Co-management of Gwaii Haanas National Park Reserve and Haida Heritage Site:
Panarchy as a Means of Assessing Linked Cultural and Ecological Landscapes for
Sustainability

By

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Bachelor of Science, University of Alberta, 2000

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ABSTRACT

I analyse the emergence of a co-management system for protected area governance at Gwaii Haanas National Park Reserve and Haida Heritage Site on the northwest coast of Canada. Of primary concern is the analysis of the co-management structure for properties that are essential for maintaining a sustainable trajectory and an exploration of the key mechanisms for its development. The underlying framework for the analysis in this thesis is panarchy which is based on four categories of factors for building resilience: 1) learning to live with change and uncertainty; 2) nurturing diversity for re-organization and renewal; 3) combining different kinds of knowledge; and 4) creating opportunity for self-organization. This framework emerges from the conclusions of a multi-year team study of the dynamics of socio-ecological systems and how to enhance the resilience of these complex systems to tackle complexity, uncertainty and global environmental change. As the Archipelago Management Board (AMB) is the institutional structure that is managing the future of Gwaii Haanas, therefore, I focus on how this structure facilitates resilience. I argue that it should be an arena for flexible collaboration with multi-level governance that facilitates adaptive management (learning

and building ecological knowledge into the institutional structure) and nurturing elements of resilience (cultural and ecological memory).

The Lyell Island blockade in 1986, was a collective action against a crisis (cultural and environmental degradation caused by industrial logging) where key stewards and several Haida elders provided leadership, vision and trust. Parks Canada helped end the conflict by offering a management approach that accommodates Haida rights to their traditional lands, the formation of Gwaii Haanas National Park Reserve and Haida Heritage Site.   Here I argue that the power-sharing structure of the AMB provides political space for experimentation. As such, the AMB appears to be an adaptive co-management system that is flexible, community-based, tailored to specific situations and supported by and working in collaboration with a concerned government agency to ensure sustainable resource management. So far, this arrangement has been able to successfully move away from a less desired trajectory toward a more sustainable one with the capacity to nurture the ecological health of Gwaii Haanas and the Haida culture on which it depends. I discuss the key role of co-management in re-coupling society to ecological feedback, creating political space for experimentation, accommodating varied ways of knowing and learning, including traditional ecological knowledge to link management with ecological understanding, and extending management into the social domain.

I conclude that management in the implementation of protected area policy in Canadian National Parks could benefit from a more explicit collaboration with local communities who have special interests and site-specific ecological knowledge to better understand and monitor complex systems for long-term sustainability of protected areas.

In turn, I have argued that, to make Gwaii Haanas the rule and not the exception in Canadian National Parks management, Parks Canada must acknowledge Aboriginal sovereignty issues on parklands and develop a governance system that works for the local people and the environment.

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CHAPTER 1: INTRODUCTION

1.0   PERSONAL REFLECTIONS: A SHORT MEMOIR OF A JASPER PARK WARDEN

Towards the end of my graduate work at the University of Victoria, I acquired a Park Warden position at Jasper National Park in Alberta, Canada. I was still in the middle of writing my thesis, but since I had been working toward an opportunity in National Parks for several years, I could not pass it up. I decided I would return to Victoria in the winter and resume my graduate work. The posting in Jasper National Park was a unique situation for me. While at Graduate School, I had already been studying in some detail the co-management arrangement at Gwaii Haanas National Park Reserve and Haida Heritage Site and I had soon ended up working at Jasper National Park - a very different park compared to Gwaii Haanas. Both parks have very similar management challenges that presented themselves operationally to me on a daily basis. Two personal, on-the-job experiences in particular during my time in Jasper struck me as common to several major themes that run throughout this thesis. The first was my involvement in what I call "the scoop and run", an example of the application of locally-derived resource management techniques. The second deals with my thoughts while inhabiting a semi-remote warden cabin located directly across from an old Métis settlement area (c.1890). This is now a heritage site equipped with interpretive signs.

The Scoop and Run

Shortly after arriving in Jasper I found myself participating in an elk hazing method I call 'the scoop and run'. This is one of the most frightening and exciting situations I have yet experienced as a park warden. Our office had received a complaint

that there was an aggressive female elk at a nearby campground. From the office we could only assume this elk had hidden her calf away for safety somewhere in the campground. I discovered fairly quickly that morning that there was nothing more dangerous in Jasper then a cow elk protecting her calf during calving season. I was dispatched to the scene along with a team of wardens including the human/wildlife conflict specialist, Wes, another experienced warden, and another new warden. When we arrived at the scene, Wes quickly moved all curious tourists away from the cow elk. Each warden was equipped with an elk stick, what I later found to be "the" tool of the trade in Jasper. An "elk stick" is actually a hockey stick tasseled at the end with large strips of flagging tape and plastic bags, which rattle and make noise when swung about in the air (nonetheless, this is the most inexpensive and effective way to get an elk's attention). Wes moved in first and began playing 'hot and cold' with the elk, walking around the site to see the cow's reaction so as to determine where the calf was hidden. Once he located the calf, we all moved in closer with our "elk sticks" held high and swinging to haze the cow a safe distance from the calf so that Wes could pick it up. Since Wes was holding the calf, our job was to cover his back from the aggressive cow elk while he ran from the campground to a forested area nearby to safely relocate the calf. The cow made several bluff charges at each of us as we moved along with Wes as a group. Earlier I was well-informed never to drop the elk stick. Once the calf is scooped, the hockey stick and plastic bags really are the only things keeping the 400-600 kg cow from trampling right over you. That morning, the cow came so close to me that I was physically tapping her on the nose with the end of the stick just to get her to move off. While we relocated her calf, her eyes rolled back in her head, her tongue dangled of out

the side of her mouth and she stamped her front hooves. It was the most aggressive display of protective instincts I had ever seen, and at such close range! As we moved, Wes was gently pinching the calf so it would squeal and the cow would know exactly where it was. After skidding down a steep hill and through the bush, Wes announced that we had gone far enough, and he laid the calf down on the ground. At that moment we all cleared the way for the cow to reunite with her calf.

The "scoop and run" is a daily event in Jasper during the spring. Wes had devised this method after a lot of research and trial and error. Cow elk will calve very close to and right in the town-site where predators are scarce. The cows will calve on the golf course, in campsites and on people's back steps. During this time cow elk become a major safety hazard to local towns people and unsuspecting tourists. Calves will return to the same spot they were born to have their calves. Therefore, the 'scoop and run' is a key in deterring calving within the town-site.

After my experience in the 'scoop and run' I found myself reflecting upon the resource management actions taken in Jasper. Why was it done in just the way it was? How might it have been done in an even more effective way? When I had visited Jasper as a child, I remember the large numbers of tourists, Jasper the bear, and herds of elk grazing on front lawns. These elements are all still there, but there are changes taking place on the landscape. Elk are continually hazed out of the town-site because of public safety concerns. Fire management is taking hold in the park as well. From Highway 16 you can see large-scale prescribed burns from recent years. The burn is meant to support numerous grazing opportunities for species such as elk and bighorn sheep, whose habitat is currently stressed due to the reduction in grassy open slopes and prairies. The fire

cycle existed in this region long before the park was established and, although this natural disturbance is beginning to reappear on the landscape, fire is still largely suppressed. There is also a "fire smart" program that is actively thinning trees around the town-site in an effort to mimic fire and create a fire buffer around the town-site. Such a complex landscape as Jasper cannot be called a wilderness in the old "preservationist and peopleless" sense anymore. All of these cases, including the 'scoop and run', are adaptive management approaches. Adaptive management reflects actions taken simultaneously with testing for their alleged effects on ecological integrity and that complement or mimic natural processes. For Jasper National Park, internationally renowned for its wilderness, managers are trying to find the balance between public safety, visitor enjoyment and ecological integrity. Adaptive management is an emerging approach highlighting the reconsideration of the human influence in the wilderness. It appears that Jasper managers are working toward restoring the landscape to its original form, by allowing for and sometimes implementing natural, dynamic processes. It makes me wonder what outcome they are seeking, and to what end will they restore the landscape to a given ecological state. There are several other challenges in the near future for Jasper National Park. The petroleum pipeline that runs through Jasper from east to west is going to be twinned, the mountain pine beetle is on the verge of infesting Jasper forests and there may be claims to traditional hunting territory in Jasper from British Columbia First Nations. This brings me to my second experience, which reflects on the absence of a cultural aspect to this landscape.

Snaring Warden Station

When I arrived in Jasper, I was posted west of town at the Snaring Warden Station. It is a beautiful site located in the Athabasca Valley at the base of Esplinade Mountain, towering behind, and the view of the Colin Range across the valley is unparalleled. My front yard was an expanse of grassy meadows spreading down into the valley. My water came from a natural spring up behind the house, and this formed a creek that drains into a lake down the road. I would walk my dog daily down into these meadows to the Moberly Homestead. It is a Métis dwelling from roughly 100 years ago. The site contains a number of historic features, some of which are obvious to the eye, but many that are not. The obvious features include a hand-built, square dovetailed log house, and a grave site. There are several interpretive signs that describe the day-to-day activities of the Moberly family and a collection of black and white photos depict the area as it once was. Upon closer examination of the area you can see that the grassy meadows were once agricultural fields with signs of other structural foundations and depressions. The water spring behind my house probably served as a fresh, all-season water source for an entire community that lived in the area. When Jasper National Park was formed, resident Métis communities such as the Moberly family were relocated to the Grande Cache area. At the same time, other Aboriginal groups that once traveled from as far as the Okanagan Valley in British Columbia were no longer allowed to hunt elk in the region. For an entire summer, I lived amongst perhaps the most tangible example of this area's former cultural landscape, and the more I explored, the more I could see what used to be.

Many questions arose from this experience. The wilderness view of management had obscured and, subsequently in large part, erased the significance of the Aboriginal presence and their culture on this landscape. Hopefully, instead, this style of park management is itself now fading away. New parks are attempting to incorporate Aboriginal communities in park planning and recognizing the importance and value of traditional ecological knowledge in management.

Gwaii Haanas National Park Reserve and Haida Heritage Site was established as a means of protecting ecological integrity as well as Haida cultural integrity. This is quite contrary to the ideals that drove park management in the early 1900's when Jasper was formed. Parks that were developed during this time, such as Jasper, focused on preserving the forest and natural beauty of the mountains to produce interest and profit from tourism. This was coupled with continued resource development activities such as logging, mining, dam construction, grazing, hunting and fishing. The sharing of management authority and incorporation of traditional ecological knowledge is key to making the arrangement at Gwaii Haanas work. I look at Jasper in a new light after studying Gwaii Haanas National Park Reserve and Haida Heritage Site. I wonder if Jasper park management can continue to introduce and facilitate ongoing natural processes in the landscape. The initial signs are there, whether these are larger in scale like prescribed burning, or simply within the town-site as we perpetuate the 'scoop and run' of elk calves. But I also wonder whether Jasper as an institution will incorporate cultural values and traditional ecological knowledge into park management today? I know from direct experience that amongst the meadows and around the natural water springs, the cultural landscape in Jasper National Park is waiting to be revitalized.

1.1   RESEARCH METHODS

1.1.1   Posing the Question

In this study I investigate how institutions managing interdependent cultural-ecological systems are structured and how these systems function together to improve sustainable resource management. I use panarchy to study the emergence of a unique co-management system for a Canadian National Park Reserve called Gwaii Haanas National Park Reserve and Haida Heritage Site. This system is based on a collaboration between the Council of the Haida Nation and Parks Canada (the national agency for parks in Canada). The park reserve is located on the west coast of British Columbia, Canada (See Figure 1-1). It includes the southern third of Haida Gwaii (also known as the Queen Charlotte Islands). The co-management structure for Gwaii Haanas National Park Reserve and Haida Heritage Site is called the Archipelago Management Board (AMB). A case study approach allowed me to focus specifically on the processes and mechanisms behind the adoption of co-management for Gwaii Haanas and their subsequent function in facilitating long-term sustainability of cultural and ecological integrity.

To get at the research focus described above I asked the following research questions: (1) What events led to today's management arrangement at Gwaii Haanas? (2) How can the long-term sustainability of Gwaii Haanas be maintained? (3) How is the co-management board (AMB) structured? (4) Is the co-management board linked to local environmental understanding? (5) What components of both ecological and cultural systems are managed and how? And finally, (6) What role does traditional ecological knowledge (TEK) play in the co-management process?
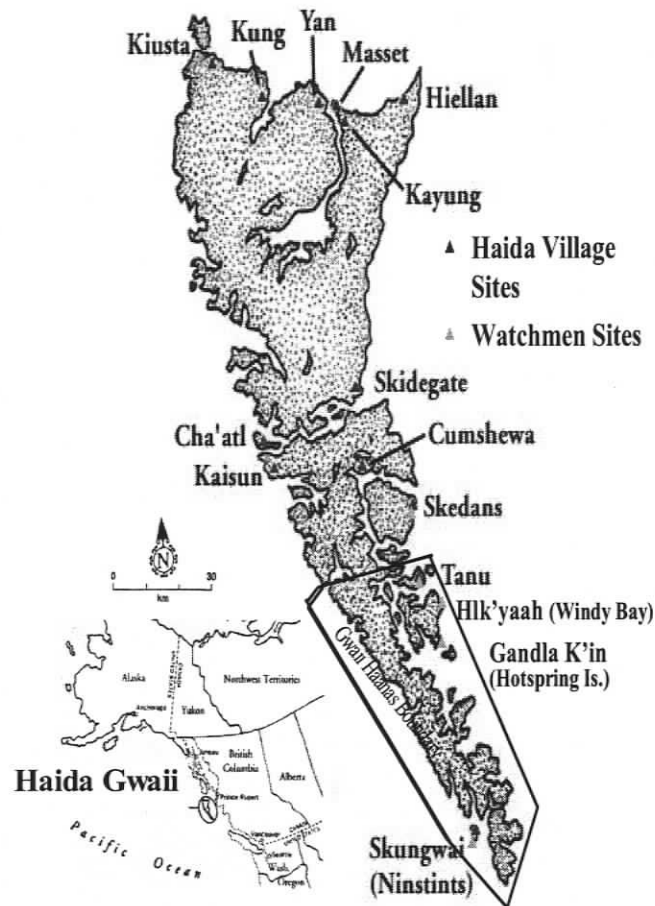
Figure 1-1. Gwaii Haanas National Park Reserve and Haida Heritage Site, Haida Gwaii, British Columbia, Canada. Showing Haida Village sites and Watchmen sites. Modified from Canadian Museum of Civilization Corporation, www.civilization.ca/ aborig/haida/havhg01e.html.

1.1.2 Gaining Experiences, Perspectives and Knowledge

My research methods included a combination of qualitative interviews of Haida and parks personnel and a review of relevant documents such as official documents and scientific literature. Management plans, inventories, maps, internet sites, newspaper articles and reports dating from 1976 to the present provided a history of how the AMB was developed and continuously informed my interviews. The goal was to obtain the interviewees' experiences regarding the development, continuing work, goals and achievements of the AMB. Open-ended, in-depth interviews were conducted in

Skidegate and Queen Charlotte City, Haida Gwaii in early July to mid-August 2003 with

seven individuals who work within the AMB and, or have been involved with the events

leading up to the formation of Gwaii Haanas. Individuals played several different roles.

Those interviewed included a Haida elder, the Chief Park Warden of Gwaii Haanas, the

vice-presidenct of the Council of the Haida Nation, the Cultural Liaison Officer for Gwaii

Haanas, a Councilor for the Skidegate Band, an assistant to the president of the Council

of the Haida Nation, a participant in the Lyell Island blockades of 1986, a marine

ecologist and ecosystem coordinator for Gwaii Haanas, representatives of the Haida

Gwaii Watchmen, members of the AMB, the Director of the Watchmen Program, and the

Director of the Skidegate Haida Immersion Program.[1] Their involvement and

experiences as they described begin from 1976, to the present. During these and

continued interviews I followed an open-ended format of questioning to obtain

information about each person's experiences, perspectives and knowledge regarding the

formation and management of Gwaii Haanas, information largely unavailable in

published reports. My interviews typically lasted from one to two hours. Interviewees

had the opportunity to remove, add and change information attributed to them and had

the right to be anonymous if they wished.

1.1.3   Research Setting

I had the opportunity to explore the islands for four weeks and observe some of

their cultural history and unique topography and geology. This group of islands is

accessible only by boat or plane. The islands are dotted with historical artifacts of

different inhabitants and explorations. In inlets and islands there are the remains of

Haida harvesting camps, mining camps, forest cut blocks, missionary graveyards and

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[1] See Appendix A for sample questions that guided discussions.

homesteads where fruit trees and garden flowers still grow. Yet the most extraordinary sites are the ancient Haida villages. I had the opportunity to travel south into Gwaii Haanas National Park Reserve and Haida Heritage Site. I visited K'una (Skedans) and T'annu, where one can still see long house depressions, and old, partially decayed beams, posts and poles. Before the turn of the last century there were many Haida villages that dotted the islands. With the successive introduction of diseases such as smallpox, the Haida population was reduced from 10,000 or more to only some 500 (Grzybowski and Slocombe 1988). These survivors eventually moved to Skidegate and Masset and the original villages were left vacant. The protection of these sites has been an essential component of the Haida repatriation movement, a touchstone to Haida heritage. Stewards, called Watchmen (which will be described in detail later in this thesis), have been protecting these ancient village sites since the mid-1980's to ensure a connection to their heritage and to prevent further damage or pillaging of the sites by unscrupulous or uninformed visitors.

During my stay in Haida Gwaii, there was a ground-breaking ceremony for the future site of the Qay'llnagaay Heritage Centre near Skidegate. It is a community-gathering cultural centre that is to be built as part of the Haida repatriation movement. I had the opportunity to help with preparations for and activities during the traditional Haida feast that followed. At this event the Haida Gwaii community and several important delegates such as Guujaaw (Council of the Haida Nation president), Miles Richardson (chair of the Gwaii Trust Society), Robert Nault (Minister of Indian Affairs), George Abbott (Minister of Community Aboriginal and Women's Services), Bill Belsey (MLA), and all of the Hereditary Chiefs sat down to share a meal, hear each other speak

and enjoy the songs, prayers and dances from the Hlgaagilda and HI Taaxuulang Guud Ad K'aaju dance groups.

The views between speakers differed, specifically regarding the topics of land rights to Haida Gwaii. However, each presented with an air of, 'we agree to disagree'. It is apparent how influential the Council of the Haida Nation has been in shaping the role of Aboriginal peoples in protected areas in Canada through their repatriation movement and land title case.

1.1.4 The Theoretical Framework

I use panarchy described by Gunderson and Holling (2004), contributions of Resilience Alliance members (www.resalliance.org) and other key publications in complex adaptive theory as the underlying framework of my thesis, which allowed me to understand some of the key mechanisms for the development of this new AMB management structure, and to analyse the co-management structure for qualities that are essential for maintaining a sustainable trajectory, i.e. resilience.

1.1.5 Ethics Review

Prior to conducting interviews, I sought and received permission from the University of Victoria's Human Research Ethics Committee (see Appendix B for the ethics approval form). All participants involved in the study signed a consent form (see Appendix C) before any information was collected to acknowledge their participation in the study. This consent form included my contact information and my supervisors' contact information, a brief synopsis of my research, as well as issues and options for maintaining confidentiality, anonymity and right to withdraw at any time.

CHAPTER 2: THE TERRAIN OF PARK MANAGEMENT

2.1   PARK MANAGEMENT: ARENAS OF CHALLENGE AND OPPORTUNITY

2.1.1   Protected Areas for Ecological Sustainability

Protected areas are meant to preserve biodiversity and ecological landscapes as well as clean air, water and many other goods and services for human communities. More and more protected areas are being created around the globe in an effort to preserve ecosystems, to protect human welfare and to counteract the rapid destruction of our natural environments on a global scale. The number of legally protected areas has grown from just a handful in 1900 to 44,000 by 2000, covering 10% of the earth's land surface (IUCN Media Brief 2004). As Theberge and Theberge (2002: 72) state in "Parks and Protected Areas in Canada: Planning and Management," "today, the generally accepted objectives for the management of protected areas include representation of native ecosystem types, maintenance of viable populations, maintenance of ecological and evolutionary processes, and continuance of ecosystem resilience in the face of human pressures". However, protected areas are often merely islands in a sea of development and environmental change. There are various challenges facing parks from both outside and within, such as tourism, road construction, trail construction, impact of pollution, poaching and global climate change. Park managers are realizing that they need to maintain or restore natural processes, species or communities because they are likely to disappear or have disappeared, or are not functioning within the expected range of variation for that ecosystem (Woodley 2002). For example, fire suppression was common throughout North America over the past 100 years. It has been identified as causing significant impact on ecological health and resilience. Fire is a key ecological

process yet it has been actively excluded and fought because it was thought only to destroy ecosystems (Woodley 2002). In 1988, after 116 years of active fire suppression, 1.6 million acres of Yellowstone National Park (1/2 of the park forest by area) burned in one summer. Fire suppression in the park over such a long period of time had created a single age stand of old trees with large amounts of debris accumulating on the forest floor. If fire had been allowed to move through the landscape in more limited events over this time period there would have been a mosaic of different stand ages creating natural 'fire breaks' throughout the landscape (Pyne 2001). The catastrophic fires at Yellowstone National Park demonstrated how predisposing environmental factors increase in intensity until a catastrophe becomes inevitable (Pyne 2001). Subsequently we are seeing a shift in perspective of forest ecologists and park managers from controlled protection of nature to actively managing ecosystems natural ecological processes and resilience. This places a greater focus on the resilience of ecosystems - their ability to persist and absorb change and disturbance (Holling 1973). For example, allowing fires to burn periodically could reintroduce the natural fire regime and reduce fuels loads and keep the risk of catastrophic fires down. The complexity and unpredictability of ecosystems establishes support for the application of adaptive management. This is a precautionary approach that attempts to provide buffers to protect a system from the failure of management actions that are based upon incomplete understanding (Folke *et al.* 2002). It is a learning-by-doing approach that continually improves management by learning from its outcomes and changing practices as indicated (Holling 1978).

D. Michael Warren and J. Pinkston (1998) illustrate adaptive management in a study of the indigenous African resource management of a tropical rainforest ecosystem in the Yoruba of Ara, Nigeria where farmers learned about the relationship between tree cover and soil fertility. Farmers gained experience with a fallow-based farming system in areas where aged cash crop trees were felled and replaced only by arable cash crops. Figure 2.1 is a diagram of the dynamic nature of knowledge systems within a problem-solving context.

Figure 2-1. Indigenous knowledge cycle. Adapted from Warren and Pinkston (1998: 158).

Warren and Pinkston's case study describes the interacting forces that have resulted in changes in the ecosystem of Ara, Nigeria from pre-colonial times through the colonial era to the present post-colonial period. These changes ranged from the introduction of cash cropping, population pressure, and the growing influence of Islam and Christianity. There was a conscious effort by local people to increase the number of species and varieties of arable food crops in order to reduce the risk related to factors such as crop pests and weather variation. It is difficult to predict future increases in population and urbanization or decline in biodiversity. Warren and Pinkston (1998) argue that the introduction of exotic tree and crop species, as well as of numerous new

varieties of arable crops, during the past half-century has increased usable biodiversity and fostered the emergence of new indigenous knowledge. Also, these authors believe that the natural resource management system in Ara may continue to be resilient since it has been adaptive, modified and evolutionary from the original settlement period to the present.

The discourse surrounding adaptive management has grown since Holling's (1978) book. This idea has resurfaced because of global initiatives and assessments of sustainability. The IUCN Sustainable Use Initiative was established in 1995 to increase knowledge and enhance understanding of the factors that affect the sustainability of natural resource use. It identifies adaptive management as key in promoting sustainable use (IUCN 2001). Adaptive management is identified in most all other IUCN initiatives such as water conservation, protecting threatened species, supporting mobile peoples and biodiversity conservation and climate change. Even though the principle of adaptive management has been supported by governments, it has been practiced less often because it is challenging to implement due to costs and scientific gaps (Theberge and Theberge 2001).

2.1.2   Protected Areas For Indigenous Peoples

Another major challenge facing protected areas across the globe is the growing concern for indigenous peoples' rights. The world's first national park was Yellowstone in the United States in 1872. It was created as a wilderness reserve and subsequently the Crow, Blackfeet and Shoshone-Bannock peoples were removed from the area and dispossessed of their land and cultural rights. The Yellowstone National Park model was used as a basis for the creation of protected areas all over the globe. This resulted in the

forced eviction of many indigenous peoples, resulting in loss of indigenous basic human needs, rights, knowledge, and social organization, leaving a legacy of mistrust between the people and the governments. The issue of reconciling conservation with indigenous peoples' rights has recently gained increased international attention. The World Summit on Sustainable Development in Rio in 1992 and then in Johannesburg in 2002 set out a number of principles, several of which highlighted indigenous peoples' vital roles in sustainable development and environmental conservation. In response to the IVth World Congress on National Parks and Protected Areas, organizations such as the World Wildlife Fund (WWF) and the International Union for the Conservation of Nature (IUCN) have been working together to develop guidelines to consider social and cultural needs and how these needs are linked to the environment (Beltran 2000). These guidelines and principles encourage park management to shift from a top-down, standardized, rigid-practice to a more local level collaborative management approach in an effort to involve indigenous people in decision-making. Furthermore, the IUCN and WWF recognized that the traditional ecological knowledge, innovations and practices of indigenous peoples have much to contribute to the management of protected areas (Beltran 2000). However, the International Indian Treaty Council, in the Indigenous Peoples' Declaration to the World Parks Congress, highlights the fact that although some states have made advances in national legislation there is still insufficient promotion of indigenous peoples' rights. Moreover, although the IUCN has made positive efforts in advancing the recognition of the rights of indigenous peoples, including the adoption of World Conservation Congress Resolution 1.53 Indigenous Peoples and Protected Areas (Montreal, Canada 1996), they believe that there is a lack of implementation of these

policies.[2] There are many challenges and barriers to implementation such as mistrust,

incompatibility with the constitution or governance of the state and the rigid structure of

the park government agency.

2.2   AN INTEGRATIVE THEORY FOR SOCIAL-ECOLOGICAL SUSTAINABILITY

It is obvious that protected areas are complex social-ecological systems. This

creates two major challenges for managing protected areas: 1) trying to adapt

management to maintain resilience in protected areas; and 2) simultaneously

reintroducing or including indigenous communities that are dependent on those

landscapes. Panarcy, which is the framework for my thesis, provides a model both to

operationalize adaptive management and to meaningfully involve indigenous peoples in

management. The Resilience Alliance is a multi-disciplinary research group that has

been developing this framework for several years to better understand the dynamics of

social-ecological systems and how to enhance the resilience of these complex systems to

tackle complexity, uncertainty and global environmental change. The major focus of

their work is to answer the question, what sustains the adaptive capacity of social-

ecological systems in a world that is constantly changing? Based on this framework

Gunderson and Holling (2002) and Folke *et al.* (2002) identify four categories of factors

for building resilience: 1) learning to live with change and uncertainty; 2) nurturing

diversity for re-organization and renewal; 3) combining different kinds of knowledge;

and 4) creating opportunity for self-organization.[3] Folke *et al.* (2002) have developed

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[2] See the International Indian Treaty Council website for the declaration to the World Parks Congress, www.treatycouncil.org.

[3] Referring specifically to Folke *et al.* 2002; Berkes *et al.* 2003 and Gunderson and Holling 2002.

several general policy recommendations in the context of sustainable development. They recommend that policy should: 1) facilitate arenas of flexible, open, multi-level governance (i.e adaptive co-management); 2) direct action to nurture elements of social/cultural and ecological resilience; 3) facilitate adaptive management and encourage learning and building of local/traditional ecological knowledge into institutional structures. Olsson *et al.* (2004) have recently proposed that adaptive co-management of ecosystems has the potential to build resilience in social-ecological systems. Resilience refers to the ability of a social-ecological system to reorganize and to renew a desired state following disturbance and change. And this ability depends on the influences of the governance structure at different scales and the degree to which the system can build and increase the capacity for learning and adaptation.

