

Figure 5.6 Micro Hydro Generation Scheme for Aspen Skiing Company

(ASC, 2003f, Klunne, 2004)

Despite the amount of energy consumed at ASC ski areas and the resultant pollution created, ASC is the industry leader in practising energy efficiency. While ASC still has plenty of room for improvement, ASC practices go above and beyond those practices described in the Sustainable Slopes charter. The use of alternative and efficient energy, efficient appliances and fixtures, and training staff on the company's energy policies has put ASC at the forefront of the industry. The company's leadership in energy dimensions demonstrates ASC's commitment to sustainability.

5.5.5 Program Indicator Dimension: Waste

"If we 'discharge' guests who don't have an environmental consciousness, they could be considered a waste product of our business, going on to ever-greater consumption and pollution" (Auden Schendler, ASC, 2001-2002a: p.20).

ASC is well on target with their recycling and waste reduction programs. Not only has ASC reduced the amount of waste reaching the landfill, ASC has taken enormous steps towards setting an industry wide example for on-site waste re-use. The Sundeck Restaurant and the Snowmass Lodge and Club were deconstructed and the materials were recycled, keeping 84% of the buildings out of the landfill (ASC, 1999-2000: p. 12). Many of these old building materials were used to build a new Sundeck Restaurant (see Figure 5.4).

Table 5.6: Observed Progress: Waste Dimension

NSAA	ASC	
Sustainable Slopes Environmental Charter Principles	Principle	Practice
11. Waste Reduction	Measure our waste stream and continue to reduce it through recycling and waste prevention.	<ul style="list-style-type: none"> • 10.6% diversion rate • Guests are encouraged to reuse linens for extended stays • 465 Tons recycled in 1999 • 300 Fluorescent bulbs recycled in 2003 • ASC is phasing out all solvent-based parts washers • ASC is working with local health and environment departments to reduce and eliminate hazardous waste • In 2003, no hazardous waste was generated at all • Donates felled trees to the community for firewood
12. Product Reuse		
13. Recycling		
14. Potentially Hazardous Waste		

(Aspen Snowmass, 2000: p. 1, Aspen Skiing Company, 2000, NSAA, 2000, ASC, 2002-2003: p. 8, Cassin, 2004)

As well as setting industry wide examples for recycling and reuse, ASC has taken it upon itself to educate staff and guests about the importance of the three “R’s” – re-using, reducing, and recycling. In fact, one employee has taken it upon himself to be the ultimate role model for reuse, bringing his own utensils to avoid using and disposing of plastic utensils (ASC, 1999-2000: p. 6). To date, the education program has been a success.

Figure 5.7: ASC Waste Indicators

(ASC, 2002-2003: p. 8)

Although ASC adheres to state laws concerning potentially hazardous waste, as well as practicing on-site reductions in the use of potentially hazardous materials (Figure 5.7), ASC has failed to include the use and disposal of these materials as one of their guiding or environmental principles. As the damages resulting from a spill or leak of a hazardous solvent are potentially devastating, ASC should include the use and disposal of these materials in the company's principles and educate visitors about the proper handling and disposal of such materials (this may include nail polish remover, hairspray, old batteries, etc.).

ASC, again, is on target with the Sustainable Slopes charter when it comes to issues of waste. Although ASC has yet to develop a guiding principle for the use and disposal of potentially hazardous materials, the company follows all laws concerning hazardous materials and boasts a zero generation rate for the year 2003. ASC practices

are in accordance with the principles presented in the Sustainable Slopes. ASC has made significant progress in implementing the waste dimension of Sustainable Slopes.

5.5.6 Program Indicator Dimension: Environmental Management

“Development with ski areas in the upper Eagle River Valley discourages some elk from using traditional summer and winter ranges. Colorado has become the Disneyland of the West, where demand for recreation has caused some humans to encroach on areas that used to be exclusively the home of wildlife. Wildlife cannot move to another area to avoid human contact. We’re running out of room” (Colorado State University Biologist Bill Alldredge, 1989, as cited in Glick, 2001: p 19)

ASC not only has a guiding principle that addresses environmental management where fish, wildlife, and habitat are concerned but there is an abundance of examples of action taken to implement this principle. The environmental management principle and a number of environmental management practices are detailed in Table 5.7.

Table 5.7: Observed Progress: Environmental Management Dimension

NSAA	ASC	
Sustainable Slopes Environmental Charter Principles	Principle	Practice
15. Fish and Wildlife Management	Promote habitat conservation and wildlife protection.	<ul style="list-style-type: none"> • A company-wide ban on Atlantic Swordfish has been activated in order to protect this species at risk • Wildlife Enhancement and Management Plan focuses on reducing the effects of human activities on flora and fauna, preserving and improving habitat. • Funding provided through the Environment Foundation to construct the Marlot Wetlands and numerous other environmental projects
16. Forest and Vegetative Management		
17. Wetlands and Riparian Areas		

(Aspen Snowmass, 2000: p. 1, Aspen Skiing Company, 2000, NSAA, 2000, ASC 2003e)

ASC is demonstrating leadership based ‘best practices’ where environmental management dimensions are concerned with its Environment Foundation. ASC developed an employee funded Environment Foundation that donates money to local environmental initiatives, especially those associated with habitat, fish, and wildlife management. For every dollar donated by an employee, ASC matches the donation

dollar for dollar. In this way – The Environment Foundation, and through company donations to other environmental management projects, ASC is contributing to local stewardship initiatives. Since the foundation's inception in 1999, over 130 projects have been funded with an accumulative total of \$555,000 (ASC, 2003e). Examples of Environment Foundation funded projects include:

- Pitkin County Open Space and Trails Moore Open Space Restoration \$2,000
- Solar Energy International Solar in the Schools program \$4,000
- The Waldorf School for a wetlands education project \$2,000
- The Trust for Public Lands Elk Corridor Project \$7000
- White River National Forest Carnivore Study \$2050

In a personal interview (January 21, 2004) with the Water Quality Co-ordinator for the Roaring Fork Conservancy, Rick Lofaro confirmed that ASC contributes to environmental initiatives in the valley through the Environmental Foundation program. The Conservancy has been the recipient of 5 or 6 grants, three of which have been in the last year. These projects include the following:

- The Roaring Fork Conservancy Conservation Kits (\$995)
- The Roaring Fork Conservancy Water Quality Monitoring (\$3482)
- The Roaring Fork Conservancy Stream Flow Survey Project (\$3000)

In total, the conservancy has received over \$40,000 to fund environmental management projects that address issues of water, habitat, and aquatic dependent wildlife.

In addition to supporting local initiatives through the Environment Foundation and the onsite wildlife enhancement and management plan, ASC has publicly supported revisions, more specifically, Alternative D of the White River National Forest Plan. In response to increasing forest use and the subsequent environmental impacts, the forest service commissioned an environmental impact assessment. The result of this was the White River National Forest Service Plan. The plan was presented as a series of scaled

alternatives where no action is taken (Alternative B) at one extreme and to increasingly use restrictive (Alternative D) at the other (White River National Forest Service, 1999). The alternative requiring little to no action actively supports continued ski area expansion and development (White River National Forest Service, 1999, Colorado Wild, 2002, The Ecologist, May 2000, Briggs, 2000, American Lands Alliance, 2000, Glick, 2001: pp. 228-230). Although much of ASC ski areas are within the White River National Forest, ASC took the formal position that ski areas should not be able to expand past their current boundaries within the forest service, and as such they took the formal position of supporting Alternative D, restricted use. For ski area operators like Andy Daly (PBS, 2000), President of Vail Resorts Inc. Alternative D was to have direct impacts on his company's operations as it "provides for no expansion of capacity, either within the existing ski area permit areas, or outside, so there's absolutely no ability for ski areas to grow under this alternative". This alternative angered many business and political stakeholders as the plan favoured the health and function of the ecosystem over human involvement with the landscape (Glick, 2001: pp. 228-230).

Lee Cassin (January 22, 2004), Director for the City of Aspen's Environmental Health Department reported that ASC's public position on the matter "angered many ski area operators – but it did wonders for the Aspen Skiing Company's reputation". In correspondence with the Director of Environmental Affairs at ASC, Auden Schendler (May 5, 2004b) stated that:

"In short, we supported Alt. D, which emphasized biodiversity over recreation use. We were crucified in the industry for doing this (downside) and the upside (other than it was the right thing to do) was that the environmental community was SHOCKED by our action (in a good way) and it changed permanently how we were perceived by the hard core enviro community".

