

Improving biodiversity and community well-being in urban parks: A comparison of
Seoul Forest Park (Seoul, Korea) and Stanley Park (Vancouver, Canada)

by

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B.Ag, Chonnam National University, 1993

A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of

Masters of Arts

in the School of Environmental Studies

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Supervisory Committee

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Abstract

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This research investigates how community-based stewardship and governance of urban parks benefits both biodiversity conservation and local residents' quality of life. The main objective of this research is to examine successful strategies to improve biodiversity and human well-being in urban parks. In this research, two stories of renowned city parks in metropolitan areas are interpreted: Seoul Forest Park in Seoul, Korea and Stanley Park in Vancouver, Canada. These parks are compared on the basis of the history of their creation and restoration, their strategic plans, challenges to managing the parks, the role of community-based stewardship, and the relationship between city governments and community stewardship groups. By comparing two famous metropolitan city parks, this study makes recommendations for each park. To understand the beneficial programs and approaches, I further explore how the parks' management plans address improvement in biodiversity, and how park governance and operations encourage it, particularly how stewardship groups have improved biodiversity.

Based on the research findings, this study drew several main benefits of community-based stewardship and governance of urban parks. First, supportive legislation, policies, and plans for biodiversity conservation have a decisive effect on the implementation of biodiversity improvement. Next, regular ecosystem monitoring and linking fragmented areas are mandatory to preserve and improve urban biodiversity. Also, urban green space restoration contributes not only to biodiversity conservation, but also to citizens' quality of life. In addition, listening to citizens' opinions, ensuring the safety of park users, offering cutting-edge services, and providing various cultural and educational programs, contribute to enhanced citizens' well-being in urban parks. Lastly, community-based stewardship groups play an essential role for improving biodiversity as well as citizens' quality of life in urban parks. Therefore, a successful partnership between the Parks Division in city governments and community-based stewardship groups creates a more powerful synergy that sustains biodiversity and human well-being.

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Acknowledgements

Many people deserve acknowledgement and thanks for their support during the writing of this thesis. First and foremost, I would like to thank my supervisor, Dr. Eric Higgs. Thank you for helping me to come to Canada, start the graduate course, and complete a master degree. Also, thank you for the honorable support, the valuable feedback, and the philosophical insights. I feel extremely lucky that you took a chance on me to be one of your students.

I also would like to acknowledge my other committee members, Dr. Valentin Schaefer. Thank you for being so generous with your support from the designing of my interview questions to contacting interviewees and facilitating my work in Vancouver. Thank you also for encouraging me to work continuously and giving me valuable feedback on my study.

I would like to extend my appreciation to the External Examiner, Mr. Gary Darrah. Thank you for your valuable time giving me precious feedback and comments on my thesis.

I am grateful to all those involved in my interviews. Thank you to everyone who responded to my questionnaires. Your consideration and input were invaluable. A special note goes out to my colleagues in Seoul Metropolitan Government and Seoul Forest Park Conservancy. Thank you for giving me confidence to complete this study with beneficial responses. My study literally could not exist without these data. I am also thankful to those photographers who

provided photographs for my thesis. All photographs except those by me are credited to those photographers.

I also have to express gratitude to my colleagues and friends in the graduate program in Environmental Studies at the University of Victoria. Especially, I thank my best friends, Kate Proctor, Ryan Hilperts, and Shinsaku Shiga, who have given advice, suggestions, and proofreading to complete this study.

I am so thankful to the Seoul Metropolitan Government for providing not only a chance to study in Canada for two years, but also a financial support towards the completion of my studies.

Finally, I am also deeply grateful to my husband, Hun Yi, and my children, Sungchan, Yuchan, and Daeun. This project would not have been possible without your continued support, encouragement, patience, and love.

Chapter 1

We live in an increasingly urbanized world. Presently, approximately 50% of world's population and 82% of Northern America's population live in urban areas (The United Nations Population Fund [UNFPA], 2009). The United Nations Population Fund also states that with the increasing population generally, our cities will continue to expand. Former natural ecosystems become modified through intensifying human use, and in highly developed zones become almost or entirely lost. Urban ecosystems have distinct characteristics that require special understanding in comparison with rural or wild ecosystems. Urban parks that protect remnants of biodiversity are critical pieces in understanding urban ecology and the value natural places provide for people in cities.