According to Olsson *et al.* (2004) and Folke *et al.* (2003), adaptive co-management creates a feedback loop between the social and ecological systems.[4] This structure depends on the collaboration of a network of different actors at different scales from local communities, regional, national to international organizations. According to Folke *et al.* (2003), adaptive co-management systems are flexible community-based systems of resource management formed to a specific place and situation and supported by various organizations at different levels.

By drawing on a variety of knowledge and information sources, adaptive co-management can avoid prescriptive management and track desired and sustainable trajectories. For example, Olsson and Folke (2001) describe the development of watershed management by a local crayfishery association in a contemporary Swedish community in response to the acidification of Lake Racken due to atmospheric pollution.

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[4] Refer to Figure 3-11.

They discuss how the devolution of management rights provided an opportunity for local crayfishers to set rules and individual practices within an overall framework of several national laws and regulations. There are a few local individuals in particular who play a key role in generating ecological knowledge. This information is then made accessible to the fishing association for decision-making. In addition, there is also an exchange of local ecological knowledge and management practice between various fishing associations. This knowledge is then transferred to authorities and companies at higher institutional levels at meetings of the Arvika fishing circle. In this way local crayfishers are able to respond to change and build the capacity to deal with future change into higher levels of governance.

The fourth factor for building resilience, creating opportunities for self-organization toward social-ecological sustainability, is one of two main focuses in this thesis. This relates to transformability, the capacity of a social-ecological system to move to a new configuration. According to Olsson *et al.* (2004), social transformation is essential to enable moving from a less desired trajectory to one where the capacity to manage ecosystems sustainably for human well-being is strengthened. Olsson *et al.* (2004) had studied the emergence of an adaptive co-management system for wetland landscape management in southern Sweden. Declining bird populations, eutrophication and overgrowth of lakes, and a decrease in the use of flooded meadows for haymaking and grazing triggered one concerned individual to develop a social network of concerned groups. Ecological knowledge and experience was compiled into a project proposal and shared with other ongoing projects in the area. This steward then convinced political decision-makers of the need of a new organization and improved management of the

wetland landscape. The new municipal organization was called the Ecomuseum Kristianstads Vattenrike (EKV). It facilitates and coordinates local collaboration processes with international associations, national, regional and local authorities, researchers, non-profit associations, and landowners to maintain and restore the natural and cultural values of the area (Olsson *et al.* 2004). Within a decade the prevailing management system was moved to a new collaborative ecosystem management arrangement at the landscape and catchment level. With such examples in mind, I will be analyzing the processes and mechanisms behind the adoption of the co-management of Gwaii Haanas and subsequent function in facilitating long-term sustainability of cultural and ecological integrity.

The second main focus of my thesis is traditional ecological knowledge as a necessary component of resilience building. According to Berkes and Folke (1998), this ability of resource managers to respond and adjust is dependent on the acquisition of ecological knowledge and an understanding of ecosystem dynamics (Folke *et al.* 2003). There is a substantial and growing literature on the potential of using local or traditional ecological knowledge for improving ecosystem management (Berkes and Folke 1998; Berkes 1999). This experiential learning-by-doing approach for understanding ecosystem dynamics is the framework for emerging work in adaptive management. According to Gunderson and Holling (2001), in order for adaptive management to be a dynamic ongoing process, knowledge and understanding of complex ecosystem dynamics needs to be accounted for by social institutions that can interpret and respond to environmental feedback (Gunderson and Holling 2001). Collaborative protected area management at the local level did not exist earlier in this area and is a new approach for managing

protected areas in Canada. Parks Canada has been concentrating on better understanding of ecosystem dynamics in the service of greater ecological integrity over the last three decades. In many parts of Canada this agency has not included local community interests or traditional ecological knowledge in any meaningful way. Moreover, co-management structures vary across the country and, in general, are a relatively rare and recent arrangement. It has only been in the last 20 years, with increased pressure from Aboriginals, that co-management arrangements for national parks within Aboriginals' homelands have been established. The Council of the Haida Nation was able to negotiate an arrangement of equal representation and power sharing at Gwaii Haanas National Park Reserve and Haida Heritage Site approximately ten years ago. This co-management arrangement appears to be at the cutting edge in terms of both power sharing and consideration of cultural and ecological integrity. The success of such arrangements has yet to be evaluated because few have been in operation long enough. There is no recent literature highlighting the experiences of those involved, in particular the Aboriginal peoples and those individuals, both indigenous and non-indigenous, involved in park management and infrastructure. Here, I use resilience theory to demonstrate how the AMB was formed and how it functions and to evaluate how well it is managing Gwaii Haanas for social-ecological sustainability through the concept of resilience. This analysis will help build knowledge and understanding of system transformation and function. It will also provide a valuable approach for both Aboriginal communities wanting a voice in management of their homelands and for park managers who are learning how to operationalize adaptive management and who wish to engage Aboriginal communities in a meaningful relationship.

2.2.1 Thesis Outline

I begin with an exploration of the evolving social and ecological role of Canadian national parks over the past century, and of current challenges facing the agency. This section provides the context for where Canadian national park management is today and to better understand the forces, which have shaped it and continue to do so. Chapter 3 is an examination of the appropriateness of panarchy for the analysis, planning and management of complex, social-ecological systems; I lay out panarchy as the framework for this thesis. Chapter 4 covers the geological, ecological and cultural history of Gwaii Haanas, followed by a detailed account of the events leading up to the creation of the co-management agreement and park reserve formation. In Chapter 5 I expand upon the co-management arrangement for Gwaii Haanas, and define this arrangement in terms of the structures and components involved from the panarchy perspective outlined in Chapter 2. Chapter 5 is a discussion of the major ideas set out in this thesis and issues facing Gwaii Haanas. My intention with this case study is to provide planning and management decision makers with a framework for understanding and monitoring co-management and complex socio-ecological systems for long-term sustainability in protected areas. Chapter 6 is a conclusion, presenting the major issues that emerged through this study with some final recommendations.

2.3 CANADIAN NATIONAL PARKS

2.3.1 Historical Context

Driven by changing views and values toward natural spaces, new theoretical and applied approaches have developed in Canadian national park management. The vision

of national parks has been evolving over time, driven by prevailing aesthetic preferences, and views of appropriate nature-culture relations affecting choices ranging from what areas to protect as parks to what activities to allow within them. The institutional and political history of the Canadian Parks Branch (now Parks Canada) has been shaped and reshaped by a mix of points of views ranging from individual politicians to Aboriginal people, from industry representatives to conservationists. The ideas for creating the first mountain national parks like Yellowstone and Banff are very different from those that motivate the creation of parks today. According to J.G. Nelson (1970: 26), the development of the Canadian National Park System has been shaped by the economics of the times, and by practice and precedent. Moreover, because there is no clear definition of the concept of a national park there is still a large degree of public misunderstanding regarding the purpose of national parks. Kevin McNamee (1994), now the Director for Park Establishment with Parks Canada, argues that politics and public pressure are what drive the park establishment process, and will continue to do so, because there is no law requiring the establishment of parks, or the preservation of wilderness areas. He argues that we should understand more fully the political process of park creation, and seek to influence it with better information on the full range of national park and wilderness values. In this way politicians will act more decisively to preserve wilderness.

1885-1950's

The first Canadian national park, Rocky Mountain Park (now Banff), was formed in 1885. It was modeled after Yellowstone in the US, established in 1872. The dominion park policy at this time confirmed that it was to be a public park for the pleasure, benefit and enjoyment of the people of Canada and, at the same time, it ensured that the park was

made useful and contributed to the national economy (Craig-Brown 1969, Lothian 1976). Wilderness preservation probably had little to do with the establishment of the park because, at this time, western Canada had no shortage of undeveloped land. By 1911, in addition to Rocky Mountain Park, Yoho and Glacier Park Reserves, Waterton Lakes and the Jasper Forest Park were also formed. This period of park development focused on preserving the forest and natural beauty of the mountains to produce interest and profit from tourism. This was balanced with continued resource development activities such as logging, mining, dam construction, grazing, hunting and fishing. Scholars such as Bella (1987) and Lowry (1994) tend to focus on this era of park management as parks established for tourism and recreation while allowing commercial development and resource extraction. Others such as Nelson (1970), McNamee (2002) and MacEachern (2001) describe the presence of several preservationist notions at this time. The first national park administrators were finding that tourist traffic was the best source of revenue to get the money needed to preserve, manage and develop parks. Furthermore, there were several preservationist notions in the early political debates and actions of civil servants. For example, the Alpine Club of Canada campaigned against the damming of the Spray Lakes in Banff National Park in 1912. Even though they lost, this led to the formation of the National Parks Association of Canada in 1923. It was the first national public organization primarily concerned with protecting national parks.

During the period that followed up until the 1950's, the national parks had increased in popularity, bringing in substantial amounts of tourist dollars. This convinced the government that parks were valuable national assets (McNamee 2002, Nelson 1970). Subsequently, there was an increase in infrastructure for access, accommodations,

attractions and the eventual prohibition of resource development. However, areas of useful resources were generally excluded from park boundaries. A great deal of the infrastructure built during this time (from 1914-1945) included projects such as golf courses, warden cabins, roads, trails, etc. They were constructed by cheap labour from work for relief, public works, internees and even prisoners of war (Bella 1987). During this time the park system was also expanded into central and eastern Canada. Here the land was more populated. Local communities were making a living from the same lands that the federal government wanted to protect. The expropriation of land from unwilling landowners generated bad feelings that still linger today (MacEachern 2001).

1960's-1970's

It wasn't until the late 1960's and early 1970's that ecological preservation became the essential role of national parks, as the natural landscapes of Canada dwindled in size and number because of anthropogenic development and environmental degradation. The environmental movement burgeoned during this time. There was growth of public interest in more natural forms of recreation. The volume of tourists traveling the motor-ways, attractions and town-sites of the parks and their vicinity dramatically increased. Parks like Riding Mountain and Waterton had become encircled by agricultural development, cattle grazing and oil exploration. Timber harvesting began encircling parks such as Wood Buffalo, La Maurcie and Pacific Rim National Park Reserve. Illegal hunting and commercial fishing began taking its toll on viable fish and wildlife populations in many parks. During this period, public demand for greater protection of ecosystems was reflected in the strengthening of the National Parks Act and Policy.

1980's-Present

The revisions to the National Parks Act of Canada in 1988 ushered in a new model for managing protected areas. "Maintenance of ecological integrity through the protection of natural resources shall be the first priority when considering park zoning and visitor use in a management plan" (Canada 1988). According to McNamee (2002: 43), this amendment was significant for two reasons: 1) it clearly established the chief purpose of national parks as protecting natural resources; and 2) in order to maintain the ecological integrity of the national parks, the government must now take action to define and eliminate the range of internal and external threats to the park resources. The notion of preservation and wilderness was superceded by the concept of enhancing or maintaining ecological integrity in revisions to the National Parks Act of Canada in 1988. In turn, the new Canada's National Parks Act was passed in 2000 which further revised the mandate, "Maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks" (Parliament 2000). This directs Parks Canada both to maintain ecological integrity and to restore this integrity in degraded parks. According to Woodley (2001), one of the key implications is that active management might be required in parks to maintain or restore ecological integrity. Simply "letting nature take its course" is becoming more impractical with internal and external assaults ranging from the effects of island biogeography, to exotic species, minimum viable population sizes, pollution and hyper-abundant native species, to name a few (Dearden and Rollins 2001). The concept of ecological integrity supports the recognition that ecosystems are self-organizing, dynamic and complex, and therefore,

protected area management cannot attempt to recreate a particular era. Active management is beginning to appear in parks management but is limited in operation still. Current policy on active management in national parks has been described as follows (Parks Canada 1994: 34):

> National park ecosystems will be managed with minimal interference to natural processes. However, active management may be allowed when the structure or function of an ecosystem has been seriously altered and manipulation is the only possible alternative available to restore ecological integrity.

There is still a great amount of uncertainty in the active management of complex systems. Woodley states in "Planning and Managing for Ecological Integrity" (2002: 101), "under an adaptive management framework, actions can be taken simultaneously with testing for their alleged effects on ecological integrity". Currently, active adaptive management is used in a few situations such as managing hyper-abundant species (for example, elk in Elk Island National Park), restoring fire as an ecological process (for example in Jasper National Park), and managing invasive species (such as rats at Gwaii Haanas National Park Reserve and Haida Heritage Site) (Woodley 2001). The precautionary, learning-by-doing, active adaptive management approach is suited to protected area management. However, people and institutions within Parks Canada are slow to change and are further limited by money, scientific gaps and manpower, to name a few.

During the last 30 years, marked by creation of the first biosphere reserve in Canada in 1976, connectivity between protected areas and their surroundings, both

natural and cultural, has been increasingly recognized (Slocombe and Dearden 2002). Given that many of the threats facing parks originate outside of park boundaries, it is critical to implement ecological management approaches based on the greater regional ecosystem rather than just within the administrative boundaries. Today, ecosystem-based management approaches are widely endorsed and increasingly implemented in parks planning for two main reasons. Firstly, there is the realization that parks are not islands, and are susceptible to environmental degradation from outside the administrative boundary. For example, recent analyses of the minimum critical area for large carnivores in the national parks by Landry *et al.* (2001) have shown that most parks are too small to sustain minimum viable populations of these species without the use of appropriate habitat outside the park. Secondly, and most importantly, park managers are realizing the significance and need of local support for the long-term effectiveness of protected areas (e.g. Dearden and Doyle 1997). Since park managers have no legislative powers outside of the administrative boundary of the park, participatory and collaborative approaches are increasingly stressed as the solution for making ecosystem-based management work (Slocombe and Dearden 2002).

In some parks, managers have moved beyond consultation and public participation in meetings to co-management between the Federal Government and Aboriginal peoples. Greater than fifty percent of the land area in Canada's national park system has been protected as a result of Aboriginal people's support for conservation of their lands. As a result, Aboriginals have emerged as the most dominant force influencing the establishment of national parks in Canada over the last decade (Peepre and Dearden 2002). There has been a realization in the past 20 years that Aboriginal

people deserve special recognition with respect to management when their traditional territories coincide with park lands. Land claim settlements and the treaty rights of Aboriginal people now play as great a part as National Park Policy or legislation in determining the role of Aboriginal people in park management planning, following several important legal rulings, and amendments to Canada's constitution (Peepre and Dearden 2002).

The following section is an overview of the changing social and legal status of Aboriginal people and its effect on the context of protected areas. It provides an orientation to the challenges facing National Parks and the context in which Gwaii Haanas is set.

2.3.2   The Evolving Role of Aboriginal Peoples

The changing social and legal status of Aboriginal people in Canada sets the historical context for the evolving policy, regulations and legislation of Parks Canada as it relates to Aboriginal people (Peepre and Dearden 2002). In the late 1970's land claims of Aboriginal people emerged as a perceived problem and a potential complication to managing parks. In earlier established parks such as Banff, Jasper, and Kluane all Aboriginal people had been excluded upon establishment of protected designation. Controversies regarding Aboriginal peoples' attempt to prevent transfer of land to parks and their rights to maintain traditional ways of life on federal lands are still issues today. In fact, over the past 20 years, Aboriginal peoples' rights and land claims have emerged as the dominant force shaping and creating protected areas and the legislation that governs them. Many countries are attempting co-management of protected areas with local indigenous communities. Co-management is a relatively new approach to

conservation that simultaneously enables local people's participation in decision-making, planning, and management of protected areas. Consequently, two main challenges are facing protected area managers: 1) understanding complex ecological systems; and 2) understanding complex cultural systems that are inextricably linked to homeland ecological systems.

The Calder Case of 1967 had important repercussions for Aboriginal policy and law. For the first time the Supreme Court of Canada recognized that Aboriginal title existed at the time of colonization as a legal right derived from the Aboriginal peoples' historical occupation and possession of the land, independent of any proclamation, legislative act, or treaty. Following this judgment the federal government was willing to negotiate 'comprehensive' land-claim settlements. Section 25 and 35 of the Constitution Act of 1982 entrenches Aboriginal rights in the Constitution wherein the federal policy on land claims recognizes the inherent right to self-government of Aboriginal people.

In 1990, the Sparrow Case directed the government to include Aboriginals in cooperative management of natural resources. The Supreme Court recognized the need to protect and manage non-renewable resources but held that Aboriginal people must be consulted so as to mitigate any impact upon their rights. With respect to parks, it is clear that these rulings reinforced Aboriginal beliefs that they deserve special recognition with respect to management when their traditional territories coincide with park lands (Peepre and Dearden 2002).

Changes made to Parks Canada Policy and statutes over the last 20 years have attempted to respond to issues concerning Aboriginal people. The term 'National Park

Reserve', introduced into the statute in 1972, is a designation that allows Parks Canada to treat and manage the areas in question as national parkland, but does not extinguish any Aboriginal rights or title to the area. National Park Reserves are an important accommodation for Aboriginal people because they do not prejudice their ability to select parkland in the course of land claim negotiations. The reserves then become full National Parks upon settlement of comprehensive land claims.

The 1979 Parks Canada Policy contained a number of sections that indicated a willingness on the part of the agency to be more sensitive to impacts upon local people, including Aboriginal people when establishing national parks. For example, Section 1.3.5 of the National Parks Policy (Parks Canada 1979: 39) stated that Parks Canada "will contribute toward cost of special provisions to reduce the impact of park establishment on occupants or other users of lands acquired for a national park."

In 1994, the revisions to the policy had a new and strong emphasis on ecological integrity, improved regional integration through cooperation with other jurisdictions, and a more comprehensive approach to working with Aboriginal people (Parks Canada 1994). The policy also recognized 'local knowledge' as valuable to management of heritage areas, although there was no explicit reference to traditional ecological knowledge (Parks Canada 1994: 18). The 1994 Parks Canada policy made significant progress toward a more comprehensive approach to working with Aboriginal people however, it has not ensured genuine joint cooperative decision-making and in most cases only recognizes a right to participate in decision-making, because the Minister ultimately has veto power over any decisions. Because of Parks Canada's ad hoc approach to management and planning there is a spectrum of arrangements with Aboriginal people across the country.

The most recent amendments to the National Parks Act in 1988 and 2000 extended harvesting rights to a larger number of parks and for the first time made provisions for the removal of non-renewable resources in the form of carving stone, in order to support traditional economies. The new National Parks Act does not guarantee joint management for Aboriginal peoples whose traditional lands fall within national parks. Such joint management regimes are only specified in the policy, and only then for Aboriginal groups who have successfully completed land claims settlements (Peepre and Dearden 2002).

The Supreme Court's decisions on the Haida Nation[5], Taku River Tlingit[6] and Mikisew[7] cases underscore the responsibility of the Federal government to consult with an aboriginal group when the government knows about, or ought to know about, the potential existence of an aboriginal right or title and contemplates a decision that might adversely affect it (Olynyk 2005, Lawson Lundell LLP 2005). Furthermore, the government is responsible for developing approaches to consultation that are proportionate to decisions being made and how best to integrate consideration of aboriginal interests into government decision-making.

2.3.3 Cooperative Management Models

Establishing a National Park Reserve in a territory that is subject to Aboriginal land claims requires thorough consultations to be conducted between Parks Canada and Aboriginal people. Management agreements must be reached which reflect the needs and desires of the Aboriginal people with land claims in the area as well as maintain the principles of ecological integrity and recreational access mandated by the Parks Act.

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[5] Haida Nation v. British Columbia (Minister of Forests), 2004 SCC 73.
[6] Taku River Tlingit First Nation v. British Columbia (Project Assessment Director), 2004 SCC 74.
[7] Mikisew Cree First Nation v. Canada (Minister of Canadian Heritage), 2005 SCC 69.

Cooperative management has been defined as, the sharing of power and responsibility between the government and local resource users (Berkes *et al.* 1991). In the case of Canadian National Parks, the term 'cooperative management' involves the sharing of protected area management responsibilities and authority between Aboriginal people and the federal government (Budke 1999). The application of these definitions as seen in National Park management across Canada differs according to a diversity of local factors that characterise each of Canada's National Parks (Budke 1999). Some cooperative management systems involve meaningful power sharing and joint decision-making, institutionalized in a formal agreement or partnership (Berkes *et a.* 1991). In other systems there is minimal Aboriginal involvement in the decision-making and management of the National Park, the Aboriginal people are consulted but have no legislated power over the decisions made (Budke 1999). Most often, cooperative management is realized through the establishment of a management board or committee, with representatives from the federal government and Aboriginal or other local users (Hawkes 1996). Typically, cooperative management boards are advisory in nature, limited by the National Parks Act, which is the final authority on all decisions made within Canada's National Parks (Budke 1999, Hawkes 1996). There are currently five models of cooperative management boards being used in Canada's National Parks (Budke 1999).

The first model is the Basic Advisory Board whose authority is specific to the park it manages. Such a board manages Kluane National Park in the Yukon Territory and Wood Buffalo National Park in Alberta. Ex officio members of Parks Canada are represented on the board and the Minister of Parks appoints the board members. The

board makes recommendations to the Minister about issues relating to park management and planning (Budke 1999).

The second working model in Canada's Parks is the Expanded Advisory Board. Expanded advisory boards are also specific to the individual parks being managed. Ex officio members of Parks Canada are represented on the board and all board members are appointed by the Minister of Parks but recommended by government, communities, and Aboriginal communities. The board makes recommendations to the Minister regarding park management, park planning, and operations. An example of the Expanded Advisory Board is the Mingan Archipelago Management Council which is located along the North shore of the Gulf of St. Lawrence (Budke 1999).

The third model of cooperative management used in Canada's National Parks is the Operations Board. This board makes decisions specific to each park and both the Aboriginal community and Parks Canada appoint members. Parks Canada is represented on the board by voting members and the board makes recommendations to the Minister regarding park operations, management and planning. In Gwaii Haanas National Park and Haida Heritage Site, the Operations Board is known as the Archipelago Management Board (Budke, 1999). This arrangement is acclaimed by Hawkes (1996) to be unique in its capacity for dispute resolution and as an effective model of shared decision-making.

The fourth type of cooperative management board, which governs National Parks in Canada is the Regional Government and Aboriginal Management Board that manages entire regions rather than only specific parks. Parks Canada is not represented on the Regional Government and Aboriginal Management Boards, and the board members are appointed by the government and Aboriginal communities. The board makes

recommendations to the Minister of Parks about park management and planning.

Examples of this model of cooperative management include the Ivvavik Wildlife

Management Council, located in northern Yukon Territory (Budke 1999).

Finally, the fifth model of cooperative management boards in Canadian National

Parks is the Government, Community, and Aboriginal Management Board, which is a

regional management model without Parks Canada members represented on the Board.

The government and Aboriginal communities appoint the board members and the board

makes recommendations to the Minister regarding specific management issues such as

wildlife policy, legislation, and research issues. Some examples of Government,

Community, and Aboriginal Management Boards include the Wapusk Management

Board (northern Manitoba) and the Fish and Wildlife Management Board, which is the

Council for Yukon Indians Umbrella Final Agreement (Budke 1999).

The benefits of cooperative management agreements have been determined by

both academics and stakeholders to include: an improvement of resource sustainability,

increased economic benefits for local communities and Aboriginal communities,

increased recognition and protection of treaty rights, and an increase in conflict resolution

through participatory democracy. Some of the models of cooperative management

identified above are more successful than others. Success does not rely entirely on the

board's structure but is influenced by individual behavior, specific circumstances, and the

level of dedication towards cooperation had by the interested parties. In the case of

Wapusk's Government Management and Community Board, outside facilitators attended

the first three meetings. This aided cooperation between members from the outset when

trust in the process had yet to be built. The Wapusk community also worked hard at

relationship building by engaging in activities as a group outside of the planning arena. This helped foster a mutual faith and friendship, which in turn helped the development of a common vision to be agreed upon. Commonality was also cultivated through full information exchange and open communication (Budke 1999). The common vision developed in Wapusk was not, however, written into the cooperative management agreement. According to Budke (1999), lengthy policy documents and agreements have been observed to reflect an absence of trust in the process. Newly instituted bodies may rely too much on written documents to legitimize their authority rather than on experience, expertise, and legitimization from collective community support. Cooperative management agreements must therefore be flexible and be able to adapt to dynamic circumstances (Budke 1999).

It has also been observed that creating a board that fosters trust and respect is more difficult in culturally diverse regions. Cooperative management models in Northern Canada have been more successful than those in Southern Canada, where many land claims are still outstanding. Northern national parks have been established in conjunction with Aboriginal land-claim settlements. Cooperative management models four and five illustrate how this scenario increases the influence of Aboriginal people in national park management planning. Not only is it easier to establish functioning management boards where there is clear land title, Northern communities tend to be more homogenous in culture, a factor which can ease conflict resolution. The cultural diversity of the many Aboriginals of Southern Canada, specifically British Columbia, makes reaching consensus more challenging (Budke 1999). Generally, in regions where there are

unresolved land title disputes, management boards serve in an advisory capacity only (Hawkes 1996).

2.3.4 The Growing Potential of Traditional Ecological Knowledge In Parks Management

Traditional ecological knowledge (TEK) has become increasingly acknowledged in the past 20 years as having great potential in contributing to environmental conservation and management (Berkes 1999). During the 1990's there was growing awareness of the significance and uses of TEK as 'a powerful tool" for working cross-culturally to manage protected areas. TEK refers to a peoples' understanding of ecological processes and their relationships with the environment. This relationship can be transmitted through social attitudes, beliefs, principles and conventions of behavior and practice. This knowledge is rooted in the land out of which a culture is developed and is by no means static but rather cumulative and dynamic, building on experience and adapting to social, economic, environmental, spiritual and political change (Berkes 1999). TEK has been employed to establish current and historic use patterns and for planning advice on critical habitat harvesting activities. Elders are often asked to come out onto the land with parks staff to explain things according to how they see them and offer advice such as how to properly handle animals when conducting research (Budke 1999). Peepre and Dearden (2002) maintain that the Ecological Integrity Statement of national parks appears to be consistent with the holistic world view of many Aboriginal communities and may facilitate greater co-operation in the future of management of national parks. According to Weitzner and Manseau (2001: 256) "incorporating traditional knowledge into decision-making was cited as critical, and all of the collaborative management agreements refer to recognizing and using traditional

knowledge in planning. However, the only board that uses it extensively in both cultural and natural resource management decision-making is Gwaii Haanas". The success of this arrangement has yet to be determined because few such boards have been in operation for more than a few years, there is no recent literature highlighting the experiences of those involved and the incorporation of TEK in cooperative management arrangements is relatively new.

Weitzner and Manseau (2001) have outlined a variety of reasons as to why other boards do not use traditional knowledge as extensively:

- The perception that traditional knowledge is brought to the table through aboriginal board members, and that it is not necessary to consult beyond this.
- The lack of solid traditional knowledge based in cases where people either (1) have been prohibited from using resources in the park for an extensive period of time, such as in Kluane, or (2) do not have a long history in the area, as in Tuktut Nogait, where the original users were the Thule and Copper Inuit.
- Lack of knowledge on how to appropriately collect and apply traditional knowledge in decision-making.

There is real concern in Aboriginal communities about protection of the intellectual property rights of this community-held knowledge as Western scientists and land managers become more interested in TEK (MacDonald *et al.* 2000). Several articles have been published in response to the rhetoric over the innovative uses of TEK in resource management. Many of these voice concern regarding cultural appropriation by the dominant Western science, which dominates Parks Canada's ecosystem-based

research, and the compartmentalization and attempted distillation of TEK (e.g. Nadasdy 1999; Cruikshank 2001), a knowledge embedded within the specific context of a culture.