In further conversation, Schendler reported that ASC took this formal position on Alternative D not to simply improve their public environmental record – but to formalize their environmental policies and their commitment to sustainable skiing. He further explained:

“There was more to it than that [environmentally right thing to do]: it made sense--our position was that our business depended on healthy forests and pretty viewsheds, which would both be compromised by future expansion. Also there was a sense of "how big is big enough?" with flat skier visits for 20 years, why should the ski industry be expanding?”

To date, many of the environmental management principles and practices detailed in Sustainable Slopes have been implemented and leadership is evident with the Environment Foundation, policies, and actions, and with support for public land policy revisions. For this reason, ASC can boast a solid commitment to the environmental management dimension of Sustainable Slopes.

5.5.7 Program Indicator Dimension: Air

“Still, being an economic driver and having good intentions and profound concern for a place is not enough in this era of global environmental challenges. It's time for ski resorts to reach the next level of environmental stewardship and sound business management by taking a strong political stand on the most pressing environmental issue of all, climate change” (Schendler, October 27, 2003).

Air quality is one area in which ASC is demonstrating leadership, but not nearly as directly as with other issues. In some cases ASC does not include direct principles or guidelines relating to specific issues, instead the company has expanded upon general guidelines with specific policies. Atmospheric issues and air quality are included under the broader themes of resource conservation and transportation in the ASC principles and guidelines, and developed in depth under its climate change policy (see Figure 5.8).

Figure 5.8: ASC Policy Statement on Climate Change

After studying the issue, management has adopted the following policy statements:

1. Aspen Skiing Company acknowledges that climate change is of serious concern to the ski industry and to the environment.
2. Aspen Skiing Company believes that a proactive approach is the most sensible method of addressing climate change.

To this end, we commit to the following:

- Use of green development principles in new Aspen Skiing Company development
- Energy efficiency in old buildings through economically viable retrofits
- Continued support of mass transportation and local employee housing
- Annual accounting of greenhouse gas emissions
- A ten percent reduction in greenhouse gas emissions by 2010 based on a 1999 baseline.

Beyond policies relating to climate change and air quality at a broader scale, are practices relating to air quality at a smaller scale. ASC is showing leadership in issues of air quality through energy use reductions, waste reductions, product reuse, and minimizing the use of potentially hazardous materials, etc (see Table 5.8). All of these activities reduce the amount of greenhouse gas and other pollutants being released into the air. These indirect air quality improvements are in keeping with the number one air quality practice detailed in the Sustainable Slopes charter: “Reducing air pollutants and greenhouse gas emission from buildings, facilities, and vehicles through clean energy and transportation-related measures identified in these principles” [all principles of the charter] (NSAA, 2000: p. 16).

Table 5.8: Observed Progress: Air Dimension

NSAA	ASC	
Sustainable Slopes Environmental Charter Principles	Principle	Practice
18. Air Quality	ASC Policy Statement on Climate Change	<ul style="list-style-type: none"> • Summary of CO₂ emissions per skier calculated (0.027 TONS) for future data analysis and targets • Lighting retrofits account for CO₂ emission savings of 559, 858 annually. • Micro hydro generation at Snowmass • ASC publicly supports the McCain/Lieberman Climate Stewardship Act. • Switched the entire fleet of snowcats to biodiesel reducing hydrocarbon emissions by 20%, and CO₂ and particulate emissions by 10%.

(ASC, 2002-2003: p. 9, ASC, 2003f, ASC 2003g).

In addition to the micro hydro project underway (Figure 5.6), ASC has been experimenting with biodiesel. Based on their findings and reports from the U.S. Environmental Protection Agency (ASC, 2003g) that biodiesel reduces toxic emissions, particulate matter, unburned hydrocarbons, and carbon monoxide emissions, is biodegradable, and is free of sulfur, ASC has switched their entire fleet of snowcats from diesel fuel to biodiesel. The air pollution reductions resulting from this initiative are significant. In an interview with Rick Lofaro (January 21, 2004), Water Quality Coordinator for the Roaring Fork Conservancy, confirmed that this project is one way in which ASC is making progress towards environmental sustainability.

When the air dimension of environmental management at ASC is examined, it becomes evident that ASC has not only implemented the practices and principles detailed in the Sustainable Slopes charter, but ASC has gone beyond the charter by demonstrating leadership with on-site practices and company policies.

5.5.8 Program Indicator Dimension: Aesthetics

Although ASC does not have a principle that addresses issues of visual quality, it is imperative that ASC maintain a visually pleasing environment for guests, and as such ASC is on target with Sustainable Slopes in terms of practicing ‘visual quality’. Ensuring that ASC, as a tourist destination, is aesthetically pleasing is crucial to the company’s success as tourists base much of their tourist experience on the visual quality of a destination. Therefore, it is imperative that ASC maintain a clean and aesthetically pleasing environment in order to guarantee guest satisfaction and to ensure the company’s success. For this reason, ASC is making significant progress towards the aesthetic dimension of Sustainable Slopes.

Table 5.9: Observed Progress: Aesthetic Dimension

NSAA Sustainable Slopes Environmental Charter Principles	ASC	
	Principle	Practice
19. Visual Quality		<ul style="list-style-type: none"> • Adopt-a-highway, ASC employees clean up local highways. • Patrol Headquarters at Aspen Highlands is designed to be invisible– hidden by a cliff • Light pollution is regulated at all new buildings • Long shot trail and others are designed to blend in.

(Schendler, May 4, 2004)

Although not listed in Table 5.9, the following Sustainable Slopes visual quality practices have been implemented by ASC (confirmed by personal field observations and in communications with Auden Schendler, 2004):

- Constructing trails to appear as natural openings,
- Using non-reflective building products and earth tone colours on structures,
- Minimizing ridgeline development where feasible,
- Keeping parking areas free of debris and garbage.

When contacted about visual quality dimensions at ASC, Auden Schendler (May 4, 2004) confirmed that no formal policy exists. He did highlight that as part of ASC’s

green building code ‘blending into the environment’ and not damaging trees during construction lend to visual quality practices at ASC.

Based on the reported visual quality accomplishments at ASC, it becomes self evident that ASC has made significant progress and is on target with the Sustainable Slopes charter.

5.5.9 Program Indicator Dimension: Transportation

“We are in the midst of a two-year phased switch to biodiesel in all company snowcats. Because we burn 260,000 gallons in a ski season, the environmental benefits are enormous. It’s the first time a ski resort has addressed the pollution associated with diesel engines. Other resorts are already following suit” (Pat O’Donnell, President/CEO ASC, 2001-2002a: p.4)

Although all 21 principles of Sustainable Slopes are inextricably linked, transportation more so than the other principles has direct linkages with the energy and air dimensions of the charter. Recognizing the holistic nature of environmental management, ASC has approached transportation related issues in direct relation to energy and air. ASC has implemented the transportation dimension of the Sustainable Slopes charter by not only practicing the ‘options for getting there’ suggested by the NSAA, but also by taking initiatives where transportation, energy, and air quality are concerned.

ASC can provide many examples of transportation related initiatives. For example, on-site employee housing reduces employee commutes and is a good start to reducing the number of cars on local highways. ASC also subsidizes employee bus passes, provides free shuttles for guests between the four mountains (Figure 5.9), is supporting, funding and participating in transit initiatives in the community and the

region, and is currently looking to modernize their existing alternative fuel service vehicle fleet.

Table 5.10: Observed Progress: Transportation Dimension

NSAA	ASC	
Sustainable Slopes Environmental Charter Principles	Principle	Practice
20. Transportation	Continue developing employee transportation programs that provide viable and resource efficient options for getting to work and increase education and outreach efforts to inform employees of transportation options.	<ul style="list-style-type: none"> • On-site employee housing to reduce transportation impacts. • Biodiesel in snowcat fleet • Free skier shuttles

(Aspen Snowmass, 2000: p. 1, Aspen Skiing Company, 2000, NSAA, 2000)

In an interview with Lee Cassin, the Director of the City of Aspen's Environmental Health Department (January 22, 2004), she identified transportation as one of the biggest issues facing the Aspen Community. One of the ways in which the city and ASC collectively address this issue is by working together to facilitate "one of the best transportation systems in Colorado" (Lee Cassin, 2004). The free bus system (Figure 5.9) services all four ski areas as well as several communities in the region. "Tourists and community members alike make use of this transportation method and cars are frequently left at home. In fact, there is very little parking in town and parking fees reflect the fact that taking the bus is favoured" (Cassin, 2004). The public transportation service is a joint public service between the City of Aspen and ASC, whereby the ski company provides funding for the service. The benefits of the service, as described by Lee Cassin, are a reduction of vehicles on local roads and subsequently a reduction in resultant pollutants.