Urban natural habitats are fragmented, isolated, and degraded through the vibrant interactions among social, economic, institutional, and environmental influences. Large numbers of weedy species persist, and ecological succession is disturbed in urban areas (Trepl 1995). Thus, urban areas present distinctive ecosystems, having barely reversible disturbance generated by human activities. The result of urbanization processes causes tremendous losses in biodiversity and ultimately affects human well-being (Alberti and Waddell 2000, Vale and Vale 1976, Luniak 1994, Kowarik 1995, Marzluff 2001). Biodiversity critically contributes to human well-being by providing not only essential services for life, offering clean air, clean water, and healthy soils to grow food and pollinate fruits,

but also many social and health benefits. Therefore, urban biodiversity losses are a significant issue, and implementing a comprehensive urban biodiversity conservation strategy is increasingly important.

To prevent the loss of urban biodiversity and contribute to enhance the quality of life of many urban dwellers, more efficient preservation and restoration activities are required. For this reason, ecological restoration is an essential component and process for the conservation of biodiversity. In urban areas, ecological restoration is indispensable for reciprocal flourishing of both city dwellers and urban ecosystems (Cairns 2002).

Ecological restoration in urban areas reduces urbanization impacts such as the urban heat island effect, air pollution, habitat loss, and urban runoff, and promotes urban ecosystem function. Moreover, ecological restoration plays a significant role in connecting people with their natural environment through meaningful engagement and experiences by offering environmental awareness, social relations, and recreational opportunities. Therefore, urban ecological restoration projects provide hope for not only for urban biota, but also for people and cities themselves.

For these reasons, in this study, I examine what actions can be taken to conserve biodiversity and promote human well-being in urban areas. This research synthesizes the stories of two renowned city parks in metropolitan areas: Seoul Forest Park in Korea and Stanley Park in Vancouver Canada.

My choice of urban parks as the focus or ground of this study is based on my own experience. Since 1993, I have planned, created, restored, and

managed many city parks while working in the Parks Division of the Seoul Metropolitan Government. Due to the rapid urbanization process, Seoul has many problems to be solved such as housing, traffic, and environment. Especially, during the last few decades we experienced the reduction of green areas and overpopulation. Consequently, many citizens recognize that preserving and restoring green spaces in the city would be the best ways to be a sustainable city. For these reasons, the city government has put much emphasis on the policies preserving and restoring green spaces and has accomplished many green projects. Therefore, whenever we carry out new green projects, especially ecological restoration works such as riparian land and park restoration, the projects are highly praised by many citizens. Moreover, cooperation between city government and citizens during the restoration works provided more effective results that promoted awareness of the importance of urban ecosystems and built community support for stewardship activities. However, through my working experience, I felt that in spite of the city government's great effort to restore urban green areas, many citizens still require more city parks with high-quality services because of the influence urban green spaces have on improving their quality of life.

City governments play a major role in the improvement of citizens' well-being as well as urban biodiversity. They have a variety of goals, strategies, and plans not only for the protection and restoration of natural areas and endangered species, but also for the restoration of cultural areas for citizens. Establishing and implementing appropriate plans are increasingly important activities for local

governments as they strive to make their communities more liveable. In addition, community-based stewardship groups also make a contribution to preserve and maintain urban ecosystems. In my observations of park management and restoration in Seoul, I noted how much value community-based stewardship organizations could bring to the health of parks and specifically to improving biodiversity.

Therefore, I explore how community-based stewardship and governance of urban parks benefit both biodiversity conservation and local residents' well-being. I compare Stanley Park and Seoul Forest Park, which share many characteristics (large emblematic parks in major cities) but also differ in key ways (Stanley Park is much older, and cultural values supporting use of these parks are very different). Instead of studying just one park intensely, I chose to compare parks in different national and cultural settings to gain a better appreciation of community-based stewardship.