In the first half of the 20th century there was little appreciation within the Canadian government that parks could be used to support and maintain the land uses of Aboriginal peoples, an arrangement that would help to protect their land-based culture. Instead, Parks Canada stressed the importance of ecology and natural areas, irrespective of heritage or culture. It was not until 1979 that Parks Canada Policy addressed the concept of joint park management by government and Aboriginal peoples. The level of communication and co-operation between Parks Canada and Aboriginal peoples increased further during the 1990's. Presently, involvement of Aboriginal peoples in parks varies from the complete exclusion of Aboriginals to the cooperative management of parks with Aboriginal groups. Parks Canada's ad hoc approach to relations with Aboriginal peoples affords a level of flexibility, allowing park managers to respond to regional needs. However, without clearly defined parameters for relations with Aboriginal peoples challenges are going to emerge as Aboriginal peoples continue to work toward nothing short of complete control over park management. Weitzner and Manseau (2001) in "Taking the pulse of collaborative management in Canada's national parks and national park reserves: voices from the field," list five necessary conditions that emerge for crossing boundaries through collaborative management:

- …in our minds: There must be: respect among the parties (for differences in values, world-view, cultures); basic trust; and an open and positive attitude towards embarking on new relationships, and seeing boards as a legitimate decision-making body.

- …in knowledge systems: Traditional knowledge must be incorporated into decision-making to the fullest extent possible.

- …with regard to process: Differing cultures and decision-making processes need to be more balanced for meaningful participation to take place.

- …on the ground: There must be protection of Aboriginal rights in national parks.

- …with regard to outcomes: There must be mutual benefits (social, political, or economic).

As Parks and regional resource management continue to evolve, other approaches will influence and eventually subsume current co-operative management and ecosystem-based management arrangements. The unique co-management arrangement at Gwaii Haanas National Park Reserve and Haida Heritage Site appears to be cutting edge in terms of power sharing and consideration of both cultural and ecological integrity in its management policy. The success of these arrangements, such as the Archipelago Management Board, have yet to be evaluated because few have been in operation long enough. There is no recent literature highlighting the experiences of those involved, namely the Aboriginal communities and those involved in park management and infrastructure. It is important to understand the structure and function of these collaborations because they are influencing the trajectory of the social-ecological system. The next chapter sets out the framework that assists in the understanding of complex social-ecological systems and the appropriate management structures which are key for sustainable management.

CHAPTER 3: BUILDING RESILIENCE FOR SUSTAINABILITY

3.1   PANARCHY

The following chapter introduces th Resilience Alliance and other key scholars that are exploring the dynamics of complex adaptive systems. Furthermore, panarchy, which encompasses the resilience framework, will be explored in detail as it relates to understanding complex social-ecological systems.

3.1.1   The Resilience Alliance

The Resilience Alliance is an association of economists, social scientists and natural scientists. They have been developing an integrative theory that seeks to understand the changes in ecosystems and associated changes in society and economic conditions occurring globally. It is a quest for a theory to understand the source and role of adaptive change in systems. The Resilience Alliance has developed ways to identify, monitor and maintain or restore adaptive 'attributes' of social-ecological systems. The notion of 'attributes' was dubbed resilience and subsequently became the group's name. C.S. Holling, a Canadian ecologist, founded the Resilience Alliance in 1999. His work began on mathematical and experimental analysis of ecological processes mainly with predator/prey dynamics (Holling 1959). He has developed integrative theories of change that are practical to employ. Much of his work integrates systems theory and ecology with simulation modeling and policy analysis. Important ideas he has introduced include adaptive management (Holling 1978, Walters and Holling 1990), adaptive cycles (Holling 1992), resilience (Holling 1973) and panarchy (Gunderson and Holling 2002).

The Resilience Alliance sought out a new theory because the traditional responses to these problems are flawed and inadequate. Most conventional approaches do not

recognize the inherent uncertainty and unpredictability of evolving complex social-ecological systems. The Resilience Alliance believes these simple prescriptive, insufficient theories are continually used because they replace this uncertainty with the illusion of control and security. They have argued it is a pathology based on disciplinary gaps and deep limitations that arise from people's worldviews that create less resilient ecosystems, more rigid institutions, and deeper social dependencies.

There are three fundamental themes that underlie their exploration in the book, Panarchy: Understanding Transformations in Human and Natural Systems (Gunderson and Holling 2002). One theme is the research to find and measure resilience and the conditions that facilitate loss or renewal of resilience. The second theme recognizes that social-ecological systems are nested across scales. This means that systems are always part of greater, more inclusive systems. For example, the ecosystem of a log on the forest floor is a subsystem of the stand in which it is located, which in turn is a subsystem of the broader forest. Furthermore, human and natural scales are connected and if these scales are decoupled the learning and identification of these changes are lost. The ability to reorganize and renew a desired social-ecological systemic state following disturbance and change will strongly depend on the influences from states and dynamics at scales above and below. Such cross-scale aspects of resilience are captured in the notion of a panarchy. Panarchy is meant to encompass the resilience framework. C.S. Holling and Lance Gunderson developed the term "panarchy" to represent the unpredictable and complex nature of systems: "Pan" from the Greek God named Pan, symbol of the universe and personification of Nature, whose persona evokes an image of pandemonium and unpredictable change; and 'archy' from the hierarchial or nested nature of systems,

interconnected in a complex, highly dynamic, adaptive, and synergistic manner (Gunderson and Holling 2002: 25-62). The third theme is the collapse or adaptive change and transformation of systems. Systems cycle through a generally slow phase of accumulation of capital followed by a generally rapid phase of collapse and reorganization. This phase of the systems' cycle is important because, depending on the availability of novelty, the system will either transform and renew or transform and collapse.[8] The panarchy model provides a stylized representation of the formation, reorganization and transformation of systems and is introduced in the next section of this chapter.

Panarchy helps explain how systems (economic, ecological and social) transform, adapt and interact across different temporal and spatial scales. It contains the framework for understanding complex systems and the importance of elements and structures of resilience that enable a system to maintain adaptive capabilities in the face of change. The Resilience Alliance defines resilience in complex social and ecological systems as: (a) the amount of stress that the system can absorb and still remain within a given state; (b) the degree to which the system is capable of self-organization; and (c) the degree to which the system can build and increase the capacity for learning and adaptation (www.resalliance.org). Gunderson and Holling (2002) and Berkes et al. (2003) identify the following factors for dealing with dynamic and unpredictable social-ecological systems:

1) We must learn to live with change and uncertainty. Management can erode resilience by using rigid control in an attempt to maintain stable states. Such an

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[8] See Figure 3-1.

approach can disrupt flexible, creative and adaptive response mechanisms, leaving fragile social-ecological systems.

2) It is difficult to predict shifts in ecosystems therefore predictive methods must be replaced with risk spreading and insurance strategies to sustain social-ecological systems. It is key to nurture diversity – components of resilience for re-organization and renewal in the wake of unpredictable and complex perturbations.

3) Combining different kinds of knowledge is essential for resilience building management. The knowledge and wisdom of local users and interest groups can provide understanding of ecosystem dynamics.

4) Resilience building management must create opportunity for self-organization by being flexible and open to learning.

It is apparent from these works that resource managers must maintain or enhance system resilience in order to sustain social-ecological systems in the face of unexpected stresses. Berkes *et al.* (2002) highlight the social mechanisms behind the transformation of ecosystem management, the key role of active adaptive management and flexible community-based management structures for facilitating resilience building, and the importance of traditional ecological knowledge for linking ecological understanding with management structures. According to Olsson and Folke (2001), the challenge for policy is to stimulate institutional arrangements to be more in tune with ecosystem dynamics and to make linked social-ecological systems resilient to change. Folke *et al.* (2002) have developed three policy recommendations that were drawn from the synthesis of resilience research in the context of sustainable development. Policy should:

1)   Direct action to nurture elements of social/cultural and ecological resilience. Monitoring and nurturing variables of diversity provide insurance to cope with uncertainty.

2)   Facilitate adaptive management and encourage learning and building of local/traditional ecological knowledge into institutional structures. Adaptive management is a learning-by-doing approach that continually monitors and accumulates knowledge to match the dynamics and unpredictability in systems. The collective memory of experiences can be drawn on my managers at multiple levels in an institutional structure.

3)   Facilitate arenas of flexible, open, multi-level governance i.e adaptive co-management. This type of governance would generate a diversity of management options that are key to responding to unpredictable perturbations. Adaptive co-management systems are community-based therefore management is tailored to specific situations and supported by a diverse set of interest groups from different scales, from local to international.

Based upon this promising research I use panarchy, in Chapter 5, to analyse the AMB structure at Gwaii Haanas. Gwaii Haanas represents a very complex social-ecological system and since the mid 18th century there has been increasing pressure on the ecological and cultural systems of this area. Now, the AMB, a co-management governance structure, is responsible for the sustainability of this social-ecological system.

Subsequently, it is critical to analyse this structure to determine if it is capable of managing Gwaii Haanas sustainably.

I begin the present chapter by describing the panarchy model as a stylized representation of how complex systems function across temporal and spatial scales. This is followed by a critique of conventional 'command and control' resource management. I then discuss in detail the key roles of active adaptive management, flexible community-based management structures, and traditional ecological knowledge for building ecological resilience as set out by panarchy theorists.

3.2   THE PANARCHY MODEL

Panarchy is best explained by using a model. The panarchy model is a stylized representation of the four functions of a dynamic social and/or biophysical system. The four functions are: 1) entrepreneurial exploitation (r); 2) organizational consolidation (k); 3) creative destruction (Ω); and re- or de-structuring (α). There relationships are summarized in Figure 3-1. To help illustrate this model, I will apply it to two systems: a forest system (stylized in Figure 3-2), and a social system (stylized in Figure 3-4).
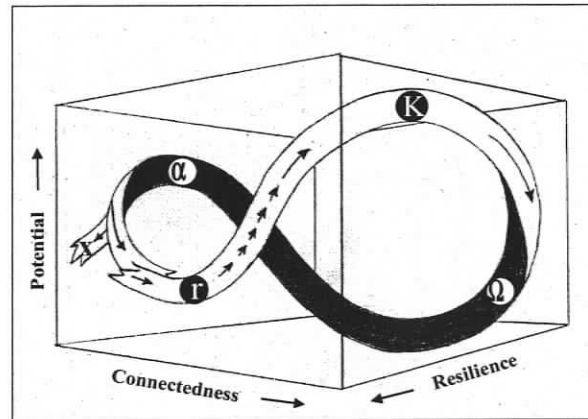
Figure 3-1. Panarchy model: representation of the four functions of a system: entrepreneurial exploitation (**r**); organizational consolidation (**k**); creative destruction (Ω); and re- or de-structuring (***a***). Arrows indicate flow in the cycle. Short arrows indicate slow changes and long indicate rapid change. The y-axis is the degree of accumulated potential[9] which sets limits to the number of alternative options for the systems trajectory. The x-axis is the degree of connectedness[10] which determines the degree to which a system can control its futures. The z-axis is the resilience of a system and how vulnerable it is to disturbance. The **X** is a stylization of how potential can leak away[11] resulting in the system organizing down to a less productive state. (Adapted from Holling and Gunderson 2002: 34-41).

Forest System

In the "r phase" of a forest system, the residual biomass and biotic legacies (such as seeds and snags) make up the pioneer stage characterized by an aggressive and fast sequestering of space, nutrients, light, and water by fast-growing pioneering species. In

[9] The potential for ecological, social, or economic change can be expressed and measured in ways specific to specific situations or systems. Ecosystem potential, for example, could be represented by potential productivity – the potential provided by the amount of biomass, physical structure, and nutrients accumulated as a consequence of ecosystem successional dynamic. Social or cultural potential could be represented by the character of the accumulated networks of relationships – friendships, mutual respect, and trust among people and between people and institutions of governance. In the economy, potential could be represented by the economic potential provided by accumulated usable knowledge, inventions, and skills that are available and accessible. (Holling and Gunderson. 2002; 49)

[10] Connectedness reflects the strength of internal connections that mediate and regulate the influences between inside processes and the outside world – essentially the degree of internal control that a system can exert over external variability. An organism, ecosystem, organization, or economic sector with high connectedness is little influenced by external variability; its operation and fate are controlled by internal regulatory processes that mediate variability. (Holling and Gunderson. 2002; 50)

[11] 'Leak away' is when some of the accumulated resources literally leave the system. For example the leaching away of nutrients in the soil.

the model this is expressed by the progression from r to k, expanding, growing and accumulating potential from resources such as carbon, nutrients and biota (Holling and Gunderson 2002). As the forest grows older and matures toward k, resident species begin to develop more complex ecological relationships, and species less able to adapt are out-competed (Holling and Gunderson 2002). The maturing forest develops systems of relationships between elements that control variability (such as temperature) and ensure the certainty of nutrient and resource transfer to the canopy trees. The transition from r to k is relatively slow, predictable, and more connected, but this increases the systems rigidity and vulnerability (Holling and Gunderson 2002). "In the forest, fuel for fires and food for insect defoliators reach critical levels as processes that inhibit fire propagation (e.g., fire 'breaks' and natural openings) and inhibit insect population growth (e.g., avian predation) are homogenized and diluted" (Holling and Gunderson 2002: 44). At this point a trigger, be it insect defoliators or a dry spell that initiates a fire, releases the accumulated resources from the k-state. The shift from k to Ω is a relatively fast process. In the above examples this process ends when the insect pests run out of food or when the fire runs out of fuel. The Ω to α-phase is composed of "potential left over from the resources that were accumulated in the mature forest (k-phase), dead branches and tree trunks not consumed by fire or insects, the nutrients released by decomposing organic material, the seed banks established in the soil, the animals and propagules that move over small and large distances" (Holling and Gunderson 2002: 45). The Ω to α part of the cycle represents a sudden increase in uncertainty, because there are residual resources or elements that are no longer consolidated, no longer involved in the forest growth or maintenance. The forest is going through a re-organization, with weak interactions

between elements.
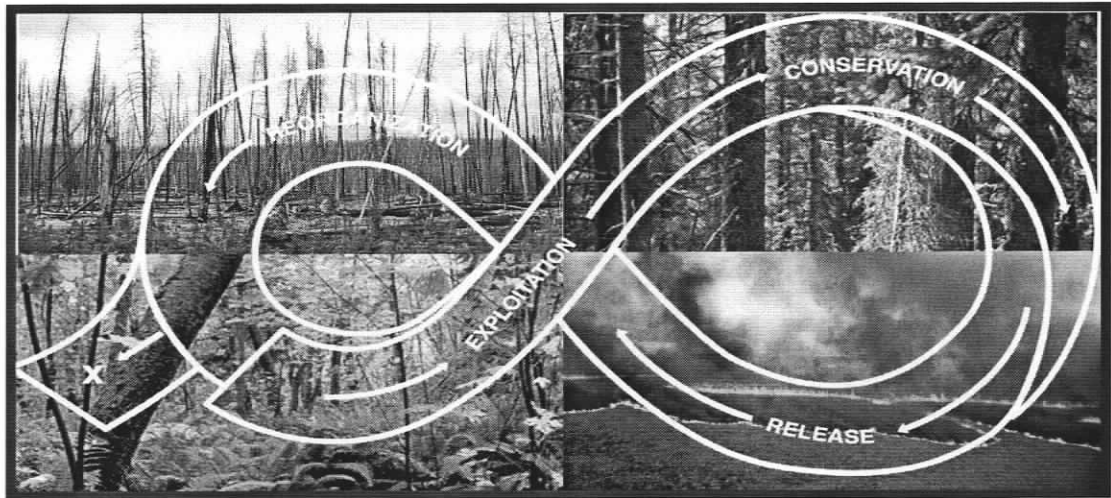
Figure 3-2. A stylized representation of forest succession using the panarchy model. The bottom left quadrant represents the r-phase where there is extensive dispersal and rapid growth of plant species during the pioneer stage. The top right quadrant represents the k-phase where there are slow growth rates and the maximum population growth is obtained during the climax stage (mature forest). The lower right quadrant represents the omega-phase where the accumulated biomass and nutrients have increased the fragility of the forest system resulting in a sudden fire and release of biomass. The top left quadrant represents the alpha-phase where there is innovation and restructuring of the nutrients and biomass in the soil.

Until the r-phase, nutrients and resources released by the perturbation (in this case the fire, or insect outbreak) begin to leak away. This is stylized by the 'x' in the panarchy model. "[T]he total expected associations and re-combinations that are possible in the α phase make it impossible to predict which events in this phase will survive to control subsequent renewal" (Holling and Gunderson 2002: 46). In other words, the ability of a system to adapt or renew itself depends on the availability of novel or legacy elements. In the case of the forest system, the elements of novelty would be the nutrients, organisms and elements made available by a source forest,[12] a source from which organisms and seeds may disperse to recolonize the area.
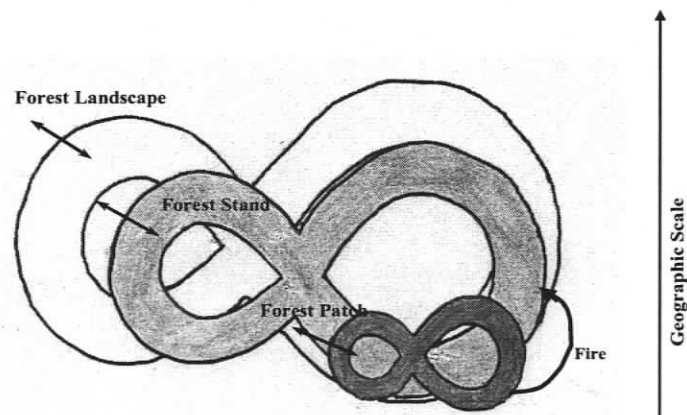
Figure 3-3. A stylized representation of nested forest systems from forest patch, forest stand to forest landscape. A fire which is ignited in a forest patch spreads to the surrounding stand. The larger, surrounding forest landscape provides source elements to help the forest stand recover, such as seeds, shade, soil stability, organisms, etc. (Adapted from Blann *et al.* (2003: 211).

These elements of novelty may not be apparent during the r-to-k phase. For example some pine seed cones are released to germinate only when cones are exposed to intense heat (i.e. fire). In Figure 3-1 you can see how the Ω to α phase is a period of low connectedness and high resilience. The residual resources or elements that are no longer

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[12] See Figure 3-3.

connected, no longer involved in the forest growth or maintenance, are permitted to recombine into novel assortments. Resilience is increased or expanded because those novel combinations provide creative experimentations and system-wide costs or failure are low (Holling and Gunderson 2002: 40).

Social System

The following describes how the model can be used to depict social systems. I will draw upon Joseph Tainter's book The Collapse of Complex Societies (1990). Tainter describes nearly two dozen complex societies over a 2,000-year period using a framework that models the creation, function, operation and collapse of these societies. His approach to the dynamic cycling of social systems is similar to that of the panarchy model. The rise and collapse of human societies is recurrent throughout history. The most widely known instance of collapse is the fall of the Roman Empire. By 27 B.C. Rome had extended its domination over the Mediterranean and into northwestern Europe. By 476 A.D., only about 500 years later, the Roman Empire had collapsed due to resource depletion, barbarian invasions, plagues, civil wars, and economic crises. It is obvious that if the great military power and vast empire of Rome could collapse then contemporary societies are not immune. For example Figure 3-4 depicts the rise and fall of the U.S.S.R using the panarchy model.
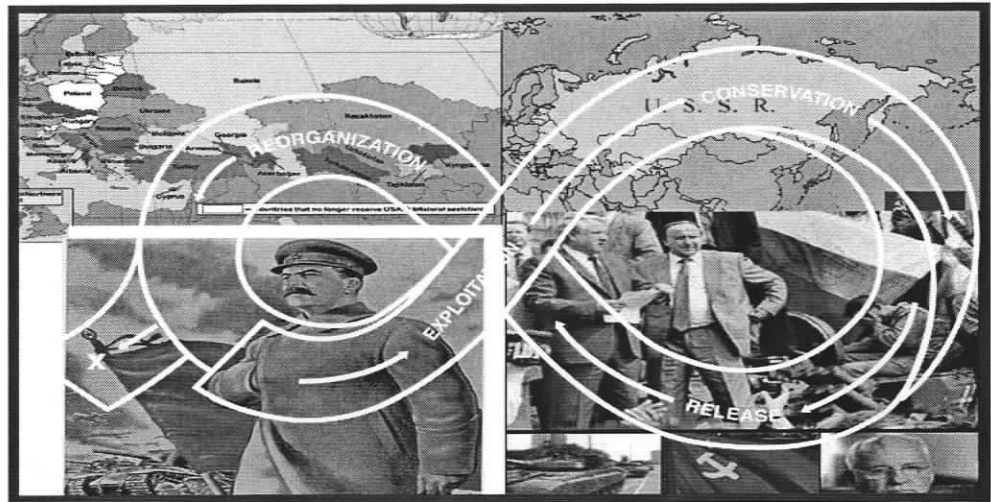
Figure 3-4. A stylized representation of a social system, the rise and fall of the U.S.S.R, using the panarchy model. The lower left quadrant is the constant mobilization of resources and investment in coercion to establish a society. At the upper right quadrant the sociopolitical organizations constantly encounter problems that require increased investment to preserve the status quo, for example increased size of bureaucracies, increase cost of internal control and external defense. The lower right quadrant is where the various segments resist and attempt to break away when the marginal cost of investment in such a large and complex bureaucracy becomes too high. At the upper left quadrant the society has dissolved into smaller, simpler, less stratified and less socially differentiated parts. It is an economizing process to restore the marginal return of organizational investment to a more favorable level.

In the model I have depicted Stalin in 1927 when he took power of Russia after Lenin's death. When he came to power he immediately set out to transform Russia into a rich and strong socialist state independent of the West by increasing the rate of industrialization and collectivization of agriculture. By the late 1930's as the war threat increased, more attention was shifted to heavy industries and light industry, the production of consumer goods was neglected in favor of armaments. Russians paid dearly for their success in rapid industrialization and strength in the Second World War. They were receiving low wages and little in the way of consumer goods. The success during this period of time can be attributed to the tight control of the Communist

government. The period after Stalin's death, 1953, ushered in the Cold War which, was marked by the nuclear arms race with the U.S.A. The period from 1985 to the present, with such political leaders as Gorbachev and Putin, was marked by the growth of separatist movements and the fall of "the iron curtain".

According to the stylized representation of the rise and fall of the U.S.S.R in Figure 3-4, the r-phase represents the constant mobilization of resources and investment in coercion to establish the U.S.S.R or societies in general (Holling and Gunderson 2002). Food, energy, and raw materials go from being easy to acquire to being much costlier, yielding no higher returns. Research and development move from being generalized knowledge (that is widely applicable and obtained at little cost), to specialized topics that are more narrowly useful, are more difficult to resolve, and are resolved only at great cost (Tainter 1990). By the k phase, sociopolitical organizations constantly encounter problems that require increased investment merely to preserve the status quo. For example, the increased size of bureaucracies, the increased cost of internal control, and escalating external defense costs. At the Ω phase the society is in danger of collapse due to one of two factors: decomposition or external stress. Decomposition is when the marginal cost of investment in complexity (e.g. the expanded Roman Empire) becomes too high, and various segments will resist and attempt to break away. When major external stresses such as economic change or war arise there is little or no reserve with which they may be countered because so much is being allocated to operating needs (Tainter 1990). At the α phase the society has dissolved into smaller, simpler, less stratified and less socially differentiated parts. It is an economizing process to restore the marginal return of organizational investment to a more favorable level.

3.2.1   Panarchy: Nested and Interconnected Systems

The above examples illustrate general ways in which open biophysical and social systems tend to function, transform and adapt. The second important feature of systems is the spatial and temporal connections between systems. As mentioned earlier, systems are hierarchial, there are systems within systems that are within systems. Every system is always part of a greater system. For example the ecosystem of a log on the forest floor is a subsystem of the stand in which it is located, which in turn is a subsystem of the broader forest. Likewise, a socio-political unit, such as Latvia or the Ukraine that were once part of the U.S.S.R., can revolt and break away from a larger nation when it becomes too costly for it to remain a part within it. The concepts of such perturbations and their associated sources of renewal are demonstrated by panarchy in a hierarchial depiction of systems (Figure 3-5). During a system's destruction and re-organization phase, there are opportunities for reshuffling and readjusting of components to maintain adaptive capabilities and interactions across levels to provide a degree of integrity and security. Three selected levels of a system are illustrated to emphasize two connections that are critical in creating and sustaining adaptive capability. "One is the "revolt" connection, which is a critical change in one cycle that cascades up to a vulnerable stage in a larger and slower system. The other is the "remember" connection, which facilitates renewal by drawing on the potential that has been accumulated and stored in a larger, slower system" (Holling *et al.* 2000: 75). Panarchy provides a framework for understanding the complexity of systems, making it possible to identify stages within the cycle, within a system most receptive to change. Understanding these components and

how they interact enables us to effectively enhance the resilience and sustainability of systems, be they ecological, economic, political or institutional.
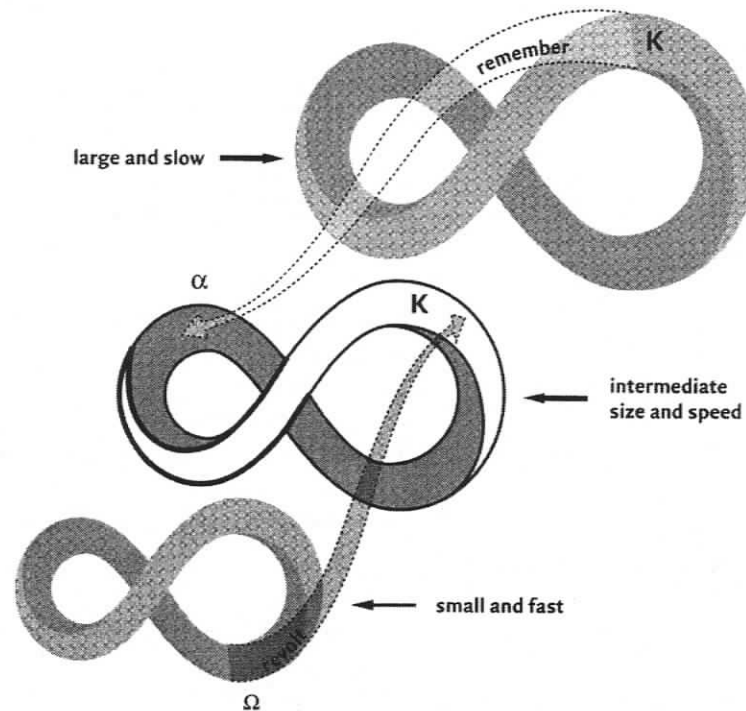
Figure 3-5. Three selected levels of a panarchy illustrating the hierarchial nature of systems. Two connections of the panarchies are critical in creating and sustaining adaptive capability. The "revolt" connection, which can cause a critical change in one cycle to cascade up to a vulnerable stage in a larger and slower one. The other is the "remember" connection, which facilitates renewal by drawing on the potential that has been accumulated and stored in a larger, slower cycle. (Holling *et al.* 2002: 75)

3.2.2   Current Approach to Understanding Resource Development and Conservation

By using the panarchy model one can begin to conceptualize how the dominant approaches to resource management and environmental conservation is often unsustainable. These approaches focus on the "front loop"[13] only (the r to k-phase of the panarchy model) of biophysical systems. Current resource development attempts to maintain economic growth by controlling processes and simplifying landscapes, and a

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[13] See Figure 3-6.

result often unanticipated, is decreasing biodiversity. This can be seen, for example, in biological pest control efforts. These efforts, such as those used in agricultural insect control, maintain large tracts of monoculture. This leads to the successful growth of host crop plants and therefore, favorable conditions for the survival and propagation of resistant pests. Environmentalists and nature conservation movements also tend to focus on the "front loop" by attempting to preserve nature "as-is". In 1988, after 116 years of fire suppression, 1.6 million acres of Yellowstone National Park (1/2 of the park forest by area) burned in one summer. Fire suppression over such a long period of time had created a dominant single age stand of old trees with large amounts of debris accumulating on the forest floor. If fire had been allowed to move through the landscape there would have been a mosaic of different stand ages creating nature 'fire breaks' throughout the landscape (Pyne 2003). Parks Canada is currently moving away from fire suppression mandates in some of its parks, and is attempting to actively set controlled fires to keep large tracts of mature forest from becoming 'tinder boxes'. The higher the progression in the k-phase of a system the more rigid, less resilient, and the more vulnerable a system becomes to an imposed stress. According to Holling and Gunderson (2002:44), "as the system evolves toward the conservation phase, k, connectivity among the flourishing survivors intensifies, and new entrants find it increasingly difficult to enter existing markets. The future seems ever more certain and determined." From the r to the k phase there is a shift from those entities that adapt to external variability and uncertainty to those that control variables to streamline options for efficiency. Low resilience results in structural vulnerability, which precipitates crisis and transformation. For example, a dry season could ignite fires or a pest outbreak could sweep through an

entire ecosystem/stand community and completely change the physical and biological structure and composition of an entire area.
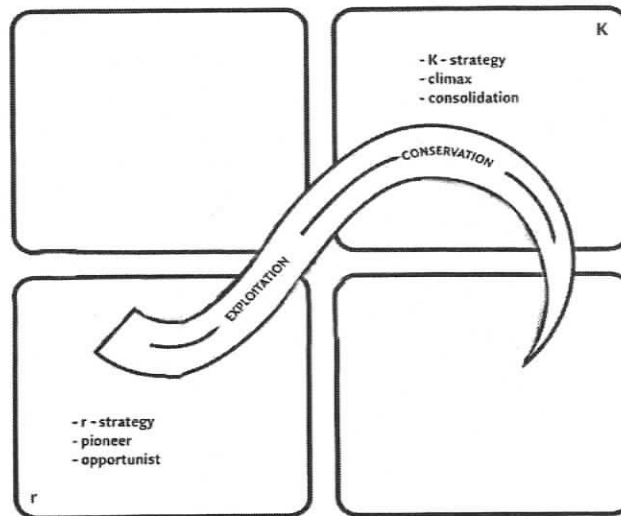
Figure 3-6. The "front loop" of the panarchy model. Adapted from Berkes *et al.* (2003: 17)

Many times the k-Ω phase of one system can cause a domino effect in another. Chris Bright (2000) describes how human-caused deforestation in Honduras compounded the effects of a hurricane in 1998, killing hundreds of people and leaving many more homeless as a result of mudslides and flooding. Forests provide stability to slopes, which would otherwise be washed away by rain and wind. Additionally, technology and subsidies can worsen situations by masking the feedback from the environment re-enforcing the perception that humanity is independent of nature and that the dynamics of a system can be understood in isolation of one system from another (Folke *et al.* 2002). "Technological masking" took place during the cod fishery collapse in Newfoundland, Canada. The Department of Fisheries and Oceans' (DFO) scientists used population assessment methods for the cod stocks that were ostensibly scientifically sound. But

ultimately wild fish populations were managed indirectly through the socio-economic enterprise of commercial fishing.