Figure 5.9: ASC Free Skier Shuttle

(Donohoe, 2004)

ASC has made significant progress towards implementing the transportation principle of Sustainable Slopes by working collaboratively with the City of Aspen and other groups, as well as by taking on-site transportation initiatives, and as such, is on target with the Sustainable Slopes charter.

5.5.10 Program Indicator Dimension: Education

“Human history becomes more and more a race between education and catastrophe” (H.G. Wells).

ASC has an extensive education and outreach program. Not only does ASC educate guests and employees about environmental issues, the resort’s education initiatives transcend ski area boundaries (Table 5.11). The environmental education department at ASC is responsible for educating the public about sustainable development while encouraging them to take action. This is accomplished through regularly published articles on sustainable skiing, corporate sustainability, and on-site environmental

research. ASC makes a concerted effort to share what they have learned about environmental management not only with the public but also with other ski areas.

Table 5.11: Observed Progress: Education

NSAA	ASC	
Sustainable Slopes Environmental Charter Principles	Principle	Practice
21. Education and Outreach	Continue to improve outreach and our on-mountain, community and employee environmental education programs.	<ul style="list-style-type: none"> • Enviro-cards educate guests about environmental actions they can take • Internship program for students • Environmental scholarships • Annual employee environmental training • Regularly published articles in academic, industry and business journals • Lectures at local schools and events • On-Mountain nature tours

(Aspen Snowmass, 2000: p. 1, Aspen Skiing Company, 2000, NSAA, 2000)

The newest addition to the environmental department at ASC is the creation of a consulting practice to educate and support other businesses to pursue sustainable development. While there is a cost associated with using the Aspen Sustainability Associates service, it is nonetheless unique to the ski industry. Money earned from consulting is funnelled directly back into the ski company and its environmental programs. The services offered by the Aspen Sustainability Consultants are detailed in Figure 5.10.

Figure 5.10: Services Offered by Aspen Sustainability Associates

<ul style="list-style-type: none"> ✓ Sustainability Reporting ✓ Solid Waste Management ✓ Public Relations ✓ LEED certification ✓ Greening Business Operations ✓ Environmental Management Systems 	<ul style="list-style-type: none"> ✓ Energy Efficiency ✓ Ski Resort and Hotel Specific Issues ✓ Green Design ✓ Renewable Energy ✓ Green Business Presentations ✓ Management Education
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(ASC, 2004: p. 3)

On-site environmental education programs offered at ASC are extensive. All four ski areas have an abundance of educational signs that inform guests about wildlife,

habitat, and environmental programs at ASC. Signs can be found around all four mountains; in the woods, on buildings and structures, and on the chair lifts (Figure 4.2).

In addition to environmental education signage, in partnership with the Aspen Centre for Environmental Studies (ACES, 2004), ASC conducts on-mountain nature tours. Many tours meet at the Environmental Education Centre at Snowmass ski area, and from there guests are led on snowshoe or skis to view local environmental features. These naturalist guided tours (Figure 5.11) are not only an interesting way to tour the mountain, but they have become a permanent daily event at ASC.

Figure 5.11: ASC/ACES On-Mountain Tours Participation Rates

Overall, environmental education and outreach at ASC mountains has been implemented in accordance with the Sustainable Slopes program. ASC has taken initiatives to not only educate guests and employees, but their environmental education

programs have transcended the ski area boundary to reach school children, other industry stakeholders, the business community, and others.

5.6 ASC Summary Assessment

Table 5.12 reports the overall progress of ASC towards sustainable skiing (as modeled by Sustainable Slopes) in all areas of their operations.

Table 5.12: ASC Summary Assessment Matrix

NSAA	ASC	Observed Values
Sustainable Slopes Environmental Charter Principles (Dimensions)	Assessment of Principles, Policies, and Practices	
Planning	ASC has gone beyond the Sustainable Slopes charter, demonstrating leadership with 'green' planning and building.	5
Water Use	Overall ASC is demonstrating leadership with unique projects and initiatives that amount to accrued water savings. While these practices are resulting in reductions in water use, there remains little to report on initiatives that focus on wastewater and treatment.	4
Energy Use	ASC is a leader where energy dimensions are concerned. Principles and practices are in place and future goals include adding new practices to the list of accomplishments.	5
Waste	ASC has made significant progress in implementing this principle and is demonstrating some leadership.	5
Environmental Management	ASC is demonstrating leadership in some areas but in general – is on target with the charter where environmental management is concerned.	4
Air	ASC is demonstrating air and climate change leadership.	5
Aesthetics	Significant progress has been made to implement the aesthetic dimension of Sustainable Slopes	4
Transportation	Significant progress has been made to implement the transportation principle. Some transportation programs are demonstrating industry leadership.	5
Education	ASC's environmental education programs are unique within the ski industry	5

5= Principles implemented/Demonstrating leadership

4= Significant Progress made/On target with Sustainable Slopes Charter

3= Some actions implemented/Showing some initiative – further initiatives required to stay on target with the Sustainable Slopes Charter

2= Investigating, but no actions implemented/has endorsed the Sustainable Slopes Charter

1= No action taken/Not yet started

The Assessment Tool (NSAA 2001) results for all four ASC mountains were not available for comparison with the observed values in Table 5.12. While the self assessed

values contained in the Sustainable Slopes reporting process would have been an ideal source of data, it remains that these reports were not available for review and as such multiple methodology was employed in order to acquire, deduce and present the observed values in Table 5.12. As the Assessment Tool results were unavailable, instead, Schendler, the Director of Environmental Affairs at ASC provided a revue of the observed values and commented on the studies findings. Schendler is the environmental department at ASC and as such, he is responsible for completing the Assessment Tool as well as for writing ASC's annual sustainability reports. As such, he is the only person who can truly assess whether the values observed for ASC in this study amount to an accurate evaluation. His comments on Table 5.12 are as follows:

"I'd rank us lower in waste, probably a three. We're not above average on that front. I'd also probably downgrade us on transportation and aesthetics. Otherwise it [Table 5.12] looks good" (Schendler, June 8, 2004).

He further explains:

"It's just that we're average in those areas. Everybody recycles and there are other resorts doing a better job at it than we are. Transport, OK, we are doing well there, probably deserve a 4. But lots of resorts do similar subsidies of local bus systems and car pool. They may not discount bus passes like we do. Visual impact, I just don't think we're outstanding in that area" (Schendler June 9, 2004).

After reviewing Table 5.12, Schendler agreed with the observed values for all program dimensions but three. For the waste, transportation, and aesthetic dimension of Sustainable Slopes, Schendler suggests that ASC is still in need of improvements. The research conducted in order to evaluate ASC's progress found that although there is always room for improvement, ASC is making significant progress implementing these three dimensions of the charter. This difference may be due to several factors:

- 1) Published materials may not actively reflect true action relating to these dimensions,
- 2) Author error, there is the possibility that observations and data may have been misinterpreted,
- 3) A difference in knowledge and familiarity with ASC management, operations, and progress where transportation, waste and aesthetics are concerned. Schendler is the leading expert on these matters and as such he has a breadth of knowledge that is greater than the author on these dimensions of the Sustainable Slopes charter at ASC, and
- 4) A different scale of reference (Although Schendler was provided with the evaluation criteria, his statement implies a comparative assessment based on the progress of other ski resorts).

Regardless of the reason for the differences, this study found evidence of progress, implementation, and in the case of transportation and waste, evidence of environmental actions that are demonstrating leadership. The observed values presented in this study will not change based on Schendler's reflections, but it may be beneficial in future evaluations of ASC's environmental progress to focus on ways in which these three dimensions can be implemented further in order to improve ASC's self assessment results.

When the values for all 9 program indicator dimensions contained in Table 5.12 are aggregated, ASC's overall evaluation value becomes 4.67. This value indicates that overall, ASC is making significant progress toward the goals of Sustainable Slopes in all dimensions of the charter. Despite having lost some points for not having constructed principles that address specific issues, ASC is without argument a leader when environmental sustainability and sustainable skiing are concerned. ASC demonstrates leadership and provides a role model for other ski areas through actions (as detailed in previous sections of this chapter) but also through publications such as Building Sustainable Resorts: Guidelines for Environmentally Sustainable Design and

Construction of Aspen Skiing Company Buildings (Schendler & Lane), and their assistance in writing Sustainable Slopes.