How can current approaches to resource management and conservation be counteracted? According to panarchy, this is accomplished by shifting the focus of management from the front loop to include the back loop.[14] Where the "front loop" is fairly predictable the "back loop" is rapid and unpredictable. According to Laszlo (1987), we cannot predict the trajectory of a dynamic system. However, if there is sufficient diversity in its components and sufficient complexity in its structure, it will have the capacity for persistence or reorganization under a wide range of conditions and fast reaction rates (Laszlo 1987). If there is not sufficient complexity, then the system will collapse under stress or perturbation into its component parts. Systems that are robust have diverse processes that structure and organize elements in the system. Referring back to the panarchy model, a systems' resilience expands and contracts as depicted in Figure 3-1. After a disturbance (Ω-phase) there is low connectedness, which permits novel re-assortment during the α to r phase of elements that were previously tightly connected to one another in the k-phase (Holling and Gunderson 2002). For example, a tree that was once taking up nutrients and growing will die and fall over onto the forest floor and become what is referred to as a nurse log. The dead tree becomes a source of nutrients and material for other organisms and is slowly broken down into the soil. During the high resilience point of the cycle of a system (α-phase) there is opportunity for testing of novel combinations (creative experimentation). Since the Ω-phase is unpredictable, managers must work to enhance elements, tools and structures in the α to r phase to enhance and ensure system sustainability. This is referred to as

[14] See Figure 3-7.

"putting the brakes on release" in Figure 3-7. According to Folke *et al.* (2003: 358) "management that actively behaves like disturbance is one of a sequence of practices, ecological and social, that generates resilience. It appreciates the role of disturbance in development and includes monitoring and ecological understanding of ecosystem condition and dynamics embedded in social institutions".
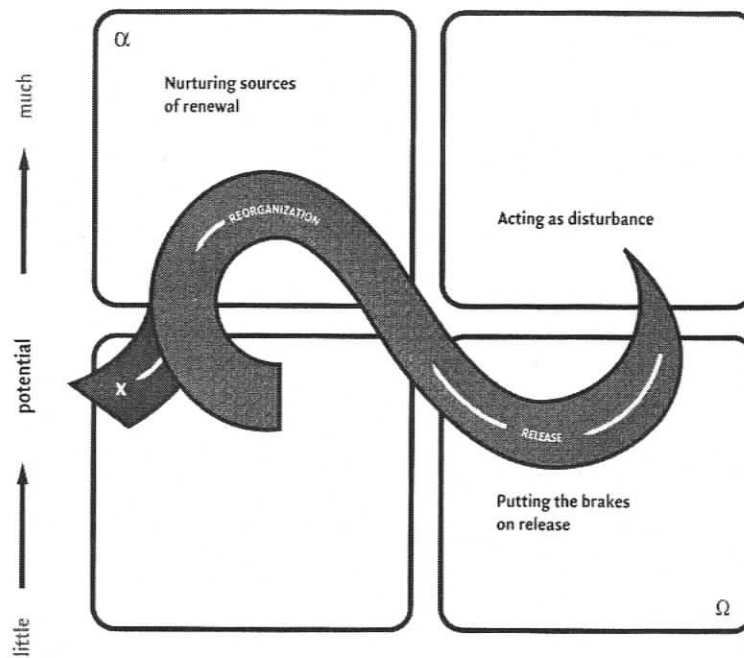
Figure 3-7. The "back loop" of the Panarchy model (Folke *et al.* 2003: 358).

For example one such management tool is adaptive management. This key idea will be discussed in detail in Chapter 5 in terms of how an institutional structure such as the AMB can facilitate resilience building into management. The following section is a detailed discussion of the essential role of resilience and the elements (ecological and social memory), tools (adaptive management) and structures (adaptive co-management) needed for renewal and re-organization.

3.3   ELEMENTS OF RESILIENCE

Two key elements for building resilience are ecological memory ("legacy") and social memory.[15] Memory is the accumulated experience and history of the system, which provides the sources for self-organization and resilience (Folke *et al.* 2003). Memory has three key functional aspects for sustaining adaptive capacity: the legacies, support areas or reservoirs and their functional links. Ecological memory consists of a diversity of species within and between functional groups (e.g. photosynthesizers, pollinators, decomposers, etc.) These groups act as biological legacies subject to disturbance and as mobile species in functional groups that link the disturbed area to other areas. Support areas provide habitat for the functional groups of mobile links.

ECOLOGICAL MEMORY
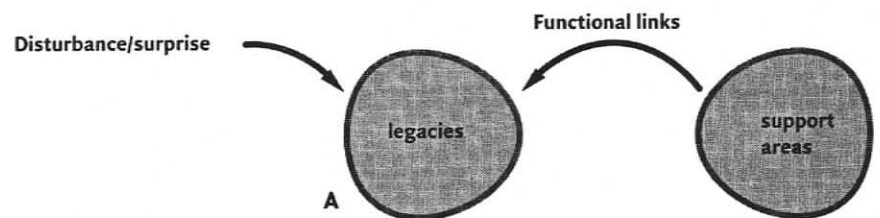
SOCIAL MEMORY
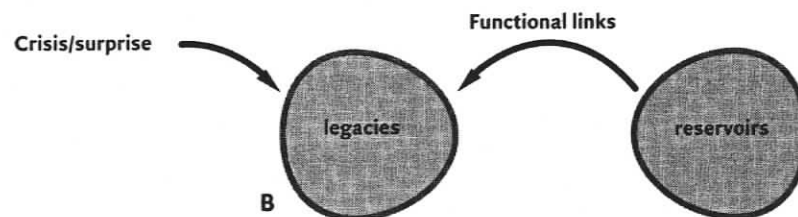
Figure 3-8. Ecological memory and social memory, key elements for building resilience. These have three key functional aspects for sustaining adaptive capacity, the legacies, support areas or reservoirs, and their functional links. (From Folke *et al.* 2003: 364)

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[15] See Figure 3-8.

Social memory consists of a diversity of individuals, institutions, and organizations. Each has different but overlapping roles within and between critical groups (e.g. knowledge carriers, and retainers, interpreters, leaders and stewards.) The groups exist as a legacy for the system experiencing the perturbation and as individual functional links that enter from outside the system to take advantage of the space created by the perturbation. They draw on reservoirs of practices, knowledge, institutions, cultural values, and worldviews. The following example illustrates how a community can learn and evolve when faced with challenging and unexpected events. It also demonstrates the role of traditional stewards and elders as leaders and knowledge carriers for collective decision-making.

In Sacred Ecology: Traditional Ecological Knowledge and Resource Management, Berkes (1999) chronicles how in the 1980's the Chisasibi Cree in the James Bay area learned to deal with the variability in caribou numbers and control over-hunting. The caribou case examines how the hunting ethic of the Cree was changed by crisis-forced learning and adaptation by their traditional management institution.

As described by Berkes, a disappearance of the caribou in the 1910's was unambiguously linked to a big, wasteful hunt at Limestone Falls as remembered through oral history. However, the strong social value among the Cree provides the support and necessary social coercion to help the hunter remain ethical. A case where this social value came into play was in the 1980's when the caribou population exploded and the overkill of caribou began again. To stop this transgression the elders gathered the hunters and reminded them of the ancient prophecy that the caribou would return (after the 1910 collapse) and the well-known story of the caribou overkill at Limestone Falls. The lesson

of the transgression, once learned, had been passed on through the elders, surviving 70 years in the Cree oral history to be used in time to redesign the hunting system when the caribou returned. This is an example of "social learning in which elders, manage cross-generational information feedbacks to make sense of resource intervention outcomes" (Berkes 1999: 95). In this case "elders and stewards provide leadership, carry and transmit knowledge, and sometimes reinterpret new information to help redesign management systems" (Berkes 1999: 95). The change in hunting ethic by the Cree through crisis-forced learning and adaptation by their traditional management system can also be referred to as adaptive management.

3.4   ADAPTIVE MANAGEMENT: DEVELOPING TOOLS FOR RESILIENCE BUILDING

Adaptive management is a major tool for building resilience. It allows for different management policies to be tested and it emphasizes institutional and social learning as we use and manage resources. It monitors and accumulates knowledge along the way, and it constantly adjusts the rules that shape our behavior to match the dynamics and uncertainty inherent within the system (Gunderson and Holling 2002). Adaptive management is a precautionary approach that attempts to provide buffers to protect a system from the failure of management actions that are based upon incomplete understanding (Folke *et al.* 2002). The discourse surrounding adaptive management has grown since Holling's (1978) book, Adaptive Environmental Assessment and Management.[16]

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[16] Major books and scientific articles include: Holling (1978), Gunderson and Holling (2002), Berkes and Folke (1998), Berkes *et al.* (2000), Berkes *et al.* (2003), Walters (1986), Ostrom (1999), and Gunderson *et al.* (1995).

A number of researchers have pointed out the similarities between adaptive management traditional systems of resource management. For example Fikret Berkes in Sacred Ecology: Traditional Ecological Knowledge and Resource Management (1999: 126) stated that "traditional management can be reinterpreted as adaptive management. Alternatively, adaptive management can perhaps be considered a rediscovery of traditional management". Berkes (1999) explored the Cree fishery system at James Bay in detail, and noted that the Cree have three management practices based on reading environmental signals (mainly the catch per unit effort): 1) concentrating fishing effort on aggregations of fish; 2) rotational or pulse-fishing; and 3) the use of a mix gill net mesh sizes. Similar to the policies of adaptive management agencies, the Cree have customary practices that contribute to community exchange networks. Also, as with formal management policies, the Cree have institutions in which elders and stewards provide leadership, carry and transmit knowledge, and sometimes reinterpret new information to redesign management practices. The case of species selectivity of gill nets is an example of adaptive management where Cree fishers were able to conceive and carry out field experiments (Figure 3-9).
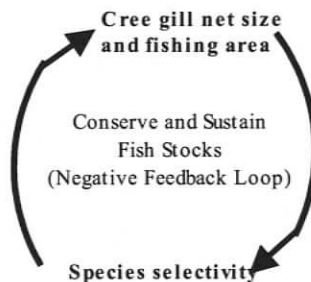
Figure 3-9. Cree traditional gillnet fishing.

The Cree combine the system of using differing gillnet sizes and rotation of fishing areas to conserve and sustain fish stocks.

In turn, this similarity is pointed out by Winterhalder (1983) in <u>The boreal forest,</u> <u>Cree-Ojibwa foraging and adaptive management</u> where Cree-Ojibwa hunters of Northern Ontario, as experts in using resources in the Subarctic, used flexible and adaptive strategies to cope with the unpredictability of Subarctic conditions. And more recently, Olsson and Folke (2001) have explored the role of local ecological knowledge in building adaptable management responses regarding watersheds in Sweden.

According to panarchy theorists social and ecological systems are linked and that social and ecological resilience requires an understanding of systems that incorporate the knowledge of local users. Management systems are an accumulation of knowledge developed by local communities through long-term trial and error and through learning-by-doing with change and crisis (Folke *et al.* 2002). Such knowledge systems integrate moral and religious beliefs with management, and in many cases, these belief systems have co-evolved to be sensitive to the attributes of the ecological system (Berkes and Folke 2002). Thus, environmental knowledge and practices are embedded within a culture, which is carried through generations, constantly changing and adapting.

Figure 3-10 depicts how traditional environmental knowledge is embedded within social institutions and worldviews. In this diagram Berkes (1998) represents how the different levels of traditional knowledge and management systems are nested within one another. Local knowledge and understanding of the environment, including behavior and habits of animals, represent a primary level. Management of resources, the tools and practices specific to a specific system, are the next level. The third level refers to the social organization that is required to ensure co-ordination, co-operation, rule making and enforcement of management, and the fourth level refers to the "worldview or cosmology,

which shapes human-nature relations and gives meaning to social interactions" (Berkes 1998: 125).

Jane Stevens (1994) in <u>Engineered Paradise</u>, describes how practice, belief and institution are linked in her exploration of Balinese rice farming. The Balinese had developed a successful agroecosystem due to three interlocking processes, as described in the research of Stephen Lansing (anthropologist), that inextricably link the people with their environment through belief systems: the islands, hydrological landscape of deep canals, water temples and social organization. Balinese farmers successfully linked their irrigation cycles to natural ecological cycles. Furthermore, the religious structure of their water temples paralleled the water flows and cycles, in effect linking each farmer's planting and irrigation schedules across the landscape.
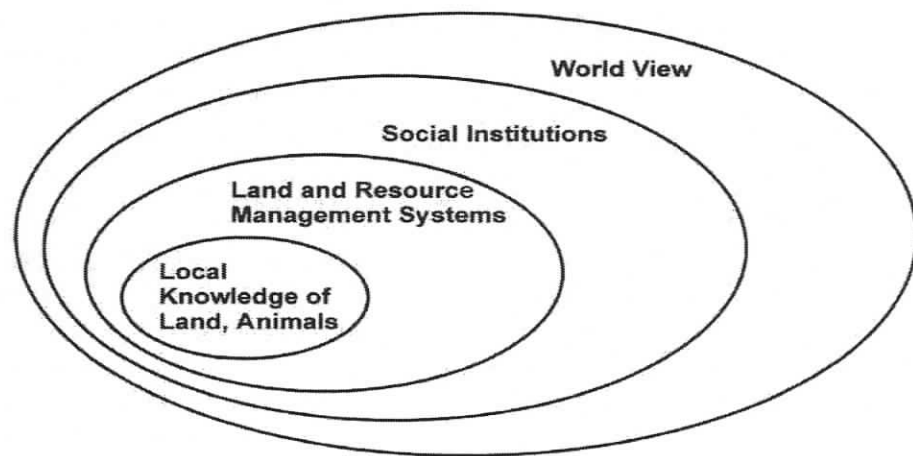
Figure 3-10. Levels of analysis in traditional knowledge and management systems from Berkes (1999:13).

3.5 ADAPTIVE CO-MANAGEMENT: INSTITUTIONAL STRUCTURES FOR RESILIENCE

In order for adaptive management to effectively support ecological resilience, local communities should be linked with other institutions both vertically and horizontally (Folke *et al.* 2002). Nesting communities within other institutions is an attempt to link ecological systems and management institutions through ecological knowledge and understanding from local practitioners and scientists (Berkes and Folke 2002). Figure 3-11 depicts a management institution nested within ecological and social systems, and shows schematically how linking these two systems in a management setting requires the inclusion of local community environmental knowledge and understanding. The most ideal arrangement for linking these two systems, according to panarchy theorists, is adaptive co-management, where flexible community-based systems of resource management are tailored to specific situations, and are enacted (working) in collaboration with concerned government agencies. The rationale is that these different institutional levels provide diversity in terms of function and response (Pinkerton 1998). Overlapping organizations can provide and enhance conflict resolution and share knowledge to yield greater resiliency. This last point was demonstrated earlier in the description of the panarchial nature of systems. In many cases the local community held environmental knowledge and understanding to which panarchy theorists refer is culturally based. In other words, it is apparent that traditional ecological knowledge is key in linking management institutions with environmental understanding and effective management practice. Important issues relating to traditional ecological knowledge and its application have been emerging over the past 20 years. However, amidst the general

rhetoric there is a lack of literature addressing ways in which culturally based knowledge and perspectives can be meaningfully included/reflected in co-management structures. The following section gives a detailed analysis of traditional ecological knowledge. This topic will be addressed in Chapter 5 in relation to Gwaii Haanas.
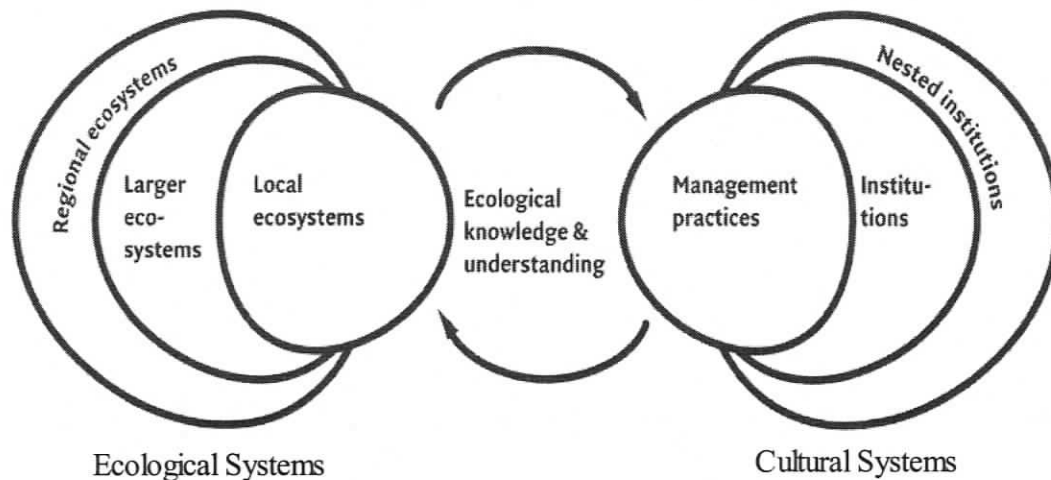
Figure 3-11. Conceptual framework for the analysis of linked social-ecological systems (Berkes and Folke. 2002: 124).

3.5.1 Traditional Ecological Knowledge: Linking Management Institutions with Environmental Understanding

Beginning in the early 1990's there has been a substantial amount of literature written about the potential benefits of collecting and applying traditional ecological knowledge (TEK). These benefits include improving scientific research, management and information, and providing a new holistic and ethical model for understanding the environment. However, despite several examples illustrating the utility of using TEK, the wider application of TEK derived information remains elusive. There has also been little success in the integration of traditional and scientific knowledge despite the duration, intensity, and interdisciplinary nature of efforts. It is obvious to many social

scientists, such as Cruikshank (1998) and Nadasdy (1999), that the political, perceptual, ethical and methodological barriers surrounding this issue come from the very nature of TEK. TEK is inextricably linked to the cultural context and language in which it is embedded. This section of the thesis will explore the definition of TEK and provide a critical analysis of the related literature that has accumulated. Furthermore, I will demonstrate how essential an institutional structure with equitable decision-making power is for bringing or facilitating TEK into a higher level of the management process. A bottom-up, power sharing arrangement helps retain the contextualized nature of TEK more fully, since it is brought in through the individuals, the local people and knowledge holders, who are directing and taking part in management and decision-making at a higher level.

According to Berkes *et al.* (2003) and Berkes and Folke (2002), traditional or local ecological knowledge is a necessary component of resilience building and is key in linking management institutions with environmental understanding and effective management practice. Therefore, it is essential in this thesis to discuss the complexity of TEK and the importance of institutional structures in facilitating the meaningful inclusion of TEK. Furthermore, this analysis emphasizes the importance of the political context between Aboriginal nations and the Federal and Provincial Government of Canada in regards to protected area management. Chapter 5 will discuss how the power-sharing of the AMB is essential for applying TEK in management and maintaining a successful and healthy relationship between Parks Canada and the Haida Nation.

Defining Traditional Ecological Knowledge

The term 'TEK' appears in <u>Lore: Capturing Traditional Environmental Knowledge</u> edited by Martha Johnson (1992). This book was based on papers produced from a 1990 international workshop on TEK, organized by the Dene Cultural Institute, a cultural exchange between researchers in developing countries and Canadian Aboriginal community members and researchers. Drawing on a background in both environmental studies and anthropology, Martha Johnson, a former director of the Dene Cultural Institute, has done extensive work in Canada's North. She defines traditional environmental knowledge in the introduction of Lore as (1992: 12):

> A body of knowledge built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use. The quantity and quality of traditional environmental knowledge varies among community members, dependent upon gender, age, social status, intellectual capability, and profession. With its roots firmly in the past, traditional environmental knowledge is cumulative and dynamic, building upon the experience of earlier generations and adapting to new technological and socioeconomic changes of the present.

Her work includes one of the most complete and comprehensive descriptions of TEK in the literature. She conceptualizes this knowledge of culture and qualifies "tradition" as cumulative and dynamic.

Johnson (1990) uses the term environmental instead of ecological in "TEK". The terms environmental and ecological are very similar and have been used interchangeably.

However, there are authors who use traditional ecological knowledge, indigenous knowledge, local knowledge, traditional ecological knowledge and wisdom etc., to differentiate and avoid certain stereotypes that can be associated with these terms (e.g. Berkes 1999, Agrawal 1995, Cruikshank 1998, and Turner *et al.* 2000, respectively). Despite the international use of TEK there is no universally accepted definition of "traditional ecological knowledge". It is evident from the array of terms used to refer to TEK that the ambiguity of the words "traditional" and "ecological knowledge" can be controversial and therefore force authors to seek out terms they find more acceptable.

According to David Lertzman (1998), a social scientist whose area of expertise centers on aboriginal/resource industry relations, and the integration of western science and traditional ecological knowledge, the term 'TEK' is a misnomer for two reasons: (1) Using the term 'traditional' insinuates an antiquated and stagnant character to that which is a lived experience with evolving social norms and practices; and (2) By definition "knowledge" is facts or experiences known by a person. This term lends a shallow character to the "outcome of a complex system of social relations and institutions, founded upon certain beliefs and values, mediated by the practices or oral cultural tradition" (Lertzman 1998: 158). He has recognized five main features of TEK from his review of the literature (p. 165):

    i.)   A spatial aspect: i.e. it is located in a certain place;

    ii.)   A temporal nature: i.e. it is handed down through many generations;

    iii.)   Culturally located: i.e. it functions as part of a larger worldview in a cultural system; and

    iv.)   Socially mediated: i.e. it is transmitted through social institutions.

Methodology: the fifth feature, which, although not often noted in the literature, is implicit. It relates to the methodological aspects of TEK, of how knowledge is accessed, assessed, verified and transmitted, which some seem to refer to as procedural knowledge. Lertzman finds this to be one of TEK's more notable features.

For some tradition is cumulative and open to change. Nancy Turner, an ethnobotanist who has done extensive work in British Columbia, claims that some of the Aboriginal communities she works with believe it gives their knowledge an edge of cultural continuity derived from a long history of experience (Pers. comm. 2003). She also believes that using the term TEK is advantageous because it is an internationally shared term. Eugene Hunn (1993: 13), an anthropologist, explains:

New ideas and techniques may be incorporated into a given tradition, but only if they fit into the complex fabric of existing traditional practices and understandings. Thus traditions are enduring adaptations to specific places…. Traditions are the products of generations of intelligent reflection tested in the rigorous laboratory of survival. That they have endured is proof to their power.

Many scholars such as Arun Agrawal (1995), a political scientist, and Paul Sillitoe (1998), an anthropologist, avoid the debate over tradition by using the term indigenous knowledge. Several of Agrawal's articles interrogate the concept of indigenous knowledge and the strategies its advocates present to promote development. He uses indigenous knowledge for lack of a better word. According to Agrawal (1995), ambiguous labels such as "indigenous" and "western" are obscuring the obvious need to safeguard the interests and autonomy of "indigenous" peoples. Sillitoe (1998), like

Agrawal (1995), is concerned with the battle of perspectives and lack of theoretical or methodological coherence around this issue. "The current debate over whether it is justifiable to talk about indigenous knowledge illustrates the need for an anthropological contribution in that it ultimately questions the discipline's reason for existence" (Sillitoe 1998: 224). The opportunities for anthropology to advance understanding in indigenous knowledge and practice, as seen by Sillitoe (1998), will be covered later in this paper.

The term "ecological knowledge" can be problematic on its own. TEK can become a problematic term if ecology is narrowly defined as a branch of biology concerned with the relationships between living things and their environment in the domain of Western science (Berkes 1999: 6). In the Cartesian Newtonian paradigm, scientific descriptions are believed to be objective, therefore independent of the human observer and the process of knowing. Conversely, if ecology is broadly defined to refer to the knowledge, however acquired, of relationships of living things with one another and with their environment, then the term can be maintained (Berkes 1999: 6). This broad definition is analogous to what can be referred to as "kincentric ecology" (originally a term developed by Dennis Martinez), as Salmon (2000: 1332) explains:

> Indigenous people view both themselves and nature as part of an extended ecological family that shares ancestry and origins. It is an awareness that life in any environment is viable only when humans view the life surrounding them as kin....The interactions that result from this "kincentric ecology" enhance and preserve the ecosystem....Without human recognition of their role in the complexities of life in a place, the life suffers and loses its sustainability.

Salmon is an ethnobotanist who has extensive knowledge of the Raramuri in Mexico. In "Kincentric ecology: Indigenous Perceptions of the Human-Nature Relationship" (2000), he illustrates the term "kincentric ecology" through the Raramuri concept of iwígara, the complexities their perceptions of self and culture intertwined in the web of life. It is obvious that Salmon's description of kincentric ecology cannot be applied so broadly to all indigenous peoples everywhere. However, he stresses how important it is to point out the link between culture and land to make ecologists, land managers, environmentalists, and conservationists aware of culture when trying to preserve a landscape.

There are few pieces of literature where indigenous peoples have used the terms mentioned above. Many of the conferences or workshops, for example the International Development Research Centre (IDRC) TEK workshop and the Traditional and Western Scientific Environmental Knowledge Workshop, where Aboriginal people were invited to speak about this subject, referred to TEK as "their peoples knowledge" or "way of life". This is understandable when you consider the depth of Berkes' or Johnson's definition of TEK. It seems as though TEK is used "for lack of a better word" to describe the contextual knowledge of a people who are long resident in one place. As mentioned earlier in this section many scholars disseminate indigenous knowledge to other contexts and spaces of convenience.

It seems acceptable to use the term TEK as long as the author gives a critical qualification for the context in which they are using it. On the other hand TEK has seemingly become a catch phrase denoting a fad or whim and/or carries the accumulation of misuses and abuses over time. How does one refer to the rich, contextual knowledge

of a people, as defined by Johnson or Berkes, in a word or phrase that people will recognize and respect? Divergent and sometimes contradictory views on TEK reveal the underlying perceptual, ethical, political and methodological nature of the issue. It is very important to keep in mind what TEK is and not what the popular term insinuates given its growing importance in protected area management, fisheries, and wildlife management, to name a few.

The Emergence of TEK

TEK reflects a fairly recent research paradigm in resource management, with the earliest systematic studies carried out by anthropologists (e.g. Williams and Hunn 1982). According to Berkes (1999) the intellectual roots of TEK come from ethnoscience (folk taxonomy, ethnobotanical and ethnozoological classifications) and human ecology (indigenous understandings of natural processes, including the relationship of humans with animals, plants etc). Ethnoscience and human ecology are integrated by the application of TEK to contemporary problems such as conservation, resource management, and sustainable development (Berkes 1999). Research in ethnoscience and human ecology exposed the intellectual roots of traditional ecological knowledge. Leading researchers in these fields had firsthand experience with indigenous peoples and their local knowledge, and that helped scientists accept the validity of "folk science" (Berkes 1999). Until recently, the study of traditional knowledge was carried out by Western scientists and social scientists. However, some of the major aboriginal cultural groups in Northern Canada, including the Inuit, Dene, and Cree have begun to assert their control over their knowledge and carry out their own TEK studies (Berkes 1999).

According to Berkes (1999) there are tangible and practical reasons why TEK is

so important for the common heritage of humankind, quite apart from the ethical imperative of conserving cultural diversity. The growing realization that environmental degradation and unsustainable practices pose a direct challenge to the long-term survival of both biodiversity and humanity ignited the landmark United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, in 1992 (Brundtland 1987). This international gathering legitimated the field of TEK, creating a force behind scientists and local communities to forge innovative strategies, based on indigenous knowledge systems, for sustainable resource management. International concern for TEK started as early as the 1980's when the World Conservation Union (IUCN) established the Working Group on Traditional Ecological Knowledge. Its practical mission was to assert the value of local knowledge for conservation and resource management to resource managers. Many countries, including Canada, have held workshops to address the challenges put forward by UNCED's Agenda 21 and Convention on Biodiversity. For example, the Canadian IDRC broadened their mandate to emphasize sustainable and equitable development issues 'recognizing and strengthening the role of indigenous people and their communities'.

Since this initiative the number of scholarly papers and sponsored sessions and workshops has been accumulating. I will discuss three major strands that are apparent in the extensive accumulations of literature on TEK: (1) The identification of a new holistic and ethical model for understanding the environment; (2) Solutions for contemporary sustainable resource management problems; and (3) Where Aboriginals are in the debate. An analysis of this kind brings out the epistemological tension, which runs through much

of the literature. It appears that this tension is based on a failure to recognize key philosophical and methodological features of traditional ecological knowledge.

A New Holistic and Ethical Model for Understanding the Environment

According to Kimmerer (2002), exposure to TEK has a legitimate role in the education of the next generation of biologists, environmental scientists, and natural resource managers. Based on the literature it is surprising to see a scientist approach TEK, not for the wealth of biological information it contains, but for the cultural framework of respect, reciprocity and responsibility of which it is embedded. It is almost touching how Kimmerer reflects on her experience with students who are "hungry for an approach to understanding nature that includes both science and cultural values and spirituality" (Kimmerer 2002: 438). Kimmerer affectively motivates the reader to step outside our own cultural and educational framework and seek to redefine our evolving relationship with nature by looking to, by no means appropriating, knowledge systems of indigenous peoples at a time when our ecosystems are threatened by imbalance between humans and culture. Despite her broad assumption that indigenous peoples live in harmony with their environment, which may not always be the case, her argument to encourage scientists and students to step outside the typical academic framework and seek a relationship with nature is convincing.

Similarly, in "Traditional Ecological Knowledge: The Third Alternative (Commentary)" Pierotti and Wildcat (2000) explore the idea that TEK may be useful in helping scientists respond to the changing public perceptions of science, and new cultural pressures in our society. Pierotti and Wildcat (2000: 1339) explain:

The spatial orientation of native peoples leads them to recognize that there are always new experiences and knowledge in the world, and transmission of TEK by oral traditions allows them to adjust in response to changing conditions. As a result, ethical and moral instructions for living are fit to the current ecological and historical context.

Pierotti and Wildcat (2000) state two basic concepts of TEK that show evidence for the convergence of TEK and Western science: 1) all things are connected, which is conceptually related to Western community ecology, and 2) all things are related, which changes the emphasis from the human to the ecological community as the focus of theories concerning nature. Pierotti and Wildcat (2000: 1333) state: "TEK is inherently multidisciplinary in that it links the human and the nonhuman, and is the basis not only for indigenous concepts of nature, but also for concepts of indigenous politics and ethics. This multidisciplinary aspect suggests that TEK may be useful in resolving conflicts involving a variety of stakeholders and interest groups in controversies over natural resource use, animal rights and conservation".

Pierotti and Wildcat (2000: 1339) make it clear that their work, as biologists, "teaches them more about the other members of their community and how to live with them". However, the idea of getting to know indigenous peoples is overshadowed in this paper by the original premise of the paper, "the third alternative". This states that TEK is an "additional knowledge" providing scientifically testable insights into resource management problems by placing TEK-based worldviews into a broad-based system of knowledge, giving us the ability to access a large amount of information and experience that has been previously ignored. The authors focus on the value of the information TEK

may contain and how it may augment scientific data, ignoring the contextual qualities that they revered about TEK in the first place.

While many academic writers in the field recognize the inherent "spirituality" or "holistic" nature of TEK, very few, if any, explore the main features of this spirituality, or establish an analytical criterion for holism. This results in key aspects of TEK being missed and is a disservice to traditional knowledge (Lertzman 1998). Traditional knowledge is encoded both in distinct paradigms and in seminal institutional arrangements for converting those observations into everyday practice, and these may get stripped away in translation because they do not travel easily across cultural boundaries (Cruikshank 1998). Essentially, what is happening is that scientists are trying to move into a new paradigm with the assumptions that indigenous knowledge is essentially uncomplicated and its acquisition is primarily a classification exercise. Consequently, there is an epistemological tension that runs through much of the literature, based on a failure to recognize key philosophical and methodological features of traditional knowledge (Lertzman 1998).

TEK and Applied Anthropology

The multidisciplinary nature of TEK makes its application outside its original cultural context challenging and wrought with political, ethical and communicational difficulties. It seems that challenges to cross-cultural communication and understanding, when putting TEK into practice in management, requires the expertise and collaboration of anthropologists (Huntington 2000, Sillitoe 1998, Purcell 1998).

The wider application of TEK derived information and practices remains elusive despite several examples illustrating the utility of applying TEK. According to

Huntington (2000) this difficulty can be attributed to the following three issues: the push in favor of established scientific practices, the perceived "need" to describe TEK in Western scientific terms, and the difficulty of accessing and interpreting TEK. Contrary to Pierotti and Wildcat (2000), Huntington (2000) states that use of TEK becomes a formidable practical obstacle because it is a multidisciplinary undertaking. In order to research and apply TEK, social science methods are needed to gather biological data (Huntington 2000). Huntington (2000) advocates the promotion of TEK in scientific research, impact assessments and ecological understandings but states that wildlife managers and researchers are unfamiliar with social science methods and are not prepared to attempt to use these methods to gain access to information that otherwise remains out of reach. TEK is rarely written down and must be documented as a project on its own before it is used in science. Huntington is an independent consultant who uses TEK in scientific and management contexts. He obtains his understandings of TEK through anthropological methodology, including semi-directive interviews, questionnaires, facilitated workshops and collaborative field projects. Huntington addresses many of the same difficulties of applying TEK that are echoed in the following two articles written by anthropologists.

According to Sillitoe (1998: 223), an anthropologist, "the new focus on indigenous knowledge augurs the next revolution in anthropological method, informants becoming collaborators and their communities participating user-groups, and touches upon such contemporary issues as the crisis of representation, ethnography's status with regard to intellectual property rights, and interdisciplinary cooperation between natural and social scientists". In "The Development of Indigenous Knowledge", Sillitoe is

encouraging anthropologists to take advantage of this widespread adoption of bottom-up

participation as opposed to top-down modernization approaches in development. He

exclaims (1998: 224): "already agricultural economists and human geographers, even

foresters and plant pathologists, are stealing our disciplinary clothes". Inevitably the

position of the anthropologists become that of "middle-man", requiring the formulation

of research strategies that meet the demands of development and a systemic

accommodation of indigenous knowledge. He believes anthropologists are faced with a

conundrum, that our scientific tradition has something to contribute to the development

process and that indigenous knowledge needs to be conveyed to scientists in such a way

that they can appreciate its relevance. Sillitoe (1998) makes a strong point about the

importance of interdisciplinary teamwork, that collaboration should be a two-way

process. However, in such a case where there is substantial power dimorphism, who

stands to gain? Who owns the knowledge? Anthropologists shouldn't be so concerned

with getting involved in this new applied anthropology but instead, concerned with

contributing to Western dominance. This issue is covered in greater detail an article by

Purcell (1998).

Percell argues that, standing in between the domains of the indigenous and the

"West", anthropologists must choose between being facilitators for local autonomy by

brokering the preservation and application of knowledge systems that contribute to re-

humanization and re-naturalization of nature, or be agents for hegemonic "progress"

(Purcell 1998). As cited by Sillitoe (1998), Purcell (1998) lists several difficulties of

brokering the application of indigenous knowledge:

· Differential class and community interests,

- Contested interpretations of knowledge,

- Inability of particular knowledge domains to address specific problems,

- Communication difficulties,

- Duration of research allowed by development agencies,

- Unpredictability of outcome, and

- Ethical dilemmas.

These are substantial implications when indigenous knowledge and Western scientific knowledge are placed on a comparative analytic plane. Purcell (1998) identifies five major implications for this brokering process: 1) it identifies the historical struggle between the cultural rights of indigenous peoples and the dictates of science and the ideological, ethical and epistemological dimensions that are created as a result; 2) anthropology is not simply a cultural study but also a cultural critique and transformation; 3) this perspective forces anthropologists to question what is relevant knowledge given that in applying the term "knowledge", scholars are inserting culture/knowledge as a component of power relations, knowledge is a resource or commodity; 4) the above implications force anthropologists to pay more attention to the emic. Therefore, more anthropological studies must be done by indigenous/local peoples themselves, or otherwise reflect fully collaborative efforts; and 5) applied anthropologists should place all of their tools in the service of facilitating the praxis of indigenous autonomy.

According to Cruikshank (1998), our flawed categorical distinction between nature and culture is a by-product of our own arbitrary classification system, and no one, least of all anthropologists, can act as gate keepers controlling how constructs get used. "Repatriating exported products is both naïve and dangerous, since it provides a

simplified instrument of objectification. When it becomes incorporated into a Western framework it is reconstituted to formalize relationships between people and becomes embedded in hierarchy and inequality" (Cruikshank 1998: 70). TEK must be demonstrated so that others can see how it is used in practice; it cannot easily be construed as a written, formally encoded product (Cruikshank 1998).

Application for Contemporary Sustainable Resource Management

There is an extensive accumulation of literature on the application of TEK for solving contemporary sustainable resource management problems. The literature describes ways in which TEK has been used for monitoring, responding to, and managing ecosystem processes and functions, for ecological restoration, and adaptive management. Recently, several issues have arisen out of the rhetoric and research involving TEK. TEK has a lot of promise in terms of sustainable resource management but more consideration must be given to the living cultures from which TEK is embedded. There are also issues involving conflict between paradigms of Western science and Indigenous cultural knowledge.

In Theory

Fikret Berkes *et al.* (2000) in "Rediscovery of Traditional Ecological Knowledge As Adaptive Management" give a comprehensive review of the ways in which TEK has been used for monitoring, responding to, and managing ecosystem processes and functions. According to Berkes *et al.* (2000), there exists a diversity of local or traditional practices for ecosystem management, landscape patchiness management, and other ways of responding to and managing pulses and ecological surprises. Social mechanisms behind these traditional practices include a number of adaptations for the

generation, accumulation, and transmission of knowledge; the use of local institutions to provide leaders/stewards and rules for social regulation; mechanisms for cultural internalization of traditional practices; and the development of appropriate worldviews and cultural values. Some traditional knowledge and management systems were characterized by the use of local ecological knowledge to interpret and respond to feedbacks from the environment to guide the direction of resource management. These traditional systems had certain similarities to adaptive management with its emphasis on feedback learning, and its treatment of uncertainty and unpredictability intrinsic to all ecosystems.

In "Traditional Ecological Knowledge and Wisdom (TEKW) of Aboriginal Peoples in British Columbia", Turner et al. (2000) contend that TEKW can enhance resource management practices, including ecological restoration. As in the case studies introduced in their article, Turner draws from many sources, including ethnographies, ethnohistorical writings and most importantly, from accounts of aboriginal elders to carry out her work in ecocultural restoration. Similarly, Berkes works closely with Cree and Inuit Aboriginals to develop restoration and adaptive management strategies for caribou, geese, and fish stocks in Northern Canada.

Striplen and DeWeerdt (2002: 27) state that "traditional ecological knowledge may be the epitome of what is now called adaptive management, an evolutionary process in which centuries of accumulated observations were continuously updated and integrated, and interaction with the landscape adjusted accordingly". Striplen is a member of the Ohlone Indian Tribe of California, and Coordinator of Environmental Protection for the Coast Miwok Tribe and DeWeerdt is a freelance science writer. The

perspectives of these authors are evident in the article, stressing the importance of incorporating TEK into contemporary management to form a "new science". They would like to see interdisciplinary coalitions, comprised of scientists, anthropologists, and traditional practitioners, focusing on a common goal of restoring form and function to natural landscapes.

In an IDRC Report Johnson (1993: 12) was quoted as saying "TEK could provide insights into natural resource management in under-studied areas such as wetlands, high altitude zones, coastal regions, drylands, and circumpolar regions. On top of safeguarding TEK within aboriginal communities, it should be integrated more broadly with Western science".

In Practice

During Julie Cruikshank's (1998) early work with indigenous women in the Yukon she came to view her projects as flawed by her attempts to impose a conventional academic framework to evaluate their accounts as historical or scientific data. Her original agenda, to learn how indigenous women had experienced the tumultuous changes brought to the Yukon during the twentieth century, was constantly being redirected by the women themselves, who kept insisting that she record their stories. Julie Cruikshank gradually learned how the traditional stories they kept insisting that she record, that were actually complex relationships between animals and humans, between young women and stars, between young men and animal helpers, could frame not just larger cosmological issues but also the social practices of women engaged with a rapidly globalizing world. "Stories connect people in such a world, and they unify interrupted memories that are part of any complex life" (Cruikshank 1998: 46).

According to Cruikshank (1998) narratives seemed to act as translation devices for events, unifying interrupted memories with the complexity of peoples' lives. Rooted in ancient tradition they can be used in strikingly modern ways by providing the foundation of local ethnohistory, helping people incorporate unfamiliar events into larger stories by connecting them with previous experiences (Cruikshank 1998).

A Story of Caribou and Social Learning in Sacred Ecology: Traditional ecological knowledge and resource management by Fikret Berkes (1999) illustrates the social practice of narratives. The caribou case examines how the hunting ethic of the Cree was changed by crisis-forced learning and adaptation by their traditional management institution. According to Berkes (1999), the Cree management system for monitoring caribou is very similar to the Western scientific management system using geographic distributions, migration patterns and their change, individual behavior, sex and age composition of the herd, fat deposits in caribou, and the presence/absence and effect of predators. The difference is that the Cree system reveals the direction in which the population is headed by using mental models and does not estimate population size. Traditional knowledge is complementary to Western scientific knowledge and vice versa, but these systems are not a replacement for one another.

TEK and Western Science

According to Lertzman (1998), western science is based on a utilitarian and exploitive worldview and, as a system of thought and practice for resource management, is fundamentally flawed. The truncation of knowledge is indicative of the subject-object separation of the dominant epistemological model, and hence, the objectification and commodification of nature which may be appropriate for Western science but antithetical

to oral tradition (Lertzman 1998). TEK is embedded in the beliefs, values, cultural institutions and practices of Indigenous peoples. To scientists these attributes act as barriers to obtaining this specific knowledge. According to Lertzman (1998), this is a stark parallel to the colonial perspective of the missionaries who regarded those same practices as devilry and sought to extract people's souls. To separate TEK from its social and cultural contexts is not only disrespectful but weakens its usefulness. To do so is also methodologically incorrect from the point of view of these traditions (Lertzman 1998, Berkes and Folke 1998). In "Dismantling the Divide Between Indigenous and Scientific Knowledge", Agrawal (1995) critiques scholars who are disseminating indigenous knowledge to other contexts and spaces of convenience or conversely validating indigenous knowledge to downplay science. He believes a productive dialogue will only be initiated when we move away from the sterile dichotomy between "indigenous" and "western". There are three elements that any meaningful and rigorous academic paradigm of TEK needs to recognize, including: (1) the cultural/worldview component; (2) the social/institutional component; (3) the methodological component. All three need to be taken into account in research, the planning process and professional applications (Lertzman 1998, Berkes and Folke 1998). One system of knowledge is not more valid than the other, but they offer insights from different cultural paradigms and it would be useful to see TEK and Western science as parallel and complementary knowledge systems.

In "Learning by Fishing: Practical Engagement and Environmental Concerns", Gisli Palsson (1998) focuses on Icelandic fishing to discuss the practical knowledge of fishers and professional scientists and the extent to which public resource management

would benefit from their collaboration. Palsson believes that the problem with conventional "Western" resource management is not just the typical scientific separation of nature and social context but also the tendency of current bio-economic theory to separate experts and practitioners. One possible avenue for using skippers' knowledge for the purpose of sustainable fisheries management is to have biologists observe practicing skippers on a variety of vessels with varying gear at different times of the year. The biologist would become an apprentice of the skipper and gain some of his experience and expertise. This type of interaction is a communicative strategy for recognizing differences and solving conflicts in the absence of repression and inequality. According to Palsson, science and practical knowledge should be seen as complementary and interactive sources of wisdom, not mutually exclusive.

Sustainable resource management is an issue where the dialogue around TEK has a lot of promise, but agendas and social constructs toward Indigenous peoples must be set aside to recognize the 'living' cultures, in which TEK is embedded. If TEK is to be of value we must concentrate on indigenous peoples' autonomy, safeguarding the people whose cultures possess and embody TEK.

In <u>Yaqulget Qaillun Pilartat (What the Birds Do): Yup'ik Eskimo Understanding of Geese and Those Who Study Them</u>, Ann Fienup-Riordan (1999) discusses elders' understandings of goose biology and habitat as related to storm surges, and their perception of non-Native research and hunting regulation in the coastal wetlands. It was found that although local and scientific understandings of brant behaviour generally agree on what is occurring (i.e., foraging habits, effects of past floods and coastal storm surges, and changes in nesting grounds), they do not always agree on why these changes are

taking place. According to Fienup-Riordan (1999), elders articulated a fundamental conflict between the Yup'ik view of geese as nonhuman persons and the non-Native view of geese as manageable wildlife, and they expressed deep resentment toward the non-local control that researchers and government wildlife managers represent. The Yup'ik approach conflicts with the idea of actively managing natural resources because they believe that animals control their own numbers, their populations are not determined with the help of biologists, that respecting elders' decisions is the same as respecting nature, and that if the Yup'ik don't hunt the geese like they always have, the geese will not return.

Science is often contrasted with superstition, beliefs not based in proof. This creates a hierarchical division between different types of knowledge. Yup'ik knowledge cannot be dismissed as superstition because it works and has been developed for thousands of years through life-long interactions with the environment. Creating such a dichotomy is harmful because it pits one type of knowledge against another, giving one more privilege and prestige (Nader 1996, Agrawal 1995). Science is often used as a yardstick to measure the ability by which other types of knowledge are able to construct 'good' or 'bad' resource management.

In the case of the Yup'ik, many feel that local control of their land and their lives is more in jeopardy than the geese (Fienup-Riordon 1999). The solutions to this problem are founded on personal relations between community members and scientists, where cooperative management of research projects like this one appears to be as important as any specific research policy or results (Fienup-Riordon 1999).

Where Aboriginal Peoples are in the Debate

After several international agreements and depositions surrounding the issue of sustainable development, the WWF and IUCN/WCPA in 1998 adopted a list of principles and guidelines concerning indigenous peoples' rights and knowledge systems, consultation processes, agreements between conservation institutions, decentralization, local participation, transparency, accountability, sharing benefits and international responsibility. These principles are based on the reality that, where indigenous and traditional peoples are interested in the conservation and traditional use of their lands, territories, waters, coastal seas and other resources, and their fundamental human rights are accorded, conflicts need not arise between their rights and interests, and protected area objectives (Beltran 1998). The 1998 IUCN document demonstrates how the general acceptance of indigenous peoples' rights worldwide are emerging with the recognition that their involvement is essential to ensure long-term sustainability of the areas in which they live or have an interest.

According to Cruikshank (1998), in a country such as Canada where Aboriginal peoples have had to fight for basic human rights for over one hundred years and are now fighting for their land rights and self-government, it seems paradoxical that they are now expected to share their observations and interpretations of environmental phenomena to better enable sustainable management. Aboriginal peoples are expected to provide answers to problems created by Western states in terms convenient for Western states (in the language of science) at national and international levels, as members of conference panels and regulatory boards, rather than at a local level where such knowledge could make an actual difference (Cruikshank 1998). According to Cruikshank (2001: 389), "a

growing critique of the uses and abuses of traditional knowledge identifies an underlying, problematic premise of TEK studies, that they treat deeply different cultural perspectives as bridgeable by concepts such as "biodiversity," "sustainable development" or "co-management" framed within scientific discourse". There are several different comparative approaches to science and local knowledge as Cruikshank (2001: 390) explains:

> Science and local knowledge have come to be seen as polar opposites, yet mutual stereotypes share similarities. From a scientific perspective, local knowledge may appear as "myth" (vague, subjective, context-dependent, and open to multiple interpretations) and as embedded in social institutions (such as kinship) and may come to be regarded as "epistemically vacuous." But local people are quite likely to characterize science in similar terms: as illusory, vague, subjective, context-dependent, and open to multiple interpretations, and as embedded in social institutions (such as universities)- in other words, as socially valueless.

In "The Politics of TEK: Power and the Integration of Knowledge", Nadasdy (1999) explores the question of why there has been little success, given the duration, intensity, and interdisciplinary nature of the integration efforts in integrating indigenous and Western knowledge systems. An anthropologist that has worked extensively with Aboriginals in the Yukon Territories, Canada, Paul Nadasdy focuses on the power relations between aboriginal people and the state underlying the project of knowledge integration. He points out the following problems that power relations can cause:

- Traditional knowledge becomes a new form of "data" to be incorporated into existing management bureaucracies and used by scientists and resource managers.

- Aboriginal people are forced to express themselves in ways that conform to the institutions and practices of state management rather than to their own beliefs, values, and practices.

- This new "integrated" knowledge is concentrated in administrative centers, rather than in the hands of aboriginal people.

Nadasdy (1998) argues that the project of integrating TEK with science and incorporating it into existing bureaucratic management structures will result neither in substantially improved management practices, nor in local aboriginal empowerment. This perspective contrasts markedly with that of the proponents of using TEK in co-management. What Nadasdy is essentially saying is that, for both ethical and practical reasons there needs to be a devolution of control over local land and resources to aboriginal communities themselves. In the case of northern Canada, those Aboriginals who have settled land claims have co-management arrangements with the Federal Government and are able to use TEK for self-empowerment and political control (Budke 1999, Dearden and Rollins 2002). According to Nadasdy (1999), as long as ultimate decision-making power over the land is held in distant administrative centers, local ways of life and perspectives will continue to be undervalued or ignored in favor of the illusion of scientific validity and universality. He does not mean that scientists cannot engage in their own set of practices, but maintains that they should be answering to the local

communities. Nadasdy contends that scientists would no longer define and drive the process of resource management. Although the Federal government is not likely to devolve this type of control in the near future, this paper does however effectively voice the need to carefully re-think the present approach to using TEK in the management process. Nadasdy quotes Julie Cruikshank, in stressing that the focus should not be on getting information before it is too late but on developing mechanisms for its continued transmission, i.e. first and foremost protecting the autonomy of Aboriginals.

DISCUSSION

It is not surprising that TEK has become important for contemporary resource managers in their efforts to understand the environment, given the growing realization that environmental degradation and unsustainable practices pose a direct challenge to the long-term survival of both biodiversity and humanity. International recognition of TEK and concern for its erosion and loss started as early as the 1980's when the IUCN established a Working Group on Traditional Ecological Knowledge. Its practical mission was to emphasize to resource managers the value and relevance of locally-based environmental knowledge for conservation and resource management.[17] A growing body of academic papers and research reports, conference proceedings, workshops, and management plans from all levels of government and non-government have coalesced around the field of TEK. This has created momentum behind efforts of scientists and local communities to forge innovative strategies, based on traditional knowledge systems including TEK, for sustainable resource management (e.g. Scientific Panel for Sustainable Forest Practices in Clayoquot Sound, British Columbia, 1995). Some

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[17] See Our Common Future (1987), UNCED's Agenda 21 and Convention on Biodiversity, and the Canadian International Development Research Centre (IDRC).

scientists believe that TEK can be used for monitoring, responding to, and managing ecosystem processes and functions[18] and others believe TEK provides a new holistic and ethical model for understanding the environment (Pierotti and Wildcat 2000). There are also anthropologists who believe that the new focus on indigenous knowledge is the next revolution in anthropology, referred to as the 'new applied anthropology' (Sillitoe 1998). It is assumed that the position of the anthropologists as the "middle-man" will require the formulation of new research strategies that meet the demands of development and a systemic accommodation of indigenous knowledge. The wider application of TEK-derived information in resource management remains elusive despite several examples illustrating the utility of applying TEK. There has also been little success in the integration of traditional and scientific knowledge despite the duration, intensity, and interdisciplinary nature of efforts. It is obvious to some social scientists, however, that the political, perceptual, ethical and methodological barriers surrounding this issue are linked to the very nature of TEK (Cruikshank 1998).

Fikret Berkes (1998), as shown previously (Figure 3-9), has developed a schematic diagram of traditional ecological knowledge and management systems. This diagram is important because it shows how inextricably linked traditional ecological knowledge is to the cultural and institutional context in which it is embedded. The recognition of this link poses a question: how can traditional ecological knowledge be applied ethically and appropriately for ecosystem-based management? A solution is to create a management structure that brings local people directly into the decision-making process.

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[18] See Berkes (1999), Johnson (1992), Lertzman (1998), Hunn (1993), Agrawal (1995), Berkes et al. (2000), Turner et al. (2000), Striplen and DeWeerdt (2002), Palsson (1998), Fienup-Riordan (1999), and Pierotti and Wildcat (2000) etc.

Figure 3-12 is a depiction of the dominant approach to resource management that attempts to use traditional ecological knowledge while still privileging Western perspectives. This diagram shows the hierarchy of decision-making. Traditional ecological knowledge is "collected" by scientists as pieces of data, a process which inadvertently filters out cultural attitudes, beliefs and conventions of behavior and practice through which TEK is formed and understood. This extracted information is then passed up to the management institution to help inform decision making, where it is again filtered and guided by the perceptions and direction of the decision making body. In other words, the type of information that is to be collected is ultimately determined by the decision making body, as is the type of information not to be collected. It is apparent that enumerable perceptual, ethical and methodological barriers are created through this approach.
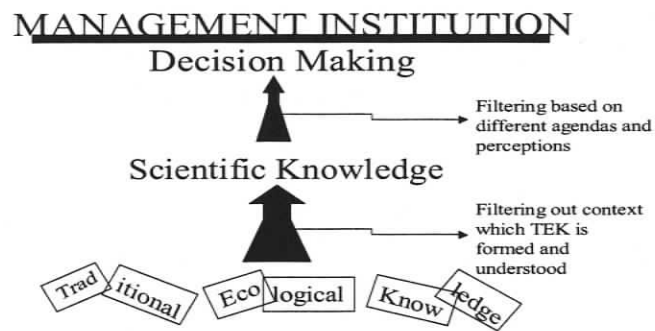
Figure 3-12. Schematic representation of the dominant approach to resource management that attempts to use traditional ecological knowledge.