Statements made as part of the first Sustainable Slopes Annual Report (NSAA, June 2001) reveal that ASC is taking the necessary steps to continue to set a precedent for sustainability. ASC states:

“Our goals in 2001-2002 include doubling annual CO₂ emissions reductions to 700,000 pounds through continued lighting retrofits and implementation of an Energy Management System at the Little Nell Hotel, ensuring that Snowmass Club Phase II development is done in an environmentally responsible manner, reducing water use from snowmaking and its impact on the environment through earthwork halfpipes and storage ponds, switching company copy and printer paper to 50 percent post-consumer stock, publishing our second annual Sustainability Report, switching to oxygenated fuel and re-refined motor oil, increasing employee participation in the Environment Foundation to raise \$150,000 annually, and pursuing the installation of a 25kw wind turbine at one of our mountains” (ASC, as cited in NSAA, June 2001: p. 2-22).

In personal interviews with several key people in the Aspen community and the environmental community, they concurred that ASC is demonstrating environmental leadership. Their statements are summarized in Table 5.13.

Table 5.13: Demonstrating Leadership at ASC

KEY PERSON	STATEMENT ON ASC LEADERSHIP
City of Aspen Director of the Environmental Health Department, Lee Cassin	<p>"Aspen Skiing Company is a leader in terms of Sustainable Slopes. They are showing leadership on all fronts and all issues. The fact that they are measuring their efforts and they are held accountable – their efforts go simply beyond the rewards of PR".</p> <p>"Without a question – in our community, in the ski industry, and as a business in general. They [ASC] are a tough act to follow".</p>
Roaring Fork Conservancy Water Quality Co-ordinator, Rick Lofaro	<p>"In the valley the Ski Company could quite possibly be the environmental leader in terms of scale and magnitude of impacts and environmental programs".</p> <p>"As far as the Aspen Skiing Company, they are the best ski area where environment is concerned that I have seen".</p>
City of Aspen Chief Building Official, Director of Renewable Energy Mitigation Program, Stephen Kanipe	<p>"I would agree the ski company is doing the right thing". "I would like to think that we [ASC and the City of Aspen] are co-leaders environmentally speaking – but the ski company is more public about their record"</p>
Environmental Leadership Program, Colorado Department of Public Health and Environment, Phyllis Woodford - Administrator	<p>"ASC – they are one of 13 companies/organizations in the top tier of our environmental leadership program. Aspen is one of our most progressive/aggressive leadership members and one we are very proud of. So basically, a Colorado Environmental Leader is a company or organization that strives for excellence, goes beyond mere compliance with regulatory requirements, believes in 'doing the right thing' with respect to the environment and is recognized and held out as an environmental leader in Colorado and nationally".</p>
National Ski Areas Association (NSAA) Director of Public Policy, Geraldine Link	<p>"Aspen's Skiing Company's comprehensive and award winning sustainability program serves as a model not only for the ski industry - but for other service-oriented and tourism industries as well."</p>

(Cassin, 2004, Woodford, 2003, Kanipe, 2004, Lofaro, 2004, Link, May 6, 2004)

In addition to statements made by key people, ASC has been given the designation as the 'Most Environmentally Friendly Ski Resort in the West' by the Ski Areas Citizens Coalition (December 2, 2003). Operating under the auspices of Colorado Wild, a conservation group, the group prepares an annual scorecard for ski areas. Through intensive surveying and interviews with ski areas and "the review of a wide body of pertinent documents including, scientific literature and case studies, such as Environmental Impact Statements for Master Development Plan revisions, expansion proposals, Forest Plan revisions; formal biological opinions prepared by the U.S. Fish

and Wildlife Service; as well as marketing, economic, and operational studies prepared by the ski industry, each ski area is graded based on a set of indicators” (Ski Area Citizens Coalition, 2000). The indicators are as follows (Ski Area Citizens Coalition, 2000):

1. Avoiding Ski Terrain Expansion on Undisturbed Land (30 points)
2. Avoiding Construction on Undisturbed Lands (40 points)
3. Avoiding Real Estate Development or Development Agreements on Undisturbed Land
4. Avoiding Parking Lot Construction on Undisturbed Land
5. Avoiding Road Construction on Undisturbed Land
6. Avoiding New Day Lodge Construction on Undisturbed Land
7. Avoiding Impacts to Threatened, Endangered or Candidate Animal, Plant and Aquatic Species (22 points)
8. Avoiding Terrain Alteration in Environmentally Sensitive Areas (30 points)
9. Avoiding Wetland Areas
10. Avoiding Old Growth
11. Avoiding Blasting Unique Geological Formations
12. Avoiding Roadless Areas
13. Avoiding New Snowmaking (20 points)
14. Avoiding Quantifiable Water Degradation (12 points)
15. Environmental Policy Positions & Public Disclosure (10 points)
16. Wildlife Habitat, Forest and Stream Protection (20 points)
17. Recycling, Water Conservation, Energy Conservation, Pollution Reduction (17 points)
18. Traffic and Emissions Reduction (13 points)

The letter grade granted to each ski area is based on the methodology presented in Figure 5.12. The points attained for each indicator are based on a scale system whereby resorts are granted points for completing environmental management tasks.

Figure 5.12: Ski Area Citizens Coalition Scorecard Methodology

<p style="text-align: center;">Numerical Score = $\frac{\text{Total points attained}}{\text{Total points (214)}} * 100\%$</p>	
<p style="text-align: center;">Letter Grade:</p>	
<p style="text-align: center;">A = 75 - 100%</p>	
<p style="text-align: center;">B = 60 - 74.9%</p>	
<p style="text-align: center;">C = 50 - 59.9%</p>	
<p style="text-align: center;">D = 40 - 49.9%</p>	
<p style="text-align: center;">F = Less than 39.9%</p>	

(Ski Area Citizens Coalition, 2000)

ASC, for several consecutive years has undergone this rigorous evaluation process and all ASC ski areas have been given a grade of A with the exception of

Snowmass which received a grade of B due to proposed development plans (Ski Area Citizens Coalition, 2003). This 'scorecard further validates the findings of this study – that ASC is demonstrating environmental leadership within the ski industry.

ASC, in many cases, goes above and beyond not only legislative and industry standards but also those standards (practices) suggested by the NSAA's Sustainable Slopes Environmental Charter (June 2000). ASC has recognized the need to take on environmental leadership roles that are separate from profits, roles that are sustainable in and of themselves without any commercial advantage. ASC is without a doubt the ski area to watch for new environmental ideas for the whole of the ski industry.

After evaluating the degree to which ASC is making efforts to implement the goals of the Sustainable Slopes charter, it becomes self evident that ASC has made significant progress towards the goals of the charter in all dimensions. In many cases ASC is demonstrating leadership by going beyond those goals to set an example within the local community, the ski industry, and the business community at large. This leadership has been confirmed by key people in the local community and in the environmental community.

CHAPTER 6: A Comparison of the North American Ski Industry and the Aspen Skiing Company

In Chapters 4 and 5, it was concluded that the North American ski industry is making some progress in implementing the Sustainable Slopes charter and that at least one ski area, ASC is making significant implementation progress.

This chapter will examine the differences between the whole of the ski industry as represented in the NSAA's Annual Reports and the case study ski area: ASC. Included in the analysis will be a discussion pertaining to the motivation for implementation, the possible reasons for differences in implementation progress, and the ways in which the industry as a whole can continue to make implementation progress.

6.1 The Results

Table 6.1 presents the complete evaluation matrix. In this table all annual reported or observed values are recorded. The last row of the table contains an aggregated value for each year. This numerical value is a representation of the average value of all 9 principle dimensions for that year.

From Table 6.1, it may be extrapolated that in all principle dimensions, values remained the same or improved for both study groups with the exception of 2002 for the ski industry (reasons for which have been discussed in Chapter 4). This forward momentum implies that Sustainable Slopes is an impetus for change in the ski industry. No longer are North American ski areas simply considering environmental action, but North American ski areas are now demonstrating some environmental initiative and are

taking some action to implement the Sustainable Slopes charter. Even more encouraging is the continued change observed both with ASC and the ski industry. In both cases, the aggregated values increased, indicating that more 'options for getting there' are being implemented overall.