Figure 3-13 represents my own conception of a co-management structure, with equal decision-making power and a direct link to locally held ecological knowledge: in

other words, a bottom up/ top down decision-making process. This scheme demonstrates how an institutional structure allowing equitable, collaborative decision-making, essentially elevates TEK into a higher level of the process while retaining its contextualized nature more fully. Since TEK is brought in through the local people and knowledge holders they are directing and taking part in management and decision-making. Figure 3-13 depicts how important institutional structures are for facilitating inclusion of TEK within its own context and enriching decision-making concerning local lands in parallel with, not as an "add-on" to Western institutional processes.
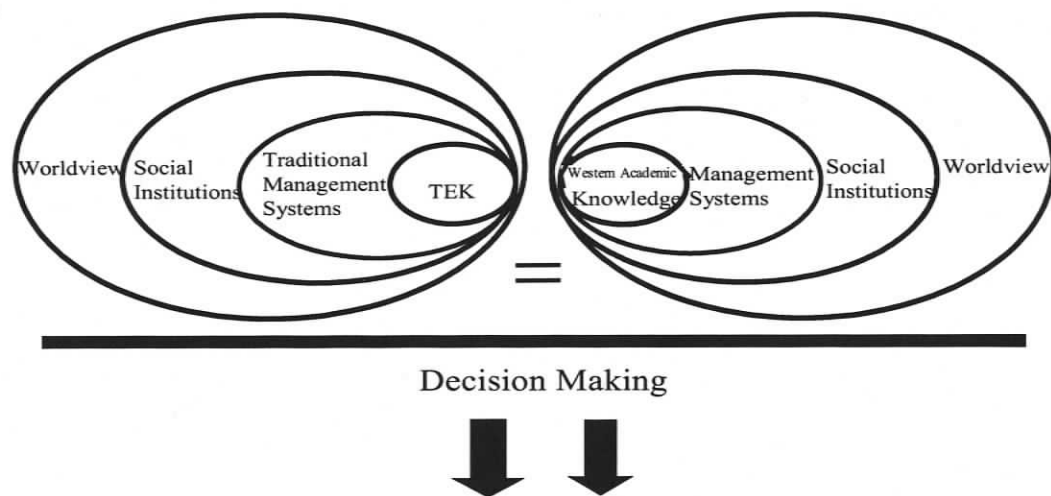
Figure 3-13. Depiction of a co-management structure with equal decision-making power provided equally by local ecological knowledge holders and scientific managers. This model is not meant to imply universality of TEK over a community.

Berkes (2002) found that multi-stakeholder bodies, often used by government agencies in decision-making, can increase legitimacy and manage conflicts without

devolution of power. Folke *et al.* (2005) agreed that collaboration networks such as developed in the UNESCO Man and Biosphere reserves, where there is an informal ad hoc assembly of concerned individuals and NGO's with no legal power, have the ability to influence policy-making processes. And Lobe and Berkes (2004) showed in the padu system of community-based fisheries management in south India, that self-organization and conflict management can occur even in the absence of resource rights or government recognition of local institutions in. As outlined in the first chapter in my thesis, in Canada there is a very complex and evolving relationship between the Federal Government and Aboriginal groups. It is clear that the Federal government has a fiduciary responsibility to Aboriginal Nations where they have a claim, interest or title. I would argue that anything short of joint power sharing would not adequately reflect the autonomy of Aboriginal groups and the successful linking of traditional ecological knowledge with management. I will expand on this point in Chapter 5 when I discuss the AMB structure at Gwaii Haanas. It is quite clear that the Council of the Haida Nation are very strong and quite determined to achieve and maintain their sovereignty. They were successful in pushing to create a management structure of equal power sharing for Gwaii Haanas.

3.6   PREPARING FOR SURPRISE AND UNCERTAINTY

According to Folke *et al.* (2005) and Gallopin (2002), among others who contribute to complex adaptive theory, it is not sufficient for a well-functioning multilevel governance system to be in tune with the dynamics of the ecosystems under management, it must be able to deal with external perturbations, surprise and uncertainty.

It needs to develop capacity for dealing with large-scale changes such as disease outbreaks, climate change, hurricanes, global market demands, subsidies, and governmental policies (Folke *et al.* 2005: 264). There must be an assessment and building of resilience to strengthen the ability of a governance system to adapt and maintain sustainability. This would entail undertaking comparative analyses with other regions and similar arrangements, assessing the adaptive capacity in the region as it relates to major threats and possibilities, and envisioning scenarios for the future to prepare for surprise and uncertainty (Folke *et al.* 2002).

Undertaking comparative analyses with other regions and similar arrangements effectively bridges local actors and communities with other scales of organization (Folke *et al.* 2005). There is an increasing body of literature that demonstrates how systems of governance that exist at multiple levels and overlap in authority and capability are better able to cope with external drives and rapid change (Ostrom 1996, McGinnis 2000, Low *et al.* 2003, McGinnis *et al.* 1999, and Folk *et al.* 2005). Multilevel governance and cross-scale interactions bridge resources, knowledge and incentives to deal with uncertainty and shape change. One such example is the Convention on Wetlands, signed in Ramsar, Iran, in 1971, an intergovernmental treaty that provides a framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 147 Contracting Parties to the Convention, with 1524 wetland sites involved, totaling 129.2 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance. The Ramsar Convention has been increasing coordination of actions among multilateral environmental agreements to more effectively achieve its objectives. For example, the

Ramsar and World Heritage conventions have cooperated to conserve internationally important sites of mutual interest. Another example is the cooperation between the Ramsar Convention and the Convention on Migratory Species where there is joint action in data collection, storage, and analysis as well as new agreements on migratory species, to name a few.

The Ramsar Convention as well as the Convention on Biological Diversity, the U.N. Convention to Combat Desertification and the Convention on Migratory Species requested the Millennium Assessment to provide decision makers with information on the links between ecosystem change and human well-being. The Millennium Ecosystem Assessment is an example of a bridging organization, which performed an essential function in dealing with the ambiguity of multiple objectives without changing formal institutions. "…Bridging organizations can be described as providing social incentives to stakeholders to invest in building trust, identification of common interests, and resolving conflict" (Folke *et al.* 2005: 462). There were 1,360 leading scientists from 95 nations who carried out the assessment under the direction of a Board that included representatives of the four international conventions, five United Nations agencies, international scientific organizations, and leaders from the private sector, NGOs, and indigenous groups (Millennium Ecosystem Assessment 2005: 17). The Millennium Ecosystem Assessment was a four-year international process (2001-05), which outlines a series of options for responding to, and addressing, the direct and indirect pressures on wetland and other global ecosystems. These scenarios are meant to explore a range of contexts under which sustainable development could be pursued, as well as a wide range of approaches in support of sustainable development or, in the context of the Ramsar

Convention of the wise use of wetlands (Millennium Ecosystem Assessment 2005: 49). According to Gallopin (2002: 365), the importance of considering scenarios as courses of events is twofold: (1) they can direct attention to the unfolding of alternatives; and (2) they can identify branching points at which human actions can significantly affect the future. These concepts will be discussed in detail as they relate to Gwaii Haanas in Chapter 5.

3.6   SUMMARY: AN INTEGRATIVE THEORY FOR THE SUSTAINABILITY OF PROTECTED AREAS

Panarchy is a new and valuable approach for research in sustainability for three main reasons. First it reflects and identifies the four functions of a system that can be applied to the interaction of both cultural and ecological systems. Secondly, it critiques and challenges the dominant approaches to conservation and resource development. And thirdly, it provides a precautionary framework for maintaining the sustainability of systems encountering unpredictable change and synergisms. Panarchy was developed to explain how systems economic, ecological and social transform, adapt and interact across different temporal and spatial scales. In doing so, it can focus efforts on elements and structures that enable a system to maintain adaptive capabilities for long-term sustainability. Panarchy is based on four categories of factors for building resilience previously outlined in Section 2.2 (p.17). Based on these principles Folke *et al.* (2002) made three policy recommendations previously described in Section 2.2 (p.18). It is apparent from analyzing the political context of Federal/Aboriginal relationships in

Canada and the issues surrounding applications of TEK, in resource management, that power sharing is an important component to be considering in institutional structures.

Protected areas all over the world are facing cumulative impacts from environmental degradation caused by resource development, urban sprawl, introduced species and global warming, to name a few. If resource managers hope to maintain the integrity of these areas in perpetuity integrative theories such as this must be considered. As the underlying framework of this thesis, I propose that panarchy can offer protected area managers with useful tools for understanding and managing these areas sustainably.

The Chapter 5 is an exploration of Gwaii Haanas management using panarchy as a framework. Indeed the co-management mandate for the region and its vision for sustainability appear to closely parallel that of panarchy. This parallel underscores the appropriateness of using a panarchy approach to achieve the stated management goals.

Table 3-14. Summarization of goals for sustainability from Gunderson and Holling, (2002) on the left and the Gwaii Haanas draft management plan (1996) on the right.

GOALS FOR SUSTAINABILITY	
According to Panarchy	**According to the Gwaii Haanas Management Plan** (Archipelago Management Board 1996)
Strengthen the perception of humanity and nature as interdependent	"Gwaii Haanas will be managed in a manner that accepts that human beings are a part of the natural world"
Nurture ecological integrity	"To protect the natural heritage of Gwaii Haanas in order to maintain its ecosystems in perpetuity and provide a benchmark for scientific and human understanding and a repository of genetic diversity."
Nurture social/cultural integrity.	"Management will be responsible for…sustaining the continuity of Haida culture [by] recognizing the integral relationships of Haida culture within the natural world and provide for continuation of cultural activities and traditional resource harvesting activities through the protection of

	Gwaii Haanas."
Enhance social/cultural knowledge and systems linked to ecological systems.	"Continue the Watchmen program as an integral part of the management of Gwaii Haanas and encourage the participation of Haida elders and youth in this program… [as a way of] supporting Haida efforts to protect and present their culture." "Provide for continuation of Haida cultural activities and traditional renewable resource harvesting in an ecologically sustainable manner."
Develop institutional structures that include these linked knowledge systems.	"The Government of Canada and the Council of the Haida Nation have agreed to share the management of Gwaii Haanas through the Archipelago Management Board (AMB). The board consists of an equal number of representatives from the two parties. Decisions of the Board are made by consensus." "Applied scientific research, monitoring and analysis will be fundamental tools used alongside traditional knowledge to broaden understanding and to make informed management decision."

Chapter 4 will include an analysis of the crisis and events that led to the transformation to today's management innovation at Gwaii Haanas. I will also be navigating through the institutional and organizational structure of the management system, identifying key individuals, local stewards, local and federal government and their involvement and collaboration in strengthening the sustainability of Gwaii Haanas. It is important to understand the structure and function of the AMB for the sake of ensuring its sustainability, to contribute to the understanding of transformation and also to contribute to the understanding of incorporating TEK in management in effective and ethical ways.

CHAPTER 4

4.0   RESULTS: THE CASE STUDY

I begin with a detailed socio-ecological history of Gwaii Haanas, identifying and describing the major forces that have shaped this area. This is followed by a description

of the AMB structure, which is now responsible for the sustainable future of this area. I include herein actual text from the interviewees regarding the definition and use of traditional ecological knowledge, the implementation and origins of the Haida Gwaii Watchmen Program, and finally comments regarding the future of Gwaii Haanas. I believe these stories convey the interviewee's ideas, as well enabling their voices to be represented.

4.1   THE SOCIAL-ECOLOGICAL HISTORY OF GWAII HAANAS

Haida Gwaii (Queen Charlotte Islands), British Columbia, Canada is a magnificent archipelago located 100 km off the west coast at 51° 49' 42' N, 131° 13' 30' W (See Figure 4-1). It is layered with over 7,000 years of Haida history and is a showcase of geologically and biologically unique landscapes, referred to by many as the "Galapagos of the North". Gwaii Haanas comprises the southern 145,000 ha of Haida Gwaii. A complex geological history, including heavy glaciation, has created a highly variable geological and biophysical landscape. About 10,000 years ago the last glacier retreated, leaving steep, sloped mountain ranges over much of the islands. The forest is dominated by Sitka spruce (*Picea sitchensis*), Western-red cedar (*Thuja plicata*), lodgepole pine (*Pinus contorta* var. *latifolia*), Western hemlock (*Tsuga heterophylla*), and yellow cedar (*Chamaecyparis nootkatensis*) at lower elevations and mountain hemlock (*Tsuga mertensiana*) along the high elevation ranges (Brayshaw 1996). The flora and fauna occurring on the archipelago have evolved in relative isolation over thousands of years; many species, occurring commonly on the mainland are not found on Haida Gwaii as native species. Unique sub-species of black bear (*Ursus americanus*),

pine marten (*Martes americana*), deer mouse (*Peromyscus maniculatus*), dusky shrew (*Sorex* monticolus) and short-tailed weasel (*Mustela erminea*) have evolved on Haida Gwaii (www.pc.gc.ca/pn-np/bc/gwaiihaanas). The extraordinary degree of floral and faunal endemism and floral range disjunctions has provided substantial support for hypothesized glacial refugia in the area (Gryzbowski and Slocombe 1988). Gwaii Haanas provides nesting habitat for 750 thousand seabirds from May through August. Rare species such as the rhinoceros auklet (*Cerorhinca monocerata*), tufted puffin (*Fratercula cirrhata*) and ancient murrelet (*Synthliboramphus antiquus*) reside on Haida Gwaii during the breeding season. Gwaii Haanas is situated along the Pacific flyway; dozens of migrating song birds stop over here during the spring and fall migration (www.pc.gc.ca/pn-np/bc/gwaiihaanas). Many species of marine mammals are found in this area, including orca (*Orcinus orca*), humpback whale (*Megaptera novaeangliae*), California gray whale (*Eschrichitus roustus*), minke whale (*Balaenoptera acutorostata*), harbour seal (*Phoca citulina*), Dall's porpoise (*Phocoenoides dalli*), Steller sea lion (*Eumetopias jubatus*) and Pacific white-sided dolphin (*Lagenoryhnchus obliquidens*).

The Haida have lived on these islands for hundreds of generations, some evidence suggesting at least 7,000 years. According to Gryzbowski and Slocombe (1988: 466), both of whom are researchers in the area of ecological sustainability and ecosystem-based management, "since European contact, resource extraction activities and species introductions have had dramatic effects on the island's terrestrial and aquatic ecosystems. The introduction of foreign diseases and technology, the opening of new markets, and the consolidation of the Dominion of Canada resulted in a marked deterioration in Haida culture." Upon European contact in 1774, the Haida population was estimated to be at

approximately 10,000. But a Haida cultural specialist (elder) speculates it could have even been as high as 80,000 at one point.[19] In the late 1800's and early 1900s the Haida were almost wiped out by disease. Their numbers dropped to only a few hundred. The present population on Haida Gwaii is approximately 5,000, 2,000 of which are Haida. According to Parks Canada, "the Haida not only survived but they continue to live and adapt their culture into the mainstream of 21st century North American society" (www.pc.gc.ca/pn-np/bc/gwaiihaanas).

Alex Grzybowski and D. Scott Slocombe (1988: 469) in their article, "Self-organization Theories and Envrionmental Management: The Case of South Moresby, Canada", developed a table of the social and biophysical processes that shaped South Moresby, now Gwaii Haanas. Table 4-1 provides an overview of the socio-biophysical history of Gwaii Haanas emphasizing critical events and transformations in the region's subsystems. This Figure illustrates the dynamic complexity of the area from 1774 to 1986. A few main examples of systemic bifurcation (see 'backloop' in panarchy model) are the almost total annihilation of the Haida people by disease during the turn of the last century, the eradication of the sea otters during the early fur trade, the introduction of black-tailed deer, rats and raccoon, the impacts of mining and large-scale clear-cut logging, global warming and, of course, the changing relationship between native peoples and the government. These examples all illustrate the range of spatial and temporal scales that transformations can take in this region as well as how cultural and economic health are completely linked and based on the viability of biophysical systems.

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[19] Diane Brown. Personal Communication. July 27, 2003

Table 4-1. History of the South Moresby socio-biophysical system emphasizing critical events and transformations in the region's subsystem. (Grzybowski and Slocombe 1988: 469)

TIME	SOCIAL SYSTEMS BY SUBSYSTEM					BIOPHYSICAL SYSTEMS
	ECO-NOMICS	TECH-NOLOGY	INST./SOC. RELATIONS	PER-CEPTIONS	DEMO-GRAPHY	BIOPHYSICAL TRANSFORMATIONS
1774	-fur trade -subsistence -commodity trade -trading in food stuffs-potatoes other types of fur argillite carvings	-steel tools/guns	-Haida traditions -conflicts between traders and Haida over fur prices	-Haida cosmology mythology/anamism -commodities for foreign markets -land is an inanimate pool of resources	-8-10,000 Haida -Haida population declining -approx. 6,000 Haida -Haida migrations begin	-Norway and black rat introduced predation on ground nesting seabirds -smallpox introduced -otter hunted to extinction-intertidal community changes-abalone and urchin population increases, decline in macrophyte-based ecosystems
1850	-small gold rush -mining exploration -fur trading -commercial fishing -homesteading -subsistence	-western medicines -steamships	-crown colony status -Haida trad. Restricted -B.C. enters Dominion -conflicts with miners -Indian Act -reserves established -Prov. Indian policy conflict Federal gov't -potlaching outlawed -land alienation policy developed -Christian religion is intro. to Haida -western education for young Haida	-Haida cosmology deteriorating -power of shamans declining -land policies biased against natives -Christianity	-smallpox epidemics -less than 1000 Haida -low fertility in Haida pop. Due to venereal disease -Haida pop. Still declining -small mining oper. -transient labor	-relaxation of Haida subsistence resource use pressure-sea mammal, salmon, halibut stocks increasing -intensifying commercial fishing pressure -sea mammal harvesting intense
1900	-mining -commercial fishing: dogfish, salmon -canneries – clams, abalone -whaling -spruce logging -fur trading -Haida subsistence -mines closing -canneries closing -whaling station closes -logging slows down -trapping -Haida subsistence	-canning technology -steam engines -A-frame logging -forest harvesting and processing innovations	-Indian agent in Masset -Sea lion control -Forest Act -Provincial Park Act -Int fisheries treaties -young Haidas sent to schools off islands -sea lion extermination -species intro. -Haida suppressed -National Parks Act -organized labor in forest industry	-forests limited -marine species limited -"cheap land" for homesteading -wilderness preservation -aboriginal title is not extinguished - aboriginal title is extinguished -declining resource exploitation opportunities	-Haida pop. low (588) few children -small mining and fishing camps -transient labour -Haida population increasing/more children in pop. -transient labour -mining /canning -settlements in South Moresby closing down	-black-tailed deer introduced-population expansion begins, differential browsing beginning to change forest community structure, competing with caribou -caribou extinct -sea lion pop. decline beginning -logging Lyell Island -spawning habitat destruction -decline in commercial fish stocks -muskrats, beaver, elk, raccoons intro -raccoon predation on ground nesting seabirds -beaver flooding forests and enlarging lakes -sea lion population decline

	-declining -large scale timber harvesting beginning in Haida Gwaii -intensive local and international fishing	-cable logging/truck logging			-no settlements in South Moresby	
1950 1986	-hand logging in SM -large scale forest harvesting in north Moresby and Graham -petroleum exploration offshore and on shore -intensive abalone harvesting -increasing labor cost in forest industry -large investments in forest sector -geoduck harvest -wilderness tourism -international market fluctuations -declining forest industry profits -stumpage declining	-high resource consumption capacity of harvesting tech. -SCUBA introduced in commercial fish -obsolescence in harvesting and processing tech. -underwater hydraulics	-new Indian Act Indian rights-autonomy -new Forest Act -TFL 24 alienated -provincial forest expansion/over commitment -international fisheries Agreements -land claims reg. Indian autonomy -Ecol. Reserves Act -new Forest Act -IPS-controversy -Haida claim -legal precedent of Meares Island -forest admin. Inflexibility -Parks Canada -compensation -resource planning initiatives	-sustained yield/tree farms -"land as industrial forest land" -"land is being destroyed/needs to be preserved" -"land as Haida cultural identity" -aboriginal title -"land is jobs" -uncertainty of employment -cumulative social impacts of logging and oil controversies	-handloggers -mining settlement at Jedway -Haida pop. expanding, high % of children -logging camp on Lyell Island -high turnover in non-indian pop. -5000-6000 residents (2000 Haida) -transient labor	-red squirrel introduced -cumulative effects on salmon stocks, populations declining -Jedway mine site physical impacts -Pacific tree frog introduced, effects unknown -decline in falcon pop. observed in north possibly due to poaching or rat/raccoon predation on seabirds -increased slope instability, stream, scour and cumulative effects on salmon stock -raccoon pop. is high-expected effects on ground nesting seabird colonies -deer browse severe in clearcuts/cedar not regenerating well -possible oil exploration in nearshore waters

Gryzybowski and Slocombe (1988) did not outline an approach for sustaining complex, unpredictable systems nor were they able to explore the co-management structure of Gwaii Haanas, which was formed shortly after the publication of their article. However, Table 4-1 demonstrates how prone Gwaii Haanas is to unpredictable sporadic change and how interconnected, dynamic and complex this system is. As mentioned

before, it is essential to analyse the AMB to determine how it is structured to maintain the resilience of Gwaii Haanas for long-term sustainability.

4.2   THE CULTURAL AND ENVIRONMENTAL CRISIS AT LYELL ISLAND

Haida traditional resource ownership has long been an issue in Gwaii Haanas, gaining momentum in 1974, when Haida drew the line against any more logging on Haida Gwaii. Regardless, the Provincial government, under immense pressure from the logging industry, supported continued forest extraction work on Lyell Island. The Haida blocked logging operations at Windy Bay, the south-eastern slope of Lyell Island, a south-central island in Haida Gwaii. The logging companies countered with a suit for damages against the Haida and, as a result, the B.C Supreme Court granted the injunction making any blockaders liable for contempt-of-court charges. However, the blockade continued. At this time the conflict over logging became the most publicized aboriginal land rights-conservation issue in Canada. It became a 13 year conflict between the Haida who wanted to protect their homeland and the tens of thousands of conservation and preservation advocates who rallied behind them, and the logging sector and the B.C. government and legislation and regulations which had been enacted to further the logging industry's objectives.

To the Haida and their supporters the events surrounding the Lyell Island blockade did not constitute a dispute. The term "dispute" has been reserved for when people's material interests are negotiable and the term "conflict" reserved for issues that are related to non-negotiable needs and values that cannot be compromised (Powell 2003). According to Elinor Powell (2003) this is when the spirit is most engaged. Any

destruction that occurs to the soil, water, earth or air of Haida Gwaii degrades the very

being of what a Haida is. According to Guujaaw (2002), the president of the Council of

the Haida Nation, "we would become like everyone else. We're part of the environment,

every inspiration is of this landscape. Everything is what we are."

The conflict at Lyell Island brought to the global stage a challenge to the

dominant approach to resource development and the need to recognize the intrinsic value

and sacred nature of Haida Gwaii. The following stories by two Haida people, Gilbert

Parnell and Diane Brown (Gwaganad), put into perspective just how significant this

battle was, not only to the Haida but also to the future of this planet.

> …The Hopi prophecy …similar in most First Nations throughout
> North America, Turtle Island. And I was told the story…that there are
> things that are happening. There are sequences of events that are foretold
> in this prophecy. And in the prophecy they talk about during a time when
> the people of the earth who will, I mean, they will forget how to cherish
> Mother Earth. And they will harm Mother Earth in many different ways,
> wars, industry, and stuff like that…so the prophecy talks about a time
> when there will be a red tide will begin up in this area of the world and
> will begin to sweep, it will begin to flow throughout the world. It starts
> here (Haida Gwaii). It starts sweeping over North America and around the
> world. This red tide is a new consciousness, a new understanding, a new
> respect for Mother Earth. And I believe that that red tide was our action
> that began on Athly Gwaii, Lyell Island. That began to open, that really
> began to, the world began to see how precious the earth, Mother Earth
> really is. I think since we went to the line there have been a lot of things
> that happened. I mean a lot of people throughout the world have really
> taken step to try and change the destructive road that we were on. And I
> believe that in the prophecy it talks about, you know, this red tide either

'yes, it will work' or 'no, it wont and we'll go down to destroy the earth'. I think it did work and I think we have turned how we look at the earth and how we want to treat her and where we want to go in the future....We must as First Nations people think seven generations down the road whenever we do anything. The reason why we do that is because we've got to ensure life goes on. We've got to ensure, then that means human life as well as the life of the earth. We're making sure that there is an area that's protected. That our people have the same opportunities and the same benefits that I have today. I can't rob my children of eating a clam or, you know, my great, great, great, great, grandchildren, you know, I can't rob them of the opportunity of tasting a fish, something that is very important to us. To find solitude, peace and solitude in a certain part of the woods of Haida Gwaii. I mean, the way we were going that wouldn't have been happening.[20]

The Government could see the wave of support. We had support like all over Europe, we had global support. In fact the Traditional Circle of Indian Elders and Youth…they told us why they wanted to meet us. All those elders, like even now when I pick up the phone and phone one and when my dad was sick for example, and then another phoned another and then you have a huge prayer circle all across the United States and part of Canada, South America, Guatemala. We just get all these prayers going. Anyway they told us that this whole group was praying and offering intensively for us when we were in the battle. They watched us closely. They said, they told us, "if Gwaii Haanas went down that was the trend for the rest of the Earth". If Gwaii Haanas was saved there was hope for things to turn around…To tell us that how crucial it was that if Gwaii Haanas went down there would be a domino effect for the rest of the world. There would be destruction after destruction. But the fact that it didn't get destroyed meant that there was enough sanity on this earth.[21]

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[20] Gilbert Parnell. Personal Communication. July 20, 2003. Vice President, Council of the Haida Nation.

4.3   THE CREATION OF GWAII HAANAS NATIONAL PARK RESERVE AND

HAIDA HERITAGE SITE

The conflict ended in July of 1987 when Canada and British Columbia signed the

South Moresby Memorandum of Understanding and later the *Memorandum of Agreement*

on South Moresby, a commitment to protect Gwaii Haanas through the designation of a

national park reserve (http://www.pc.gc.ca/pn-np/bc/gwaiihaanas). By 1992 the

Government of Canada joined with the Council of the Haida Nation to manage the area.

In January 1993 the two parties signed the *Gwaii Haanas Agreement* setting out the terms

of co-management for this park (http://www.pc.gc.ca/pn-np/bc/gwaiihaanas). Although

both parties had differing views on ownership of the area, their viewpoints were

expressed in parallel statements. Both parties agreed that:

> Long-term protective measures are essential to safeguard Gwaii
> Haanas as one of the world's great natural and cultural treasures, and that
> the highest standards of protection and preservation should be applied.

> Gwaii Haanas will be maintained and made use of so as to leave it
> unimpaired for the benefit, education and enjoyment of future,
> generations. More specifically, all actions related to the planning,
> operation and management of Gwaii Haanas will respect the protection
> and preservation of the environment, the Haida culture, and the
> maintenance of a benchmark for science and understanding (Archipelago
> Management Board 1996: 3)

The Government of Canada and the Haida Nation negotiated an Archipelago

Management Board (AMB) comprising two representatives from the Haida Nation and

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[21] Diane Brown. Personal Communication. July 27, 2003. Director of the Skidegate Haida Immersion
School.

from the Government of Canada. The AMB mandate is to examine all initiatives relating to the management of the Gwaii Haanas archipelago. According to the Strategic Management Plan, decisions of the AMB are to be reached by consensus based on scientific and traditional knowledge. Furthermore, applied scientific research, monitoring and analysis are to be fundamental tools used alongside traditional knowledge to broaden understanding and to make informed management decisions.