6.2 Reporting Change

When the rates of change are examined, it further validates the findings of this study, indicating that the North American ski industry is making progress in implementing the charter. This means that since the program's inaugural year approximately 16, or 18.6% of reporting resorts have reported improvements. This means that 16 resorts reported an improvement in one program dimension that is equal to one numerical value. For example, a resort may have reported an improvement from a 3 to a 4 for education. See Table 4.14 for the rate of change calculations and formulas.

While calculating a rate of change for ASC is not possible for comparison (given the data), it remains clear that ASC continues to take environmental action. In four of nine program dimensions ASC increased by a value of 1. This is not to say that no action occurred in the remaining five program dimensions, actions were being undertaken, but as a result of high observed scores in 2002, it becomes difficult to improve on a score of 4 or 5. In future, as ASC continues to improve upon already high values, a calculation of change may not be possible using this scale. In future, the monitoring and reporting process associated with Sustainable Slopes may require modification to accommodate the reporting of continued environmental accomplishments for those resorts who have already reported that the program has been implemented at their destination.

Comparing change between ASC and the North American ski industry becomes difficult as no rate of change can be calculated for ASC. For this reason comparisons will not be made other than to say that in both cases, the North American ski industry and ASC, changes occurred in a positive direction, resulting in progress towards the goals of the Sustainable Slopes charter.

Table 6.1: North American Ski Industry and Aspen Skiing Company Evaluation Results

Program Indicator Dimension		Program Indicator	Reported Value: Self Assessed Progress Level			Aspen Assessment	
			North American Ski Industry			Case Study: ASC	
			2001	2002	2003	2002	2003
1	PLANNING	Planning, design, construction	3.63	3.74	3.91	5	5
2	WATER	Water use for snowmaking	3.37	3.51	3.58	4	4
		Water use for facilities					
		Water use for landscaping and summer activities					
		Water quality management					
3	ENERGY	Wastewater management	3.02	3.07	3.17	5	5
		Energy use for facilities					
		Energy use for snowmaking					
		Energy use for lifts					
4	WASTE	Energy use for vehicle fleets	3.34	3.37	3.52	5	5
		Waste reduction					
		Product reuse					
		Recycling					
5	ENVIRONMENTAL MANAGEMENT	Potentially hazardous waste	3.55	3.41	3.65	3	4
		Fish and wildlife					
		Forest and vegetative management					
		Wetlands and riparian areas					
6	AIR	Air quality	3.32	3.28	3.45	4	5
7	AESTHETICS	Visual quality	3.71	3.74	3.79	4	4
8	TRANSPORTATION	Transportation	3.22	3.38	3.43	4	5
9	EDUCATION	Education and outreach	3.03	3.09	3.39	4	5
		Aggregated Annual Values	3.35	3.40	3.54	4.22	4.67

6.3 Comparing the North American Ski Industry to ASC

In Table 6.1, it becomes visually evident that ASC overall, is ahead of the North American ski industry in terms of progress made to implement the Sustainable Slopes charter.

When examining the year 2003, it becomes clear that for all program dimensions, ASC is in most cases, one full point value ahead of the industry (ASC leads the industry in all 9 program dimensions). This is further illustrated when comparing aggregated values for the same year. In the year 2003, ASC has an observed value of 4.67 while the industry has a reported value of 3.54, a difference of 1.32. While some of this difference may be due to differences in reported and observed values, or self-assessment values versus author assessed values, it remains that on all fronts ASC is demonstrating industry leadership in implementing the Sustainable Slopes charter.

6.4 Accounting for Differences

There may be many reasons for the observed differences in implementation progress for the North American Ski industry and the case study: ASC. While no one reason is responsible for the difference, what is believed to be the most significant reason will be discussed at length in this section.

The most significant reason for the observed differences is directly related to ski area ownership, management structure, and operating mandates. When asked to comment on the company's success at implementing the Sustainable Slopes charter, Auden Schendler (January, 2004), Director of Environmental Affairs at ASC, responded by stating that regardless of the Sustainable Slopes program, ASC would have met the goals of the charter. As part of the company's mandate, these goals are part of 'business

as usual', and as such the company's corporate policy dictates that environmental leadership is part of the company's operations.

For a portion of the North American ski industry, adopting a 'green' approach to business is done only when it promises profits. While the profits resulting from the implementation of the Sustainable Slopes program do not seem direct, there are many ways in which ski areas can better their bottom lines. Savings resulting from accrued energy conservation savings or waste reductions are examples of direct impacts on ski area operating budgets. Examples of non-direct beneficial impacts of implementing Sustainable Slopes are more difficult to define but include increased revenue from environmental conscious consumers (Robinson, CEO of Mountain Equipment Co-op, as cited in Weinberg, 2001: p. 12) and savings accrued from product re-use.

Recognizing that the benefits of environmental management do not always mean savings, that they often mean expenditures, ASC has taken the formal position that 'It is the right thing to do'. ASC has a management team that has a history of environmental advocacy, as well as company owners who are willing to support environmental initiatives (Sanders, 2002: p. 2, Centrella, Hecox, & Packard, 2003: p.5). For this reason company environmental leadership has become a key operating principle (See Tables 5.2 and 5.3).

The fundamental difference between ASC and other resorts of the North American ski industry is that ASC recognizes that not every environmental action is profitable and as such they state that "Aspen Skiing Company is a leader in green business practices, and one thing we've learned is that you can't be a leader in this field without a moral mandate" (Schendler, 2002: p. 28). It is values-based business and this

moral mandate to be an environmental leader that sets this ski area apart from the rest of the industry. ASC takes environmental action because it is simply the 'right thing to do' (Pat O'Donnell, CEO, ASC, as cited in Schendler, 2002: p. 28). This moral mandate has recently been recognized by the Colorado Ethics in Business Alliance (2004). ASC was honoured as recipient of the 2004 Colorado Ethics in Business Award. The recipient of this award must meet the following selection criteria:

- Integrity in organizational activities such as product development, manufacturing, human resources management, sourcing, marketing, etc.,
- Innovative partnering with other businesses, non-profits and/or government entities,
- Effectively integrating the program or effort into the firms' culture,
- Exceeding what is required by law and/or industry standards,
- Colorado centered effort (unique programs delivered in Colorado),
- High program impact relative to available resources,
- Innovative, creative approaches - internally and/or focused on the external community,
- Effort shows vision, courage, conviction - risks were taken to maintain ethical values,
- Ethical treatment of others (customers, clients, employees, volunteers, peers, etc.).

In an article entitled Where's the Green in Green Business?, Schendler (2002: p. 28) states that 'If sustainability were cheap and easy, most businesses would have achieved it by now....There isn't always a financial return on investment (despite what most consultants claim), and if there is, it may be so far out that it's unacceptable to most CEOs'. The truth remains that corporations are profit driven and environmental efforts that negatively impact profits rarely manifest in business.

The relationship between ethics and business has long been a topic that solicits heated debates. True capitalism separates ethics from profit, while companies such as Patagonia (Patagonia, 2004), Mountain Equipment Co-op (Weinberg, 2001: p. 7), Toyota

(Schendler, 2002, Toyota, 2004), and ASC are demonstrating that values-based business can continue to be profitable.

While it cannot be said that the ski industry is not taking action as a result of lacking values, this may in fact explain the differences in numerical values between the industry and ASC in the evaluation matrix. While ASC reports that implementation success is due entirely to its moral mandate and actions, the North American ski industry is still divided in terms of reporting what motivates them to take environmental action.