The AMB has been functioning for just over 10 years now. Currently it appears that both parties are working well together. However, this was not the case at the beginning. There is one occasion that stood out in every interviewee's mind as the key event that helped facilitate trust among the Haida community toward the Parks Canada Agency. Parks Canada staff hosted a potlatch to honor the Haida. By putting on the potlatch in 1995, parks personnel showed the entire community that they had respect for the Haida way. As one Haida participant in the process described:

> Before we had the agreement [Gwaii Haanas Agreement]. And the reason it didn't work well was because the people who sat on, the Haida people who sat with the government people didn't trust the government people. You know, I remember in 1995 when we were burying bones that had been dug up at the Visitor Information Centre in Charlotte [Queen Charlotte City] and the Band Council went and said to Gwaii Haanas (Parks Canada), 'you have to bury them where you got them from.' ...so in order to make amends we (parks staff) put on this potlatch in '95. That day it was snowing, snow was just whirling around. The elders were sitting against the building watching what was going on and they were burying these bones and it was cold, it was really cold. Miles Richardson, Buddy (his nickname) came to me and he said, "I guess I have to believe

them, that they're honorable, that they mean what they say". And for me that was sort of the turning point. Attitudes started to change after that because we'd already had the Canada/Haida Agreement signed in '93 but still a testing time. And when, I think when we had that potlatch the chiefs saw that we were good to our word, and I'm speaking as a parks person right now. I think that things changed and I know that the attitude at the AMB level, the Archipelago Management Board level, changed and so now it seems to work very well. You know, any issues we have go to them and they have specific times, I think it's twice a month now they have meetings and we bring issues forth, the staff bring issues forth that have to do with what we're trying to do. And if they disagree, if the AMB disagrees, if it's controversial then it doesn't go ahead. But if it's something that benefits the land and the people most of the time it's pretty smooth sailing.[22]

Another Haida participant recalled:

...they build that visitor reception centre in Charlotte [Queen Charlotte City] and in the process dug up one of our ancestors from Dagen Geets it's called. It's a village there. And they moved them. They moved the bones to a museum. ...And our, as Haida people we're not moving them anymore. They were there first. We demanded that they be reburied properly in the same spot with a plaque. So I demanded that. The Council as a whole, not just me. We were as the whole Council so we demanded of the AMB and Parks that they take those bones, rebury them, erect a plaque and hold a potlatch. There's a couple of reasons for that, I needed a non-Haida staff to experience something of how we do things, like preparing for a potlatch and they did really well. They picked berries, they did fish, they prepared all the give-away-gifts. ...I would say it's [trust] a heck of a lot better now.[23]

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[22] Barb Wilson. Personal Communication. July 8, 2003. Gwaii Haanas Cultural Liaison.
[23] Diane Brown. Personal Communication. July 27, 2003. Director of the Skidegate Haida Immersion School.

4.3.1   Building on Traditional Ecological Knowledge

When conducting my research I inquired about TEK: What is it? How do you

understand it? How do you feel it is used?[24] The following is a statement by the Gwaii

Haanas Cultural Liaison Barb Wilson (Kii7lljuus) concerning traditional ecological

knowledge:

> I think it [traditional ecological knowledge] came into the
> management and the actual day-to-day work right at the beginning
> because we have a co-management agreement, and what that means on the
> ground is that we have two Haida representatives and we have government
> representatives that sit together and they look at all the projects that we do
> when we're in Gwaii Haanas or when I'm sitting at my desk. And they
> ensure, the two Haida representatives ensure that our knowledge is
> protected and used to make decisions. And I think that it's not always
> right in your face doing it (bring her flattened hand up to her nose) but for
> instance when we look at the land and we see the impact of introduced
> species one of the things that happens with introduced species, black-
> tailed deer, is that the plants that I would use for medicinal purposes, for
> fibre, for food and just for spiritual things, those plants are disappearing
> because they are being eaten by the deer, so Todd Golumbia, who was the
> ecological integrity fellow, he would look at the land and say, "look at the
> land here. Something is going wrong." and then we would talk about the
> plants that should be there and what they're used for.
>
> I don't know that there's a big difference [between scientific
> knowledge and traditional ecological knowledge]. What I talk about when
> I talk about traditional knowledge and plants is I'm talking about, how we
> use them. And right now I use the example of the deer and the deer cull.
> We know now from looking at various sites that there's a problem with

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[24] Refer to the sample questionnaire in the appendix.

the deer eating everything. So when I speak about it, we had a symposium last October here on the islands with international people being here. I speak about the plants and the properties they have but not specific, I speak about the fact that we use them, we use them for medicinal purposes and fibre and in the days before Europeans came to the islands we used the roots for food. So there's value in the knowledge that these plants have been used and that you can still use them. But as I said earlier, if the plants aren't there, the traditional knowledge disappears. And so, for me it's imperative that we do something to try and save that and under Gwaii Haanas, in the Canada/Haida agreement we have a clause in there that says that Parks Canada will protect and promote Haida culture. So, it's part of that I would see, even if it's not blatantly stated by the scientists that they're going to put exclosures to keep deer out of certain areas. I would see that as protection of the plants, because what they're trying to do, is see what kind of plants have a seed base in the area and what they're finding is that these plants that are grazed back to the point where you don't see them are very hardy in their seed bank and a lot of plants are coming back (with the removal of deer). On Sgang Gwaii, which is Anthony Island, not this summer, 'cause I wasn't there at this time of year, but last year for the first time I saw a chocolate lily (*Fritillaria camschatcensis*). And we call it inlhiing. Which is the rice root. And we had never, and I have been going to Sgang Gwaii for, oh I started going the first time in '74, so last year which was 2002, that's the first time that chocolate lily has been on the shore line, which is quite exciting for me because that was one of our foods.

So there are things that are being done and it's in keeping in mind the birds and we as First Nations people we use the birds and the eggs as a source of protein so they are very important to us as well as to the science. So as you can see how things that are happening, they affect our traditional knowledge just by the fact that they are trying to save the birds

or they're trying to get rid of the raccoons, or they're trying to get rid of the rats or they're trying to get rid of the deer.

If you protect the one you protect the other. And I think that it doesn't matter from which side you start from as long as you're doing something, that protects the plants, that protects the birds, protects the intertidal and then it goes on to, you know, what happens with the trees, what happens with the plants, what happens with the bears, the birds, the insects. This web is so interconnected that I see that unless we are aware and start, you know, anywhere but just have it grow in all directions, the name Galapagos of the North is not going to apply any more. It will be a memory. So, I think it's really important for us to be vigilant and proactive in trying to rid ourselves of all these introduced things whether it's plants, animals, mammals, birds.

The following exert is from one of the founders of the immersion program explaining how the AMB contracted the language school to develop culturally appropriate maps for Gwaii Haanas. The information collected also serves to support the Haida land title case.

They [the AMB] needed Haida names for all the sea life, all the seafood, all the birds, all the supernatural beings. And so the elders, we did up a contract and they gave us $5,000 I guess. Very tedious process. Not so much for the naming of things, but when they wanted place names that was hard, hard work. I really credit our elders for hanging in there. We got now, close to 800 Haida names back. Many not recorded in anybody's writings. It was the memory of the elders going down. So, it was something we'd have done anyway but the opportunity came and the Park offered the class money and we go on field trips, you know, and we don't have a budget, much of a budget. So we took it and the place names is turning out to be a crucial component of the law court now. And it's

been a long-standing goal. We want the right names back of everywhere.
So I think we have close to eight or nine hundred, close to nine hundred
place names. And further to that, there's short stories on history. If a
legend to took place at a place, we recorded that. If people used it as a
hunting or food-gathering place, we recorded stories on that. If there was
a supernatural being around that area we recorded that and we also gave
them that.[25]

4.3.2 Adopting The Watchmen Program: A Traditional Management System

The protection and reclaiming of Haida ancestral remains and artifacts is central
to the Haida repatriation movement. During the early 1900's many items of Haida
culture as well as ancestral remains were removed from Haida Gwaii by anthropologists
and relic hunters, to be sold and/or stored in museums across the globe under the
assumption that the Haida were going to be annihilated by disease and these remains
would inform anthropological inquiry. The Watchmen Program is a stewardship program
developed by the Haida long before the Park Reserve was established. It was developed
in 1981 by a group of Skidegate Haida. They were observing that increased tourism and
relic hunting was degrading ecologically sensitive sites, desecrating spiritual sites, and
destroying or removing cultural artifacts and remains. The Watchmen Program, was a
stewardship program, which served to establish a presence in parts of Moresby Islands
(the southern region of Haida Gwaii). Originally these Watchmen were volunteers. "It
became increasingly significant to show the world that our old village sites were not
'abandoned' because people weren't actually residing there, but that our people are using
this area as they have for generations for hunting, fishing, food gathering, art, and as a

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[25] Diane Brown. Personal Communication. July 27, 2003. Director of the Skidegate Haida Immersion School.

touchtone to our past."[26] The establishment of the Watchmen stewardship program and the designation of the area, now known as Gwaii Haanas, as a tribal park was not sanctioned by government but appeared to be respected by tourists. The following statement by Diane Brown (Gwaganad) recounts the establishment of the Watchmen Program and how the formation of the National Park Reserve helped to support the program:

> The bottom line is we did not have the funds to take care of it (Gwaii Haanas) the way we did, we should and needed to. We really didn't have the training back then. When people first started reporting that our graves were being dug up and people were digging in old reserves, we started the Watchmen Program on our own. And how we did it was the people volunteered to go down for a certain amount of time. For example, my husband, myself, Melanie, we went to Hotsprings for a month. And you just give your time…That it's being respected. So that's really how the Watchmen Program started. It was really Colin Richardson, I'd say. He witnessed, and he came home and he started the Watchmen Program basically. But it was all volunteer. You got yourself down there, you got yourself back and you had no radios. So when we signed the agreement [Gwaii Haanas Agreement] we had that resource to tap. And that was, you know, it was hard going but the first people, the first Superintendent was really good, you know, really open to it. His name was Roger Hamilton, to I think the first one. So like I say it was hard to give up some say. But for the common good and the preservation of the place we, as a Nation, agreed to go with it.[27]

[26] Cindy Boycott, Personal Communication. July 31, 2003. AMB Member.
[27] Brown, Diane. Personal Communication. July 27, 2003. Director of the Skidegate Haida Immersion School.

When Gwaii Haanas was formed the Watchmen Program was built into the management structure of the Park Reserve via contract. The AMB provides money and infrastructure to facilitate the ongoing success of the program. The Watchmen concept of protection and stewardship was borrowed and adapted from Haida cultural lore and art. The Watchmen are three human, hatted figures, facing in three different directions looking out from the top of a carved pole that is placed in a strategic spot so as to watch over the village. The Watchmen sites are located at Skedans, Taanu, Windy Bay, Hot Springs and Sgan Gwaii.[28]

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[28] See Figure 4-1 for locations.

CHAPTER 5

5.0   THE GWAII HAANAS MANAGEMENT ARRANGEMENT IN RELATION

TO PANARCHY

> Actions toward sustainability will require understanding and appreciation
> of the dynamics of complex life-support ecosystems – a new level of
> ecological literacy – and not just among scientists, but also the general
> public at large. A fundamental challenge in this context is to build
> knowledge and incentives into institutions and organizations for managing
> the capacity of local, regional, and global ecosystems to sustain societal
> development in the context of uncertainty, surprise, and vulnerability
> (Folke *et al.* 2003: 353-354).

This chapter focuses on the processes of change and social dynamics that led to

the creation of a new park management system over a period of 13 years. I follow the

works of Olsson (2004), Berkes and Folke (1998), Berkes et al. (2004) and Gunderson

and Holling (2002) on social mechanisms of adaptability and transformation. Using the

resilience framework and related case studies I clarify features of the AMB that

contribute to the resilience of Gwaii Haanas. The AMB is now a powerful force

influencing the future of Gwaii Haanas. Co-management is a promising approach for

uniting the interests of Aboriginal peoples and national governments in a protected area

setting (Sneed 1997). However, there are very few studies that analyze how this type of

management structure protects both the ecological and cultural integrity of such areas.

Even fewer use a complex systems approach, such as panarchy, to analyze such complex

socio-biophysical systems. Consequently, I have focused my research on the most recent

change that has occurred at Haida Gwaii, the establishment of Gwaii Haanas and the co-

management structure that was developed to oversee its use and protection. The challenge is sustaining a complex system such as Gwaii Haanas that is subject to unpredictable changes.

5.1   LYELL ISLAND BLOCKADE: HAIDA CULTURAL RENEWAL AND REORGANIZATION

The Lyell Island conflict, described earlier in Chapter 4, lasted 13 years because the government of British Columbia would not negotiate a deal that was acceptable to the Haida. It was the Government of Canada that finally stepped in, offering to accommodate Haida rights to their traditional lands. Of course this came at great monetary cost for Canada, buying the government of British Columbia out at an unprecedented $106 million for the development of national parks for both the marine and terrestrial areas, to compensate forestry interests, and to create the Gwaii Trust and the South Moresby Forest Replacement Account (Archipelago Management Board 1996). The adaptive tool that I refer to is the Park Reserve structure that protects the area without prejudice to the ability of Aboriginal people to select park reserve land in the course of land claim negotiations and the co-management structure that brings Aboriginal communities directly into the decision-making process.

The changing social and legal status of Aboriginal people in Canada sets the historical context for the evolving policy, regulations and legislation of Parks Canada (Peepre and Dearden 2002). The past experience (institutional memory) of Parks Canada with Aboriginal communities and their homelands enabled the agency to respond to the Lyell Island crisis and deal with it at a lower scale of the panarchy model. The co-

management of Gwaii Haanas today is a unique arrangement partially because the Haida themselves invoked legislation that facilitated the insertion of clauses into the Parks Act to ensure power sharing with them.

Figure 5-1[29] depicts the hierarchial structure of the events surrounding the Lyell Island blockade. As described earlier, panarchy is a stylized representation of the dynamics of adaptive cycles that are nested within one another across scales of time and space (Berkes *et al.* 2002). The Lyell Island Blockade was the 'revolt', which triggered critical changes at the larger and slower provincial level, i.e., the government of British Columbia. Parks Canada, represented by the largest scale, had to step in to settle the conflict by developing the idea of a park reserve and co-management arrangement. The 'remember', in the diagram, refers to the memory and experience that Parks Canada had gained over time with other Aboriginal communities and the tools (for example the park reserve status) used to settle the conflict. Also depicted in this figure is the action of the Haida. By staging the blockade and effectively stopping the industrial logging, they put the 'brakes' on the system before the ecological degradation of Gwaii Haanas became so severe, as to result in the eventual collapse (from the point of view of the Haida) of the ecosystem. Creating a revolt, such as the Lyell Island blockade, sets the system into a certain trajectory, the outcome of which, because of the very nature of complex systems, was unpredictable. This unpredictable region is in the reorganization (α) phase of the adaptive cycle.

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[29] Adapted from Figure 14.1 in Folke *et al.* 2003: 353-354.
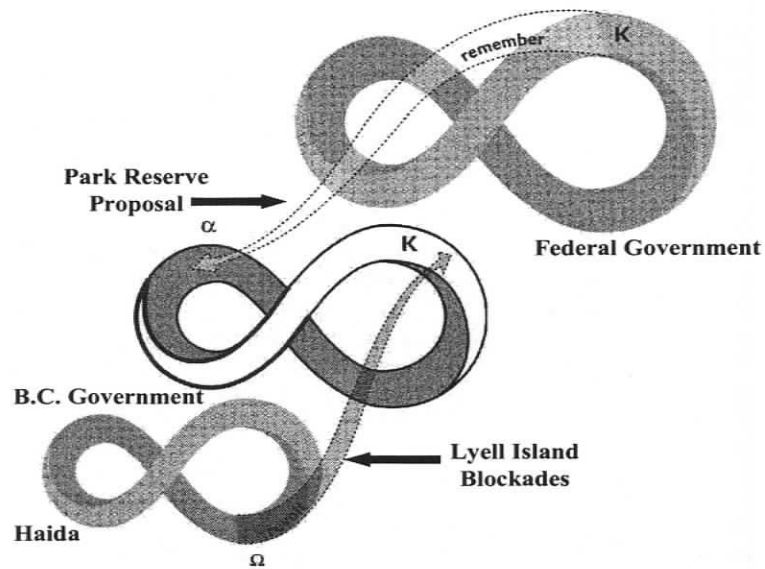
Figure 5-1. Stylized representation of the hierarchial structure of the events surrounding the Lyell Island blockade. (Adapted from Holling *et al.* 2002: 75)

This is the phase with the greatest uncertainty and unexpected crises, such as resource conflicts, but it is also the phase where innovation can take place most readily (Gunderson and Holling 2002). At this point the structure and function of the AMB is very important because it is governing the trajectory of the management of Gwaii Haanas. Therefore, how is the AMB facilitating resilience for sustainability? In other words how does the AMB manage for the area represented by the alpha quadrant? In this complex situation the AMB was successful in terms of eliminating logging, and thereby resolving the conflict. It is therefore essential to focus on the key factors affecting resilience that will enable Gwaii Haanas to maintain and enhance its adaptive capacity.

The Lyell Island blockade was an effective response to environmental degradation caused by what the Haida and others regarded as bad management of natural resources by the government of British Columbia. This is what Alcorn *et al.* refer to as "recoupl(ing)

society to ecological feedback". "Globally, local, national, and international institutions are largely insensitive to ecological feedback[30] evident at local levels. In the face of urgent need, there are few studies of the tactics and strategies used by effective civil associations toward the goal of re-coupling" (Alcorn *et al.* 2003: 321). Alcorn *et al.* (2003: 321) outline three sets of factors that are crucial to the emergence and development of a social movement. Their chapter offers valuable lessons for those researching social movements that work to revive ecological resilience, all of which are comparable to the lessons learned at Lyell Island blockade.

1. Indigenous organizations are essential because they provide the members and the numbers that give a movement its strength. Furthermore it provides solidarity and incentives, a communication network, and leaders.

2. Groups create meaning as they react to events and attribute their problems to a system rather than to isolated individual actions. By having a new, shared frame for discourse, people are more likely to change the prevailing economic, political, moral, cultural, and social dispositions of society which support environmental degradation.

3. Indigenous groups have an advantage, not because they are inherently in harmony with nature, but because they already have a culturally based discourse that supports links to ecological feedback and a collective cultural identity on which to build a movement.

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[30] Ecological feedback refers to the reaction of a local community to environmental degradation and their response to maintain the areas ecological integrity.

5.2   THE AMB STRUCTURE FOR GWAII HAANAS

5.2.1   Political Space for Experimentation and Equity

In 1992 Parks Canada and the Council of the Haida Nation signed the *Gwaii Haanas Agreement*, effectively creating a co-management arrangement. Seixas and Berkes (2003) refer to such an arrangement as political space for experimentation. Through the power-sharing structure of the AMB, traditional knowledge, spirituality, monitoring and land use are incorporated into the management of Gwaii Haanas. Equity in decision-making power is the driving force behind the success of the AMB. Initially, lack of decision-making power is what led to the Lyell Island conflict. Arguably, this conflict has helped to trigger institutional renewal (i.e. a co-management arrangement that facilitates a bottom-up/top-down decision-making process).

5.2.2   Conceptual Pluralism

There is great mutual respect required for such an arrangement as the AMB at Gwaii Haanas to be successful. According to Kendrick (2003), co-management between groups with fundamental epistemological and value differences may actually increase the necessary insights into human-environment interactions. Moreover, accommodating varied ways of knowing and learning may possibly improve the chances of developing sustainable resource management systems.

Traditional Ecological Knowledge

Figure 3-10 is a conceptual framework used by panarchy theorists to demonstrate how local ecological knowledge of the dynamics of a resource and an ecosystem can link management with ecological understanding (Berkes and Folke 2002). Based on this approach two important issues arise: firstly, that the traditional ecological knowledge of

the Haida community is key in linking management with ecological understanding; and secondly, that the AMB structure must be constructed in such a way as to facilitate this link and understanding.

Traditional ecological knowledge appears in all management plans in Canada where there is a collaborative management arrangement between local Aboriginal peoples and Parks Canada. According to a Parks Canada report, "it has been recognized that TEK is a powerful tool for working cross-culturally" (Budke 1999:15). And, in a report by Weitzner and Manseau (2001: 256), "incorporating traditional knowledge into decision-making was cited as critical, and all of the collaborative management agreements refer to recognizing and using traditional knowledge in planning". Furthermore, Weitzner and Manseau (2001: 256) state that Gwaii Haanas is "the only board that uses it extensively in both cultural and natural resources management decision-making".

It became apparent when researching the AMB of Gwaii Haanas that equal power sharing is essential for the inclusion of TEK in both cultural and natural resource management. As of 2003, three of the four members are Haida because Ernie Gladstone, the new Field Unit Superintendent (who is automatically on the Board as a Parks Canada representative), is Haida. From interviews with Haida it became apparent that TEK manifests through the Haida member's perceptions and agendas and is directed by the Haida people.

5.3   KEY FACTORS FOR RESILIENCE BUILDING

5.3.1   Memory and Knowledge: Sources of Innovation and Novelty

Haida social memory consists of knowledge carriers and retainers such as elders, stewards such as the Haida warriors, and leaders and visionaries such as presidents of the Council of the Haida Nation. The components and links of this social memory are the language, songs, dances, stories, and structural expressions of Haida culture. The knowledge, institutions, cultural values and worldview are reservoirs that can be drawn upon.

The Haida have endured several crises, which have created space for renewal, reorganization and novelty. Part of this renewal has been strengthening opportunities for language learning and use. The Skidegate Haida Immersion Program was developed in 1998 to rejuvenate the Haida language. Haida language, songs, dancing and other cultural expression had long been suppressed by the policies of residential schools, church and government. Only 35 people are currently fluent in Haida.[31]

The disappearance of TEK is a growing concern as Elders pass away and communities lose their connections with the land because of the long-term effects of residential schooling and acculturization. Up until the 1980's, Aboriginal communities throughout Canada were removed from lands designated for protected area status. For example, the Champagne-Aishihik were removed from their lands with the formation of Kluane National Park in the 1940's and only in the 1980's were they brought back into a co-operative management arrangement with Parks Canada. During those 40 years of

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[31] Brown, Diane. Personal Communication. July 27, 2003. Director of the Skidegate Haida Immersion School.

exile much of the connections and knowledge of the Champagne-Aishihik to this area has been lost.

The Haida were decimated by disease in the late 19th century early 20th century but have managed to maintain their legacy which has been affirmed by the AMB: "The Haida recognize that the natural and cultural elements of Gwaii Haanas are inseparable and that protection of Gwaii Haanas is essential to sustaining Haida culture" (Archipelago Management Board 1996: 20). For example one major project directed by the AMB, as mentioned in the previous chapter, is the active removal of the introduced black tailed deer that have been suppressing native plant species many of which have important food and medicinal uses. Haida elders provide insights as to where and what type of plants had been suppressed by the deer and describe the dietary value of these plants such as the chocolate lily (*Fritillaria camschatcensis*). It is apparent form this example that the health and diversity of the environment provides dietary diversity which contributes to the health of the local community. Consequently, it has become important to include local communities in park management in order to maintain the connection between ecological understanding and resource management. By the same token, it is just as important to nurture and protect the culture of local communities from which TEK is developed, embedded and maintained as it is to protect species, landscapes and functions for environmental sustainability. And, in the case of the Haida, one such element is their language. Other such elements include the cultural heritage found in archaeological research and maintenance of stories and historical sites. The Watchmen program also provides an opportunity for Haida to re-learn who came from these sites and learn who the families associated with those sites are today. Whenever possible

Haida elders are strategically placed with Haida youth to create an opportunity to pass on that knowledge. In light of the panarchy model, focusing resource management on nurturing and protecting elements of both culture and ecology is one of the most important contributions to environmental sustainability (in this case protected area management) in addition to the recognition that cultural and ecological landscapes are inextricably linked.
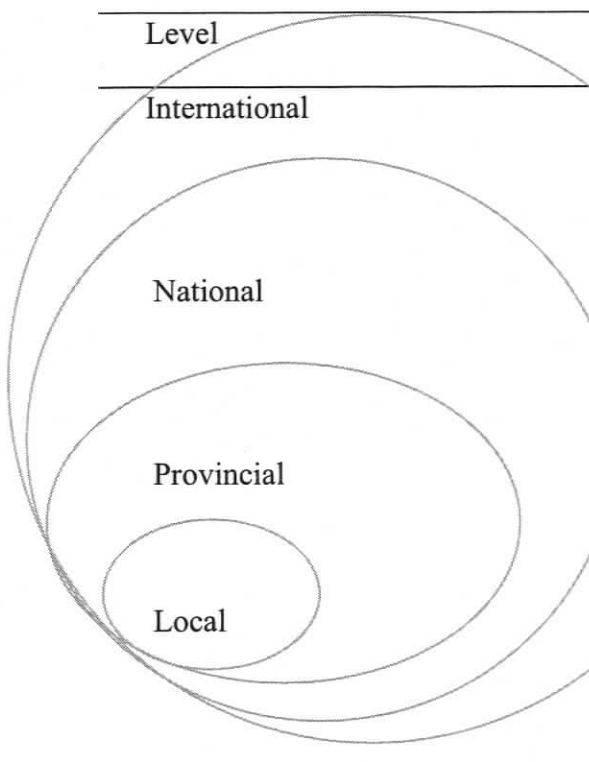
5.4   PREPARING FOR UNCERTAINTY AND SURPRISE

Today, Haida Gwaii is facing several possible perturbations and changes that could drastically affect its long-term social-ecological viability. Here are some of the issues that could cause major shifts: implementation of offshore drilling in the Hecate Strait, the effects of global warming, the pressure of increased tourism on sensitive areas, the impacts of introduced species on native plant communities, the diet of local people, the loss of elders and their knowledge, the complex implications of the new National Marine Conservation Area (NMCA), the degrading effects of industrial resource extraction, and the uncertainties of a land title settlement. Even the AMB structure itself is susceptible to systemic re-organization. Indeed, the impact of these issues, such as the marine conservation area and the land title case, and their outcomes are unpredictable. According to Folke *et al.* (2002), there must also be an assessment and building of resilience to strengthen the ability of a governance system to adapt and maintain sustainability. This would entail undertaking comparative analyses with other regions as well as those with similar arrangements, to facilitate the flow of information. It also entails envisioning scenarios for the future to prepare for surprise and uncertainty. A

narrative may be formed that indicates what the future would look like and how events might unfold.

5.4.1 Adaptive Networking

The AMB has developed into a flexible collaborative approach for managing Gwaii Haanas. The AMB together with other actors operating at different levels, from the local to international, are coordinating ongoing activities to facilitate the flow of information between social networks and combining various sources of information.

Table 5-1. Examples of actors at different levels presently involved in various collaboration projects in Haida Gwaii.

Level	Organization and Institutions
International	Research Group on Introduced Species Protection and Repatriation of First Nation Cultural Heritage UNESCO – World Heritage Site
National	Ocean Management Research Network Coasts Under Stress Silva Forest Foundation World Wildlife Fund Canada
Provincial	Sierra Club B.C. Nature Conservancy B.C. Union of British Columbia Indian Chiefs
Local	Laskeek Bay Conservation Society Watchmen Program Skidegate Haida Immersion Program Haida Repatriation Committee Gowgaia Institute

For example, The Research Group on Introduced Species (RGIS) is an international research group that works in partnership with local communities to study the changes in the ecology of Haida Gwaii caused by species introduced since European

contact. This international research group is made up of representatives from Parks Canada, Ministry of Water, Land and Air Protection, the Laskeek Bay Conservation Society, the National Centre for Scientific Research in Montpellier, France, and the Canadian National Wildlife Centre (www.rgisbc.com).