Table 6.2: Potential Benefits from Fully Implementing the Sustainable Slopes Principles

Principle	Increased Monetary Savings	Reduced Environmental Impacts	Reduced Regulatory Liability	Increased Positive Public Image
Planning, Design, and Construction	1.83	2.56	2.00	2.53
Water Use For Snowmaking	2.24	2.42	2.16	2.16
Water Use for Facilities	1.89	2.29	1.67	2.22
Water Use for Landscaping and Summer Activities	1.83	2.39	1.74	2.35
Water Quality Management	1.41	2.45	1.93	2.34
Wastewater Management	1.54	2.30	1.95	2.14
Energy Use for Facilities	2.51	2.38	1.65	2.37
Energy Use for Snowmaking	2.29	2.16	1.66	2.05
Energy Use for Lifts	2.13	2.13	1.75	2.17
Energy Use for Vehicle Fleets	2.02	2.31	1.55	2.22
Waste Reduction	1.78	2.37	1.54	2.34
Product Re-use	1.85	2.32	1.51	2.17
Recycling	1.78	2.33	1.65	2.35
Potentially Hazardous Wastes	1.71	2.43	2.29	1.93
Fish and Wildlife	1.42	2.29	1.71	2.34
Forest and Vegetative Management	1.43	2.37	1.90	2.30
Wetlands and Riparian Areas	1.50	2.36	2.05	2.36
Air Quality	1.45	2.40	1.83	2.19
Visual Quality	1.45	2.45	1.76	2.45
Transportation	1.54	2.20	1.59	2.27
Education and Outreach	1.44	2.14	1.67	2.51
Overall	1.79	2.31	1.74	2.28

For Principles where resorts self-assessed scores were lower than a 3 (indicative of limited progress) the resorts were asked to rate the potential benefits of implementation based on the scale below:

1=low potential benefit 2=medium potential benefit 3=high potential benefit

Table 6.2 illustrates that while reduced environmental impacts and increased positive public image are named as the most positive potential benefits resulting from implementing the charter, it remains that increased monetary savings continues to be a large contributing factor to ski area environmental decision making.

While the conclusion that moral responsibility distinguishes environmental leaders is not a new concept in the field of corporate sustainable development, taking corporate environmental action because of a moral mandate is rare in business. ASC claims as much, and as such, this study concludes that ASC's values-based business operations and its moral mandates are what distinguish ASC as distinct within the North American ski industry in terms of progress made in implementing the Sustainable Slopes charter. ASC is a leader in implementing the Sustainable Slopes charter, and considered more broadly, ASC is a leader in terms of corporate sustainability and sustainable tourism (see Table 5.13).

Moral mandate alone may explain ASC's progress to date, but it does not explain the progress made to date by the ski industry as a whole; in fact it is what distinguishes the industry and its progress as distinct. The industry reports that benefits resulting from program implementation include positive environmental impacts and improved public perception. These benefits, and the fact that the industry has identified them as the most positive indicates that although the ski industry does not have the strength of an environmental mandate it is not entirely free of moral obligations. This is evidenced simply by the number of resorts endorsing the charter, and the number of resorts reporting progress.

In terms of progress rate, as Schendler implies (2002: p. 28) the costs and efforts associated with sustainable skiing impede progress in this direction. While both are valid reasons for slow progress, it remains that progress is being made despite these impediments, and that motivations for change are likely due to the industry's desire to improve their environmental record. While the motivation for doing so may be directly related to their profit margins (employing green marketing tools to increase revenue, etc.) – it remains that the industry as a whole, regardless of the force driving the change, is making progress in implementing the Sustainable Slopes charter.

6.5 Summarizing the Findings

While environmental ethics can not explain environmental action in its entirety, it certainly is one driving force for progress to varying degrees. In the case of the North American ski industry and ASC, environmental ethics appear to be a driving force for progress. The distinction between the study groups is that the ski industry continues to be influenced by financial considerations while ASC is influenced to a much lesser degree by profits (or in a different way) and more so by their obligation to 'do the right thing'.

Regardless of the reasons for the differences, it was the objective of this study to report on the progress of the ski industry in implementing Sustainable Slopes: the Environmental Charter for Ski Areas. To date, the industry has made some implementation progress (Table 6.2) and as a result, they are taking action to improve their environmental record and have a positive impact on their environments. Some ski areas are demonstrating progress at a different rate than others, as illustrated by the case study: ASC (Table 6.2). Reasons for differences in implementation progress appear to

relate directly to financial considerations and the strength of a ski area's environmental ethics.

As illustrated in Chapter 5 and Table 6.2, ASC demonstrates environmental leadership within the ski industry and in a broader context, the tourism industry. As a result, ASC sets the contemporary standard for sustainable skiing in North America. Ski area operators can look at the accomplishments of ASC, as reported in the NSAA's Annual Reports (2001, 2002, 2003) and many other publications, as a way in which they can model their own environmental management policies, plans, and actions. By looking to industry leaders for guidance North American ski areas can continue to make progress towards the goals of the charter and develop their own leadership based environmental actions. In this way, the ski industry can continue to report progress towards the goals of Sustainable Slopes in the future.

CHAPTER 7: Conclusions

The North American ski industry has responded to criticism about its environmental performance with the creation of Sustainable Slopes: the Environmental Charter for Ski Areas (NSAA, 2000). The program's detailed model for sustainable skiing has provided the ski industry with a framework from which environmental actions can be modelled. While the NSAA's charter can not assume full responsibility for environmental progress taken since its creation, it can be concluded that it has provided impetus for environmental action within the industry.

To date, the ski industry is making some progress towards the goals of the charter. The trend analysis shows that ski areas, over three years have continued to make efforts to implement the charter and improve their environmental performance. Variances in implementation rates between program dimensions and years occur and reasons for such variances have been discussed previously.

The variance of most significance is identifiable when comparing the case study: Aspen Skiing Company to the North American ski industry. The case study illustrates that the ski industry is capable of making significant (as defined in Table 3.3) progress towards the goals of Sustainable Slopes. ASC to date has made significant progress and continues to take action to improve their environmental record, while the North American ski industry as a whole has yet to report this level of progress. The case study also illustrates that differences in implementation rates do occur between resorts. The reasons

for the differences include the location of the resort, the number of skier visits annually, the operating budget of the resorts, and the size of the operation. This case study also brought to light that environmental ethics play a crucial role in the sustainable skiing process. Differences in implementation rates and environmental performance records can be partly attributed to the importance of environmental ethics at individual ski areas. In the case of ASC, a moral mandate where the environment is concerned is what defines the environmental performance differences between this ski area and the North American ski industry.

This difference becomes meaningful when applied to the industry itself. As the ski industry continues to work towards sustainability, in future, significant (as defined in Table 3.3) progress will not occur in the absence of environmental ethics. Simply endorsing the Sustainable Slopes charter is not enough to improve a ski areas environmental record or reduce their impact on the environment. The case study demonstrates that a moral mandate to be environmentally responsible is a crucial component of sustainable skiing.

As a result of this finding, the definition of 'Sustainable Skiing' presented in Chapter 2 must be modified in order to reflect this new understanding of the relationships between the ski industry and environmentally sustainable development. The definition has been modified in Table 7.1.

Table 7.1: Sustainable Skiing

Sustainable skiing means achieving a particular combination of numbers and types of visitors, the cumulative effect of whose activities at a given ski destination, together with the actions of the ski resort and servicing businesses, can continue into the foreseeable future without damaging the quality of the environment on which the activities are based.

Operating under the auspices of an environmental ethic, ski areas must create formal environmental policies and management plans, and monitoring and reporting systems must be put in place in order to track progress towards the goals of the management plan. Plans and policies must include provisions for the maintenance, preservation and protection of ecological processes as well as the inclusion of stakeholders in the decision and reporting processes at ski destinations.

The NSAA (2000: p. 1) repeatedly states that ‘the environment is the ski area’s number one asset’. The future of the ski industry is directly dependent on the health of the environment and as such, the ski industry must continue to make progress to implement the goals of Sustainable Slopes and take action to improve the state of the environment. The next step for sustainable skiing may include more resorts endorsing the charter, resorts continuing to implement the goals of the charter, and ski areas assuming an environmental ethic and integrating it into their management frameworks. In future, the Sustainable Slopes charter and its accompanying monitoring program will require continuing improvements as sustainable skiing evolves and North American ski areas continue to implement the charter. These changes may include:

- A move towards a more sophisticated model for reporting that accounts for continued improvements where implementation has already been reported,
- The modification of vague verbal guidelines that include statements such as ‘where possible, where practical, where feasible, and where appropriate’.
- The creation and subsequent monitoring of progress towards tangible goals and/or environmental indicators such as reducing industry air pollution by 1%, and the industry wide purchase of renewable energy amounting to 1% of individual ski area energy purchases.

If given the opportunity to conduct this study again, there are several things that could have been accomplished differently. The first and most important of which is in regards to the North American ski industry data. The questions of validity concerning this data, though mitigated for the purpose of this study, could have been improved upon if the original data sets were made available. While this was not possible in this case, soliciting the assistance of several key ski areas to complete an assessment (secondary to that for the NSAA's Annual Reports) for review would have helped to shed further perspective on the data. This data would have provided a sampling of the original data set and as a result it would have strengthened the aggregated data used in this study.

With regards to the case study, one week was spent in Aspen, Colorado completing the field component of this study. This time was limited by many factors and as a result, the number of people interviewed was also subsequently limited. In addition, participant observation was severally limited by time so that limited environmental actions were observed during this time frame. As previously stated, the lack of a recorded positive observation did not necessarily mean that environmental actions were not being taken, simply that it was not observed during the duration of field observations. Extending the length of time allotted for field work would have greatly improved upon the data gathered on-site at ASC.

In conclusion, the North American ski industry is improving its environmental record by implementing Sustainable Slopes: the Environmental Charter for Ski Areas. While the charter itself is not entirely responsible for environmental improvements since its inception, it is responsible for providing momentum for change. The charter and its accompanying monitoring and reporting system have ignited an industry wide desire to

improve environmental performances not only for the sake of profit margins, but for the sake of the environment itself.

Future research in the area of 'Sustainable Skiing' would benefit from following the North American ski industry's progress towards environmental sustainability. As this study was limited to three years of program implementation data, a study of greater scope, one that examines the ski industry over a longer time frame may prove useful in understanding the impediments to sustainable skiing that the industry is facing and the reasons for differences in progress success.

APPENDIX

A1: Principle Implementation Status by Resort Size 2003

Principle	0-100,000	100,000 - 250,000	250,000 - 500,000	> 500,000	Avg. All Resorts
Planning, Design, and Construction	3.33	3.63	4.21	4.18	3.91
Water Use For Snowmaking	3.63	3.48	3.87	3.64	3.67
Water Use for Facilities	2.71	3.36	3.63	3.54	3.36
Water Use for Landscaping and Summer Activities	3.43	3.53	4.06	3.70	3.72
Water Quality Management	3.07	3.95	3.93	3.77	3.73
Wastewater Management	2.64	3.50	3.63	3.69	3.43
Energy Use for Facilities	2.79	3.27	3.56	3.85	3.38
Energy Use for Snowmaking	2.71	3.19	3.45	3.55	3.31
Energy Use for Lifts	2.71	2.45	2.74	3.08	2.73
Energy Use for Vehicle Fleets	2.93	3.05	3.41	3.62	3.25
Waste Reduction	3.14	3.50	3.59	3.62	3.48
Product Re-use	2.86	2.91	3.26	3.15	3.06
Recycling	3.36	3.05	3.63	3.77	3.43
Potentially Hazardous Wastes	3.64	4.09	4.30	4.18	4.12
Fish and Wildlife	3.07	3.27	3.85	3.77	3.52
Forest and Vegetative Management	3.36	3.36	3.93	3.85	3.65
Wetlands and Riparian Areas	3.43	3.38	4.00	4.00	3.78
Air Quality	3.07	3.05	3.81	3.85	3.45
Visual Quality	3.50	3.68	4.00	3.85	3.79
Transportation	2.79	3.18	3.67	4.00	3.43
Education and Outreach	2.86	3.09	3.74	3.77	3.39

Resort size based on the number of skier visits annually.
 (NSAA, 2003: p. 2-9)

A2: Average Principle Implementation Status by Region and Overall 2003

Principle	CR	CN	MA	MW	NE	NR	PN	SE	SI	All
Planning, Design, and Construction	3.87	4.00	3.40	3.33	4.33	4.00	3.83	3.00	4.18	3.91
Water Use For Snowmaking	3.43	4.00	4.00	3.33	3.83	3.80	3.67	3.75	3.55	3.67
Water Use for Facilities	3.44	3.00	3.80	2.67	3.71	3.36	3.10	3.25	3.17	3.36
Water Use for Landscaping and Summer Activities	3.75	3.50	3.50	3.00	4.11	4.00	3.67	3.67	3.45	3.72
Water Quality Management	3.88	3.50	4.00	2.67	3.93	4.00	3.20	3.75	3.67	3.73
Wastewater Management	3.56	2.50	3.60	2.67	3.93	3.55	3.30	4.25	2.67	3.43
Energy Use for Facilities	3.75	3.00	3.40	2.00	3.57	3.36	3.20	3.25	3.25	3.38
Energy Use for Snowmaking	3.27	3.50	3.20	2.00	3.64	3.50	4.00	3.25	3.09	3.31
Energy Use for Lifts	3.19	3.00	2.80	1.00	2.86	3.00	2.50	2.25	2.42	2.73
Energy Use for Vehicle Fleets	3.25	3.00	3.40	1.67	3.43	3.27	3.30	3.00	3.42	3.25
Waste Reduction	3.88	3.00	3.80	2.67	3.00	3.18	3.50	3.25	3.33	3.48
Product Re-use	3.50	3.50	3.20	2.00	3.00	2.91	2.80	3.25	3.00	3.06
Recycling	3.88	3.00	3.20	3.00	3.36	3.36	3.20	3.50	3.42	3.43
Potentially Hazardous Wastes	4.44	3.50	4.00	4.00	4.07	4.25	3.70	3.75	4.25	4.12
Fish and Wildlife	3.75	3.00	3.20	2.67	3.71	3.64	3.50	3.25	3.42	3.52
Forest and Vegetative Management	3.88	3.50	3.80	2.67	3.64	3.64	3.80	3.00	3.67	3.65
Wetlands and Riparian Areas	4.15	4.00	3.00	3.50	3.90	4.11	3.25	3.00	3.50	3.78
Air Quality	3.69	3.00	3.60	3.33	3.57	3.36	3.10	3.00	3.58	3.45
Visual Quality	3.81	4.00	3.60	4.00	3.71	4.00	3.60	3.75	3.83	3.79
Transportation	3.69	3.50	3.20	1.33	3.57	3.45	3.20	3.00	3.83	3.43
Education and Outreach	4.00	3.00	3.00	1.67	3.36	3.45	3.20	3.25	3.42	3.39

NE – Northeast (Maine, Vermont, New Hampshire, Connecticut, Massachusetts, Rhode Island)

MA – Mid-Atlantic (Pennsylvania, New Jersey, New York)

SE – Southeast (Virginia, West Virginia, North Carolina, South Carolina, Tennessee, Georgia)

MW – Midwest (North Dakota, South Dakota, Nebraska, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Indiana, Michigan, Ohio)

CR – Central Rockies (Colorado, New Mexico)

NR – Northern Rockies (Idaho, Montana, Wyoming, Utah)

PN – Pacific Northwest (Washington, Oregon, Alaska)

SI – Sierras (California, Nevada, Arizona)

CN – Canada

NSAA, 2003: p. 2-6

A3: Interview Questionnaire Outline

Auden Schendler

Director of Environmental Affairs

Aspen Skiing Company

Aspen Colorado

Sample Interview Questions

1. What would have occurred at Aspen in the Absence of Sustainable Slopes?
2. Have any major costs been associated with the implementation and monitoring of the Sustainable Slopes Program at Aspen?

ASPEN SKIING COMPANY ENVIRONMENTAL PERFORMANCE

Aspen is proud of its environmental record. Has it always been this way? Was there a time when it wasn't so?

What steps has ASC taken to become to strengthen its environmental performance?

What are ASC's most difficult environmental problems?

What would you say is ASC's greatest environmental accomplishment?

How does ASC benefit from investments in environmental programs? (Prompts) Is it increased monetary savings, reduced environmental impacts, reduced regulatory liability, increased positive public image, or another benefit?

How do the visitors and clients of ASC benefit from environmental programs?

What are the main barriers to you in achieving your environmental goals?

How do you tackle these obstacles?

What remaining opportunities do you have to become more environmentally sustainable?

How do ASC's environmental programs set ASC apart from other ski areas?

Many believe that ASC is the industry leader where environmental performance is concerned. What simple advice would you offer to other ski area managers to improve their environmental record?

SUSTAINABLE SLOPES

How long has Aspen Skiing Company (ASC) endorsed the Sustainable Slopes Charter?

In your opinion, why was Sustainable Slopes created?

What role did ASC have in the creation of this program?

Who else played an important role in the creation of this program?

How has Sustainable Slopes altered the way in which you manage ASC environmentally?

SUSTAINABLE SLOPES REPORTING

Sustainable Slopes contains a set of 21 principles. Do you think that this list is sufficient for 'greening' a ski area'?

If not what would you add?

What would you drop and why?

What are the main barriers to you in achieving all the goals of the Sustainable Slopes Charter?

Which principle is the most important and why?

Which other principles are the most important to ASC?