An example of collaboration at a national level is the Coasts Under Stress network (www.coastsunderstress.ca). This is an interdisciplinary research group that uses a set of carefully-constructed complementary case studies on the East and West Coasts of Canada to achieve an integrated analysis of the long- and short-term impacts of socio-environmental restructuring on the health of people, their communities and the environment. Coasts Under Stress has helped fund archaeological research at Gwaii Haanas jointly with the Social Sciences and Humanities Research Council and the Natural Sciences and Engineering Research Council and Parks Canada. The artifacts found provide insight into Haida fishing culture at Gwaii Haanas. These artifacts will be returned to the Haida Museum at Qay'llnagaay after analysis.

At a more regional level, the Protection and Repatriation of First Nation Cultural Heritage research project provides resources and information to First Nation partners such as the Haida Repatriation Committee. This project is a collaboration between an international team of scholars in law and anthropology and First Nation partners in the provinces of Alberta and British Columbia. It has four main objectives, to disseminate information about the existing legal regime, to facilitate respect for, and understanding of, Aboriginal concepts of property and law, to assist Aboriginal community partners, collect and develop archival and educational resources, and to critically analyze domestic

federal and provincial legislation to provide recommendations for reform
(http://www.law.ualberta.ca/research/aboriginalculturalheritage/index.htm).

5.4.2   Envisioning Scenarios for the Future

According to Gallopin (2002: 365), considering scenarios as courses of events is
important to direct attention to the unfolding of alternatives and identifying branching
points at which human actions can significantly affect the future. Gryzbowski and
Slocombe (1988: 470-471) in their article, "Self-organization Theories and
Environmental Management: The Case of South Moresby, Canada", identified critical
variables in the South Moresby (now Gwaii Haanas) social-biophysical system, classified
by spatial and temporal scale. They selected these variables through a review of the
relevant literature, community surveys, and implementation of a Delphi-type technique
wherein key individuals were contacted and asked to identify important and critical
variables. Critical variables may lead the system into a new state. Therefore, according
to Gryzbowski and Slocombe (1988: 468), the identification of critical variables reveals
the spectrum of possible future states. By using critical variables like these a narrative
may be formed that indicates what the future would look like and how events might
unfold.

Table 5-2. Critical variables in the Gwaii Haanas social-biophysical system. (Adapted from Gryzbowski and Slocombe 1988: 470-471).

Important demographic and perceptual variables	Drivers/Critical Variables
	Local labor demand and supply
	Labor mobility/willingness to retrain
	Increase in Haida population
	Native rights/native land rights
	Uncertainty of local employment

	Perception of forest industry decline
	Perception of emerging resources
	Wilderness appreciation and preservation
	Spiritual values/animism
	Awareness of environmental degradation
Important biophysical variables	Drivers/Critical Variables
	Forest community changes due to deer browsing
	Rat and raccoon predation on seabird colonies
	Cumulative impacts on salmon stocks and forest land
	base caused by increasing slope instability due to logging
	steep slopes
	Soil erosion
	Stream scouring
Important economic and technological variables	Drivers/Critical Variables
	Emerging world competition in wood products
	Fluctuating world wood product prices
	Obsolete harvesting/processing technology
	Reinvestment capital availability
	US protectionist legislation
	Labor costs fixed and high
	Emerging industries/new employment
	Stumpage revenues and rates
	Currency changes
	Efficiency of harvesting technology
	Product/process innovations in forest industry on a global
	scale
	Age of local and regional technology in forest industry
Important institutional variables	Drivers/Critical Variables
	Forest land administration inflexibility
	Evolving native rights/land claims
	Legal precedents/Meares Island
	US protectionist legislation
	Opinion polls/election cycle

The identification of critical variables creates a context of possible future states.

Management actions must develop decision criteria that reflect these processes if they

want to avoid being overwhelmed by sudden perturbations and change. The next step is

to put together these driving forces in the form of a scenario. The scenario should unfold in a series of events that best captures the situational dynamics and ends in a plot, an image of the future. According to Gallopin (2002: 366), "the construction and interpretation of the scenario will be influenced by the beliefs and theoretical assumptions of the analyst. The account of the mechanisms leading to alternative scenarios and judgment of the efficacy of alternative actions is guided by one's worldview, although this is rarely made explicit". The end result is meant to be a critical reflection and exploration of the philosophy behind the structure of the scenario. These are essential aspects of the scenario description and documentation (Gallopin 2002).

At this time, it appears that the AMB has developed into a flexible collaborative approach for managing the social-biophysical sustainability of Gwaii Haanas. However, it is useful to develop images of the future for the AMB so as to explore different trajectories and examine what kinds of new questions might arise. In the following section I map out two scenarios on the adaptive cycle (panarchy model) to highlight the transformation and unfolding of events. I develop these scenarios based on a set of driving forces that may actually behave in a variety of different ways with different possible plots but, as mentioned above, the end result is meant to be a critical reflection and exploration. Ultimately it is necessary for the AMB members to develop and interpret scenarios for the future of Gwaii Haanas. Their beliefs and theoretical assumptions should guide and judge the account of the scenarios.

Pessimistic Scenario

This first scenario is a pessimistic vision of Gwaii Haanas. It depicts a situation where global environmental change and external perturbations compound local stresses

already present at Gwaii Haanas causing a cascade of ecological collapse. Global warming drastically affects the viability of fish populations already affected by increased slope instability, stream scouring and soil erosion from past forest practices and off-shore fishing. Change in annual temperature changes plant communities, particularly in the alpine region. A major oil spill damages large expanses of coast-line and impacts rare seabird colonies already under pressure from rat and raccoon predation. Tourism increases throughout the archipelago. Increased tourism impacts cultural and ecologically sensitive areas through overuse and vandalism. Tourists also spread rats throughout the islands, inadvertently transported by boats. Forest communities continually change due to deer browsing. The forestry and fishing industry on the islands eventually collapses. The situation then becomes very similar to that found in Newfoundland with the cod fishery collapse. Many people leave the island to find jobs elsewhere and those who remain are on social assistance. The adaptive cycle in this scenario collapses because the potential and diversity have been eradicated by misuse and major external perturbations (Figure 5-2). Ecologically Haida Gwaii flips into an irreversible, eroding state. The cultural cohesion and adaptive abilities have been lost despite the efforts of the AMB. Haida cultural and ecological memory are further and further degraded and lost.
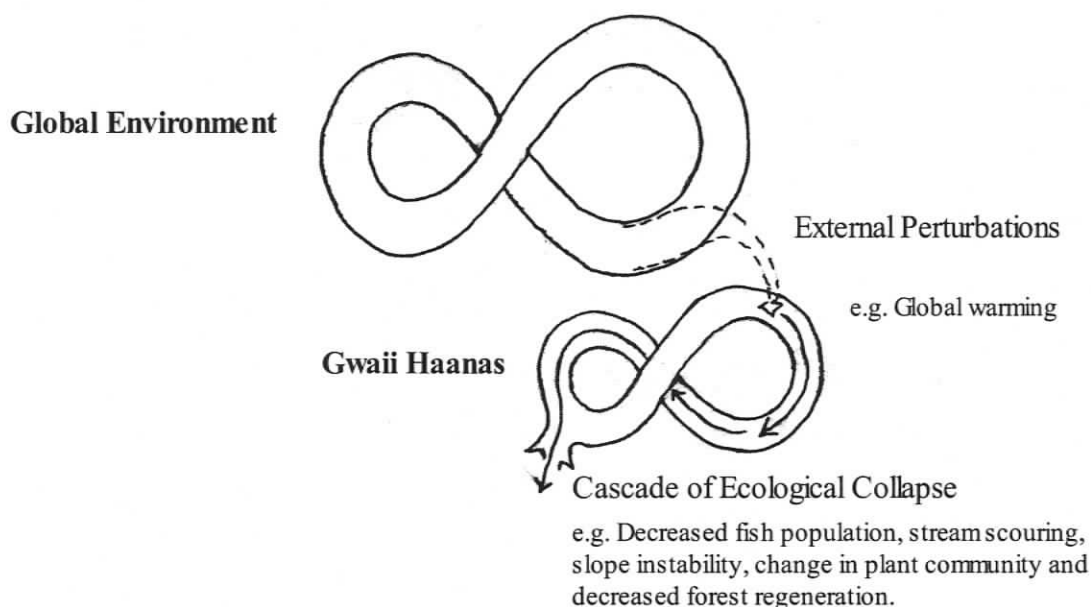
Figure 5-2. The ecological collapse of Gwaii Haanas from global environmental perturbations.

Adaptive Scenario

The second scenario depicts a path that works with system transformation. In this scenario there is a drastic institutional re-organization into a co-management arrangement, the AMB, in response to the Lyell Island blockade. The introduction of a park reserve and Haida Heritage Site, Gwaii Haanas, strongly decreases the pressure on resources without affecting the ability of the Haida to pursue their land title case. Connectedness is reduced through the decentralized, diversified, bottom-up co-management arrangement which, counters the top-down approach of Parks Canada. The AMB uses both cultural and science based knowledge to make management decisions. The AMB actively protects both ecological and cultural sources of renewal. For example, introduced species are actively removed from islands to restore native plant communities. Haida place names and stories are collected and made use of for

management purposes as well as for the Haida title case. The Skidegate Haida Immersion School and the Watchmen program are both funded through the AMB. The following is a vision of Gwaii Haanas in 2010 and beyond. It was developed by the AMB (1996: 7-8) and included in the Gwaii Haanas management plan.

As the pounding seas of Pacific winter storms subside, a sense of renewal stirs in Gwaii Haanas. Eagles cruise the rain-drenched shorelines, watching, waiting. River otters patrol the beaches and coves. The Kaaw fishers know that the herring are coming. Overnight, in sheltered bays and beaches lining the shore of a large inlet, the water turns milky green with herring spawn. A tribe of sea lions arrives to feast, wary of a pod of orcas circling offshore. Flocks of gulls, excited by the opportunity, create a frenzy of activity on the water. Below the surface, all manner of sea life congregates to share the bounty.

As the days grow longer, flocks of migrating birds pass though on their journeys along the coast. A raven watches an old man and his grandchild walking down the beach. Seabirds come in from the Pacific by the thousands, making ready their nests in the forest floor, tree-tops, and rocky promonitories. All of the bird colonies have expanded and grown dramatically since control measures on raccoons and rats were initiated.

Birders from around the globe come to witness the spectacle. At night, a sailboat drifts by as people on deck listen with bated breath to the call of parent murrelets beckoning their young to the sea. As day breaks, a falcon swoops, knocking a murrelet out of its flight; the guests watch with mixed emotion as the raptor retrieves its prey.

With the coming of summer, visitors from all over the world begin to arrive. Each one of them shares the sensation of being the first person to set foot here. Advance information provides the visitor with the

necessary knowledge to respect the land. In this way, the need for more direct management control is reduced.

At a year round cultural camp, people of all ages immerse themselves in the cultural and natural heritage of Gwaii Haanas. Among their activities is a trip in a Haida canoe to a nearby village site. Along the way they stop to jig cod, which are once again plentiful. As evening falls, dinner is followed by song and stories passed down through countless generations. A drum beat resonates with the spiritual power of the earth, awakening a personal connection to the natural world.

At Windy Bay, a party of three kayakers are greeted by the Watchmen. Outside the longhouse, the kayakers describe a pod of killer whales they encountered off the point to a group of students on a six week field course in Gwaii Haanas. After tea and socializing, the kayakers make their pilgrimage into the ancient forests.

As the days cool and the rains return, the ground becomes saturated and the creeks begin to swell. Activities shift to a creek mouth where a cacophony of sounds build as eagles, martens, gulls and seals gather to watch a bear feast on salmon from the creek. His skills are critical for their survival as well as his own. Remote control video cameras cause no interference while capturing the whole performance. Satellite connections allow students to link in from anywhere in the world to share the moment.

Winter arrives with a vengeance with winds over 100 km/hour creating six meter swells that pound the West Coast. A sea otter takes refuge in a protected cove until the winds ease and he can resume his feeding. All creatures yield and retreat when the power of winter unleashes itself over Gwaii Haanas. With the passing of the winter solstice, however, and the lengthening of the days, there stirs again the springtime of new beginnings.

This scenario appears to be less of a story and more of a healthy strategy to maintain the sustainability of Gwaii Haanas. However, the success of this scenario depends on the AMB's ability to deliberately set smaller adaptive cycles that are more manageable (Figure 5-3). Setting smaller adaptive cycles entails implementing adaptive management such as prescribed burning whereas small, deliberate, and frequent disturbances are created to avoid a larger more destructive or devastating adaptive cycle.

Smaller Adaptive Cycle

Adaptive Management
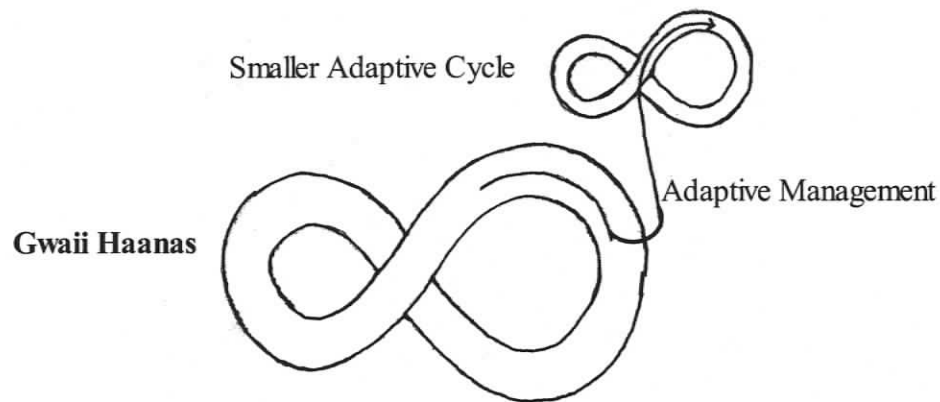
Gwaii Haanas

Figure 5-3. The deliberate setting of smaller adaptive cycles through adaptive management to maintain sustainability of Gwaii Haanas.

- Facilitate arenas of flexible, open, multilevel governance (adaptive co-management),

- Direct action to nurture elements of social/cultural and ecological resilience,

- Accelerate learning through actively adaptive networking and encourage learning and building of local/traditional ecological knowledge into institutional structures and,

- Envision the future through scenarios.

It is important to point out that there are an almost infinite number of scenarios that can be envisioned. The two I have presented are at extreme ends of the spectrum.

CHAPTER 6: CONCLUSION

6.0   TRANSFORMATION AND SUSTAINABILITY OF GWAII HAANAS

NATIONAL PARK RESERVE AND HAIDA HERITAGE SITE

The Lyell Island blockade was a social movement that was a catalyst in the protection of the ecological integrity of Gwaii Haanas. A local community is a supportive link to ecological feedback, which in the case of Gwaii Haanas was the Lyell Island blockade against the environmental degradation caused by industrial logging. The perception of crisis triggered a collective action, key stewards such as Guujaaw, Miles Richardson, and several elders provided leadership, vision and trust. These leaders along with Haida warriors encouraged the building of social networks that included environmentalists from across North America and further caught media attention from across the globe. Parks Canada provided a window of opportunity at a critical time, and support for a new management approach that includes participation from both local and federal levels.

The Council of the Haida Nation and Parks Canada were able to organize a comprehensive agreement that includes the vision and goals of both organizations. This agreement did not relinquish the rights of the Haida to continue their land title case for Haida Gwaii and facilitated the modification of park legislation to ensure power sharing between the two organizations. The incorporation of new perceptions and values for protecting both cultural and ecological integrity into the management plan allowed the creation of the AMB and the development of an adaptive co-management approach for Gwaii Haanas. The self-organizing processes that followed the rapid transformation in 1974-1985 initiated social transformation that appears to have moved away from

unsustainable and undesired trajectories, toward social-ecological trajectories that strengthen and enhance management of desired social values and ecological protection. The nurturing of cultural and ecological memory and the creating functional feedback loops such as social network building and collaborative learning processes initiated by both Haida and Parks Canada, helped build resilience for the formation of Gwaii Haanas.

This case study illustrates the linkage of cultural and ecological systems, which therefore implies that cultural memory can affect the sustainability of Gwaii Haanas as much as ecological memory can. Moreover, the loss of cultural memory-such as language and traditional ecological knowledge-could jeopardize the adaptive capacity of the co-management arrangement process. In turn, sources of resilience can be found in Haida memory and knowledge. This perspective brings to light how important the sources of memory and knowledge are in the management of Gwaii Haanas. Traditional ecological knowledge is a necessary component of social-ecological resilience. Since social and ecological systems are linked, losing social memory can affect the ecosystem as much as losing ecological memory. In the case of Gwaii Haanas, if key actors hadn't been present the direction of management would have been uncertain and transformation would have taken another path. It is important, too, to understand that traditional ecological knowledge is embedded within a greater cultural context. Moreover, a culture, such as that of the Haida, is inextricably linked with and dependent on the health of the land. This complexity supports the importance of an adaptive co-management arrangement with equal power sharing that: re-enforces the repatriation of Haida cultural identity, includes TEK in management through meaningful participation and decision-making, and accepts linked cultural-ecological systems.

This case study illustrates how accommodating varied ways of knowing and learning improves the chances of developing sustainable resource management systems. Yet a high degree of mutual respect is required for a co-management arrangement to be successful. Up until the event of the Visitor Centre potlatch hosted by Parks Canada, this respect was not always evident. However, co-management between groups with fundamental perceptual differences can expand insights into human-environment relations. Furthermore, each individual on the AMB is carefully selected to ensure there are no personality conflicts.

Parks Canada has been working over the last three decades to better understand ecosystem dynamics. However, in many parts of Canada this agency has neglected local community interests and, specifically, the importance and relevance of traditional ecological knowledge in park management. The mapping, introduced species, and cultural and biophysical inventory projects at Gwaii Haanas have helped to nurture, protect and recover some components of ecological health, such as native plant communities. At the same time Parks Canada has acknowledged the value of Haida traditional ecological knowledge and management systems for environmental understanding. Culturally appropriate maps, enthnobotanical databases, Haida place names and stories are just some products of these projects that are also being used to help in the Haida land title case and repatriation movement.

The AMB at Gwaii Haanas currently appears to be an adaptive co-management system that is flexible, community-based, tailored to specific situations, and supported by a concerned government agency to ensure ongoing solutions to sustainable resource management. This arrangement was able to successfully move away from a less desired

trajectory toward a more sustainable one with the potential to nurture the ecological health of Haida Gwaii and the Haida culture on which it depends. In due course, one can speculate that in the future this arrangement could work toward incorporating the marine aspect of this region, referring specifically to the marine conservation area. It is uncertain whether the AMB is robust enough to absorb changes that previously would have threatened its existence, but many of the major components are now in place. There must be an assessment and building of resilience to strengthen the ability of a governance system to adapt and maintain sustainability. This would take the form of a monitoring program that focuses on cultural and ecological components of resilience and adaptive management approaches. Envisioning scenarios is key for vision building to prepare for unexpected systemic surprises and uncertainties, as discussed in the previous chapter. Vision building entails identifying critical variables to form a narrative that indicates what the future would look like and how events might unfold for the future. There should be more comparative analyses with other regions and similar arrangements and assessing the adaptive capacity in the region as it relates to major threats and perturbations.

6.1   PANARCHY: BUILDING RESILIENCE FOR SUSTAINABILITY

There have been dramatic changes in social and environmental systems across the globe. With ever-increasing intensity and scale of human activities, synergistic cascades of change are occurring across local, regional and global scales. There are limits to knowledge when dealing with complex dynamic systems, and panarchy is a precautionary approach that emphasizes the need for adaptive learning processes and

nurturing sources of resilience. Panarchy theorists (Holling *et al.* 2003: 5) "…seek to understand the source and role of change in systems – particularly the kinds of changes that are transforming, in systems that are adaptive. Such changes are economic, ecological, social, and evolutionary. They concern rapidly unfolding processes and slowly changing ones – gradual change and episodic change, local and global changes".

This thesis identifies the key elements that form the adaptive institutional responses to resource and ecosystem change in the evolution and maintenance of Gwaii Haanas. It is apparent from this case study that social-biophysical systems such as those encompassing Gwaii Haanas are complex and fragile. Furthermore, social and biophysical systems are interconnected and subject to sudden change and even collapse. Panarchy is a tool that can help to ensure that these systems, the land, water and people of Haida Gwaii, maintain a high level of resilience.

Social-ecological systems undergo transformation, continually adapting and collapsing in a world that is constantly changing. Managers are trying to shift their focus from a 'command and control' approach and managing for a given stable state, including the view of protected areas without people, to taking an adaptive management approach that simultaneously includes indigenous communities as active participants in protected areas. Panarchy offers a framework for having the necessary components in place to prevent systemic collapse of social-biophysical systems. It outlines the elements of resilience and management structures that operationalize adaptive management. Panarchy is based on four categories of factors for building resilience (as previously described in Section 2.2, p.17):

1) We must learn to live with change and uncertainty. Management can erode resilience by using rigid control in an attempt to maintain stable states. Such an approach can disrupt flexible, creative and adaptive response mechanisms, leaving fragile social-ecological systems.

2) It is difficult to predict shifts in ecosystems therefore predictive methods must be replaced with risk spreading and insurance strategies to sustain social-ecological systems. It is key to nurture diversity – components of resilience for re-organization and renewal in the wake of unpredictable and complex perturbations.

3) Combining different kinds of knowledge is essential for resilience building management. The knowledge and wisdom of local users and interest groups can provide understanding of ecosystem dynamics.

4) Resilience building management must create opportunity for self-organization by being flexible and open to learning.

Folke *et al.* (2002) have developed several general policy recommendations in the context of sustainable development based on these four categories of factors for resilience building (as previously describe in Section 2.2, p.18:

1) Direct action to nurture elements of social/cultural and ecological resilience. Monitoring and nurturing variables of diversity provide insurance to cope with uncertainty.

2) Facilitate adaptive management and encourage learning and building of local/traditional ecological knowledge into institutional structures. Adaptive

management is a learning-by-doing approach that continually monitors and accumulates knowledge to match the dynamics and unpredictability in systems. The collective memory of experiences can be drawn on my managers at multiple levels in an institutional structure.

3) Facilitate arenas of flexible, open, multi-level governance i.e adaptive co-management. This type of governance would generate a diversity of management options that are key to responding to unpredictable perturbations. Adaptive co-management systems are community-based therefore management is tailored to specific situations and supported by a diverse set of interest groups from different scales, from local to international.

By analysing a case study like Gwaii Haanas with this framework it sheds light on current challenges facing resource management and conservation of land, wildlife and water that has been under the control of central governments for a long time. It also raises questions about the efficacy of older national parks, such as Jasper National Park, in Canada that were established almost a century ago and appear slow to change management approaches because of rigid historical legacies. Referring back to my personal reflections in Chapter 1, I wonder if Jasper park management can continue to introduce and facilitate ongoing natural processes in the landscape given the severity of internal and external threats. Also the wilderness view of management has obscured and subsequently in large part erased the significance of the Aboriginal presence and their culture on this landscape. To avoid conflicts such as the Mohawk Oka crisis in 1990 in Quebec, the Haida Lyell Island blockades of the 1980's at Haida Gwaii, B.C., the deadly

standoff at Ipperwash Provincial Park in Ontario with the Stony Pointers in 1995 or the 2006 standoff in Caledonia, Ontario with the Six Nations/Iraquois, parks like Jasper need to start taking into consideration Aboriginal rights. It is not a matter of whether Jasper as an institution will incorporate Aboriginal rights, cultural values and traditional ecological knowledge into park management it is when and how. The framework used in this thesis points to the sorts of challenges and issues natural resource managers must deal with: how has management evolved and how has it changed over time? Who participates in management and how are the participants connected to others across space and level of management? What variables influence the ecosystem's ability to respond to change without loss of its integrity? What role does traditional ecological knowledge of indigenous peoples play in management and how does it relate to Western academic knowledge contributed mainly by government and outside institutions? How are institutional structures embedded in and linked to various ecological scales to allow for learning and adaptation? There needs to be more analysis of case studies such as Gwaii Haanas to envision how this framework plays out in other scenarios. An analysis of Gwaii Haanas also highlights how unique this case study is. For example, the AMB is a collaboration between one First Nation, the Haida Nation, and Parks Canada whereas other protected areas such as Gulf Islands National Park Reserve are grappling with the how to include the interests of 19 different First Nations with over lapping interests in this area. Also Gwaii Haanas is terrestrially based and does not yet include the national marine conservation area.

A major concern I share with Nadasdy (2003) is that Aboriginal peoples have had to develop bureaucracies that parallel those of the federal government with which they

must deal and compel Aboriginal people to speak and act in ways that tend to be very different form those of their original culture. Even though Parks Canada is entering into co-management it still very much reflects a strong, paternalistic structure of policy and guidelines. However, I still believe that collaboration is the only way to operationalize TEK because it must be embedded within the culture of those making decisions. Conventional resource management of National Parks in many parts of Canada tends to neglect local interests, rights and their ecological knowledge as well as institutional structures that would facilitate more of a bottom-up as a complement to a top-down approach to management. There is still a gap between management by local communities and by government policy making, despite the abundance of linked social-ecological systems like the case study outlined in this thesis. Given the changing climate concerning Aboriginal knowledge rights, values and land rights case studies such as this must be considered more widely, specifically in Canada. Scientific adaptive management in the implementation of protected area policy in Canadian National Parks could benefit from a more explicit collaboration with local communities who have site-specific ecological knowledge in other words, adaptive co-management. Furthermore, panarchy offers a valuable framework for understanding and maintaining cultural and ecological resilience in the context of protected area management.

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APPENDIX A

Question Sample #1

Personal Background
- How long have you been working with the park reserve?
- What is your role here at the park reserve?
- What was your training for this position?

Park Background
- What spurred the creation of the park reserve – Why was it established?

Use of Knowledge in the Park
- What is traditional knowledge?
- When was traditional knowledge introduced into the park reserve setting?
- How is traditional knowledge collected? Is there a set protocol? Can you give examples?
- Is this knowledge being used in making decisions? –How is it being used? Can you give examples?
- What are some of the future challenges for collecting or using traditional knowledge?
- Do you have any advice for other people who want to collect and use traditional knowledge in resource management?
- How is scientific knowledge collected? Is there a set protocol? Can you give examples?
- Is this knowledge being used in making decisions? –How is it being used? Can you give examples?

Watchmen Program
- Can you describe the Watchmen Program to me?
- What spurred the creation of the Watchmen Program – Why was it established?
- How has the program developed/changed over time - with the development of Gwaii Haanas National Park Reserve?
- How do you see the future role of the Watchmen Program?

Conclusion
- Do you have any advice for other people who may want to enter into a similar arrangement?
- Are there any additional comments you would like to make that we did not discuss?

Question Sample #2

Personal Background
- How long have you been working with the park reserve?
- What is your role here at the park reserve?

- What was your training for this position?

Park Background
- What spurred the creation of the park reserve – Why was it established?

Use of Knowledge in the Park
- What is traditional knowledge?
- When was traditional knowledge introduced into the park reserve setting?
- How is traditional knowledge collected? Is there a set protocol? Can you give examples?
- Is this knowledge being used in making decisions? –How is it being used? Can you give examples?
- What are some of the future challenges for collecting or using traditional knowledge?
- Do you have any advice for other people who want to collect and use traditional knowledge in resource management?
- How is scientific knowledge collected? Is there a set protocol? Can you give examples?
- Is this knowledge being used in making decisions? –How is it being used? Can you give examples?

Watchmen Program
- Can you describe the Watchmen Program to me?
- What spurred the creation of the Watchmen Program – Why was it established?
- How has the program developed/changed over time - with the development of Gwaii Haanas National Park Reserve?
- How do you see the future role of the Watchmen Program?

Conclusion
- Do you have any advice for other people who may want to enter into a similar arrangement?
- Are there any additional comments you would like to make that we did not discuss?

APPENDIX B

(Human ethics approval form)