In what areas (of the 21 outlined by the charter) has ASC excelled?

In what area(s) do you think ASC needs to direct more attention to in the future and why?

Are there any principles that do not apply to ASC? Can you tell me why?

Can you give me a few specific examples of the way in which your ski area has supported the principles of the charter?

Can you estimate your overall level of implementation in meeting the intents of the principles? Scale of 1 to 5 (1 being no action – 5 being implementation). The scale is the same as that used by the National Ski Areas Association.

Can you do that for each of the 21 principles? (Provide list of principles and a scale of 1 thru 5).

In the future as the operations of ASC continue to develop and expand what changes will have to be made to your environmental management strategy to ensure that ASC continues to operate sustainably?

What advice do you have to offer resorts that are just beginning to consider the environment in their management approach?

Other specific questions will be posed in an open discussion with the participant. The topics to be discussed may include:

- Planning, Design and Construction
- Water Resources
- Wastewater management
- Energy use
- Snowmaking
- Waste Management
- Fish and Wildlife
- Forest and Vegetative Management
- Wetlands and Riparian Areas
- Air Quality
- Visual Quality
- Transportation
- Environmental Education and Outreach

Discussion regarding ASC's new CONSULTING COMPANY

Discussion on X-GAMES at ASC

Open Discussion

A4: Interview Questionnaire Outline

Lee Cassin

Director Environmental Health Department

City of Aspen

Aspen, Colorado

General Background:

Can you tell me briefly about the City of Aspen Environmental Health Department?

How long have you been with the city?

What exactly are you responsible for?

Knowledge of Aspen Skiing Company:

In our email correspondence you mention that many of the city's programs are based on those of the Aspen Skiing Company (ASC). Can you tell me about this?

Which programs in particular?

How does ASC contribute to the city's ongoing sustainability efforts?

In your experience what are the key ski industry environmental issues?

In your experience is ASC making attempts to address these issues? Can you provide further examples?

As Director of the Environmental Health Department can you confirm or deny that ASC is working towards environmental sustainability? Can you provide any examples?

In your professional opinion would you consider ASC an environmental leader? Why?

Open questions related to:

EXAMPLES OF ASPEN SKIING COMPANY ENVIRONMENTAL INITIATIVES

Water Resources

Waste Management

Fish and Wildlife and Forest and Vegetative Management

Open Dialogue pertaining to:

SUSTAINABLE SLOPES

Open Discussion

A5: Interview Questionnaire Outline

Rick Lofaro

Water Quality Co-ordinator
Roaring Fork Conservancy
Basalt, Colorado

General Background:

Questionnaire relating to Mr. Lofaro's background.
Open discussion of the Conservancy's agenda and accomplishments.

Community Stakeholders

Discussion of ASC's Community Environmental Advisory Committee (CEAC).

Examples of Ski Area Environmental Progress

Discussion of Mr. Lofaro's knowledge of ASC's environmental activities.

ASC PARTNERSHIPS AND CONTRIBUTIONS TO THE CONSERVANCY

Discussion of ASC's relationship with the Roaring Fork Conservancy.

Discussion regarding the following: THE MOST PRESSING ENVIRONMENTAL ISSUES FOR SKI AREAS TODAY AND IN THE FUTURE?

ASC

In your professional opinion would you consider ASC an environmental leader? Why?

Discussion of ASC's activities in the community, at large, on larger scale environmental issues.

Open discussion of Mr. Lofaro's knowledge of Sustainable Slopes and ASC's progress towards the goals of the charter.

Discussion of the prominence of Sustainable Slopes in the community. Does ASC market this program and report their success to the community?

A6: Interview Questionnaire Outline

Stephen Kanipe
Chief Building Official
Director of REMP – Renewable Energy Mitigation Program
City of Aspen
Aspen, Colorado

General Background:

Can you tell me briefly about REMP?

How long have you been with the city?

What exactly are you responsible for?

Knowledge of Aspen Skiing Company:

Discussion of partnerships and relationships existing between ASC and the City of Aspen

In our email correspondence you mention that many of the city's programs are based on those of the Aspen Skiing Company (ASC). Can you tell me about this?

Where has the Aspen Skiing Company shown environmental leadership on planning, design and construction? Can you provide examples?

In your experience what are the key ski industry environmental issues?

In your experience is ASC making attempts to address these issues? Can you provide further examples?

As Director of the Environmental Health Department can you confirm or deny that ASC is working towards environmental sustainability? Can you provide any examples?

In your professional opinion would you consider ASC an environmental leader? Why?

Are you aware of the Sustainable Slopes program? Can you provide commentary on the program, or on ASC's progress towards the program's goals?

A7: Participant Observation Framework

<u>Indicator Dimension</u>	<u>KEY CRITERIA SAMPLE*</u>	<u>Observed (Yes)/Not observed (No)</u>
Planning	<ul style="list-style-type: none"> • Incorporating green building principles, such as using energy, water and material efficiency techniques and sustainable building practices • Engaging stakeholders collaboratively on the siting of improvements and the analysis of alternatives • Using long-life, low maintenance materials in building 	
Water	<ul style="list-style-type: none"> • Installing water storage facilities to recapture snowmelt runoff for reuse • Using appropriate technology and equipment to optimize efficiency 	
	<ul style="list-style-type: none"> • Installing water efficient equipment in facilities such as low-flow faucets and toilets • Conducting water use audits and investigating methods and alternatives technologies to reduce water consumption 	
	<ul style="list-style-type: none"> • Watering at appropriate times to minimize evaporation • Using drought tolerant plants in landscaped areas 	
	<ul style="list-style-type: none"> • Participating in watershed planning, monitoring and restoration efforts 	
	<ul style="list-style-type: none"> • Connecting septic systems to municipal wastewater systems 	
Energy	<ul style="list-style-type: none"> • Purchasing green power, such as wind-generated power from energy providers • Auditing current usage levels, and targeting areas for improvement 	
	<ul style="list-style-type: none"> • Using high efficiency snow guns and air compressors for snowmaking operations • Using on mountain reservoirs and ponds to gravity feed snowmaking systems where possible 	
	<ul style="list-style-type: none"> • Using renewable energy sources 	
	<ul style="list-style-type: none"> • Providing shuttles or transportation for guests and employees 	
	<ul style="list-style-type: none"> • Using energy efficient vehicles 	
Waste	<ul style="list-style-type: none"> • Conducting an audit of waste production to establish a baseline and track progress toward reduction 	
	<ul style="list-style-type: none"> • Using washable or compostable tableware/silverware in cafeterias and lodges • Composting food wastes, grass clippings, and woody debris for use in landscaping and revegetation areas 	
	<ul style="list-style-type: none"> • Recycling office paper, cardboard, newspaper, aluminium, glass, plastic and food service waste 	
	<ul style="list-style-type: none"> • Safely storing and disposing of potentially hazardous materials such as solvents, cleaning materials, pesticides and paints 	

<u>Indicator Dimension</u>	<u>KEY CRITERIA SAMPLE*</u>	<u>Observed (Yes)/Not observed (No)</u>
Environmental Management	<ul style="list-style-type: none"> • Supporting and participating in research of fish and wildlife populations and their interactions with ski areas 	
	<ul style="list-style-type: none"> • Revegetating disturbed areas as quickly as possible following disturbance • Provide signage to inform guests of sensitive vegetation areas 	
	<ul style="list-style-type: none"> • Engaging in restoration, remediation and protection projects • Inventorying and monitoring wetland and riparian areas 	
Air	<ul style="list-style-type: none"> • Reducing air pollutants and greenhouse gas emissions from buildings, facilities and vehicles through clean energy and transportation related measures 	
Aesthetics	<ul style="list-style-type: none"> • Designing lifts and buildings to blend into the natural backdrop or complement the natural surroundings 	
Transportation	<ul style="list-style-type: none"> • Supporting and participating in transit initiatives in the community and region • Offering and promoting carpooling incentives for guests such as discounts or preferred parking 	
Education	<ul style="list-style-type: none"> • Partnering with local school systems, businesses, and the public on initiatives and opportunities for protecting and enhancing the environment • Dedicating personnel to environmental concerns and incorporating environmental performance measures and expectation into departmental goals 	

The list of key criteria (or options for getting there) is a sample of hundreds listed in Sustainable Slopes (2000). The framework used during field research contained all 'options for getting there' and as a result, it was much longer. This table is meant to be representative of the framework used in the field.

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