My research methods included an extensive literature review, visits to many North American urban parks, and interviews with park officials. Key informant interviews provided a critical and distinctive source of information for this study, revealing vital information on the major research questions. Interviewees included urban park managers working in urban parks within governments, advisory, and non-profit organizations. Examining two different country's city parks reveals political, cultural, and environmental differences that impact biodiversity and citizens' quality of life in city parks. I employ the case studies as references in providing practical guidelines to apply more effectively to

future urban park projects. By comparing two famous metropolitan city parks, I recommend, broadly speaking, what Seoul can learn from Vancouver, and what Vancouver can learn from Seoul. Consequently, through this study, I suggest successful strategies to improve biodiversity and human well-being in city parks.

1.1 Research Objectives

The main objective of my research is to examine successful strategies to improve biodiversity and human well-being in urban parks. This study is designed to provide beneficial suggestions to Seoul Forest Park as well as Vancouver Stanley Park. For the purpose of this research, I investigate how community-based stewardship and governance of urban parks benefit both biodiversity conservation and local residents' quality of life. I also conducted research into how the parks management plans address improvement in biodiversity, and how park governance and operations encourage it, particularly how stewardship groups have improved biodiversity.

My research is guided by the following questions:

Primary Research Question

- How do community-based stewardship and governance of urban parks benefit both biodiversity and local residents' quality of life?

Secondary Research Questions

- How do governance and operations benefit biodiversity and encourage citizens' quality of life?

- Specifically, how have stewardship groups improved biodiversity and local residents' quality of life in the park? How are they doing this presently, and what are the future plans?
- What are some problems in managing urban parks?

1.2 Thesis Organization

The format of this thesis includes six chapters. In chapter 2, I investigate literature pertaining to the urban ecology and biodiversity, ecological restoration, urban park, and stewardship in urban parks to improve biodiversity and human well-being. The review provides the framework for the research strategy and methods. Chapter 3 presents an outline of the theoretical pillars that make up the research framework. Methodologies and methods of data collection and analysis are illustrated. Chapter 4 focuses on Seoul Forest Park in Seoul, and especially on park governance, park plans and strategies, and accomplishments for biodiversity conservation and citizens' well-being. In chapter 5, I turn to Stanley Park in Vancouver following similar contours to my investigation of Seoul Forest Park. Chapter 6 provides an interpretation of my research questions and gives recommendations for Stanley Park and Seoul Forest Park. It also recommends future research avenues and reviews the main findings of this research.

1.3 Description of the Study Area

1.3.1 Seoul Parks

Seoul, located at 126° 59' E and 37° 34' N, is at the center of the Korean

Peninsula. The city total area encompasses 60,533 hectares extending from 30.3 km north to south and 36.78 km east to west. Seoul has 25 local autonomous governments. Over 10 million people live in Seoul which is 21.2% of Korea's total population (Seoul Metropolitan Government 2010). Seoul has four distinct seasons. Summer is hot and humid, while winter is often frigid and accompanied by snow. However, spring and autumn are pleasant seasons. Average temperatures are approximately 5 degrees Celsius in January and 24.9 degrees Celsius in July (Korea Meteorological Administration 2010).

Seoul is surrounded by several mountains and rivers. Namsan Mountain is located at the center of Seoul. Bukhansan and Suraksan Mountains are located at the north, and Gwanaksan Mountain is in the south of Seoul. Hangang River flows through the center of Seoul. Two large parks, World Cup Park and Seoul Forest, are located along the Hangang River. The Hangang River, which became known to the world during the 1988 Seoul Olympic Games, is one of the most popular attractions in Seoul. The river plays a vital role in providing citizens with popular spots for relaxation and nature education. Besides the Hangang, Seoul also has four major streams: Cheonggyecheon, Jungnangcheon, Yangjaecheon, and Hongjecheon. Among these streams, the Cheonggyecheon, passing through the downtown area, has recently been restored by the Seoul Metropolitan Government (SMG) to improve the city's environment and provide

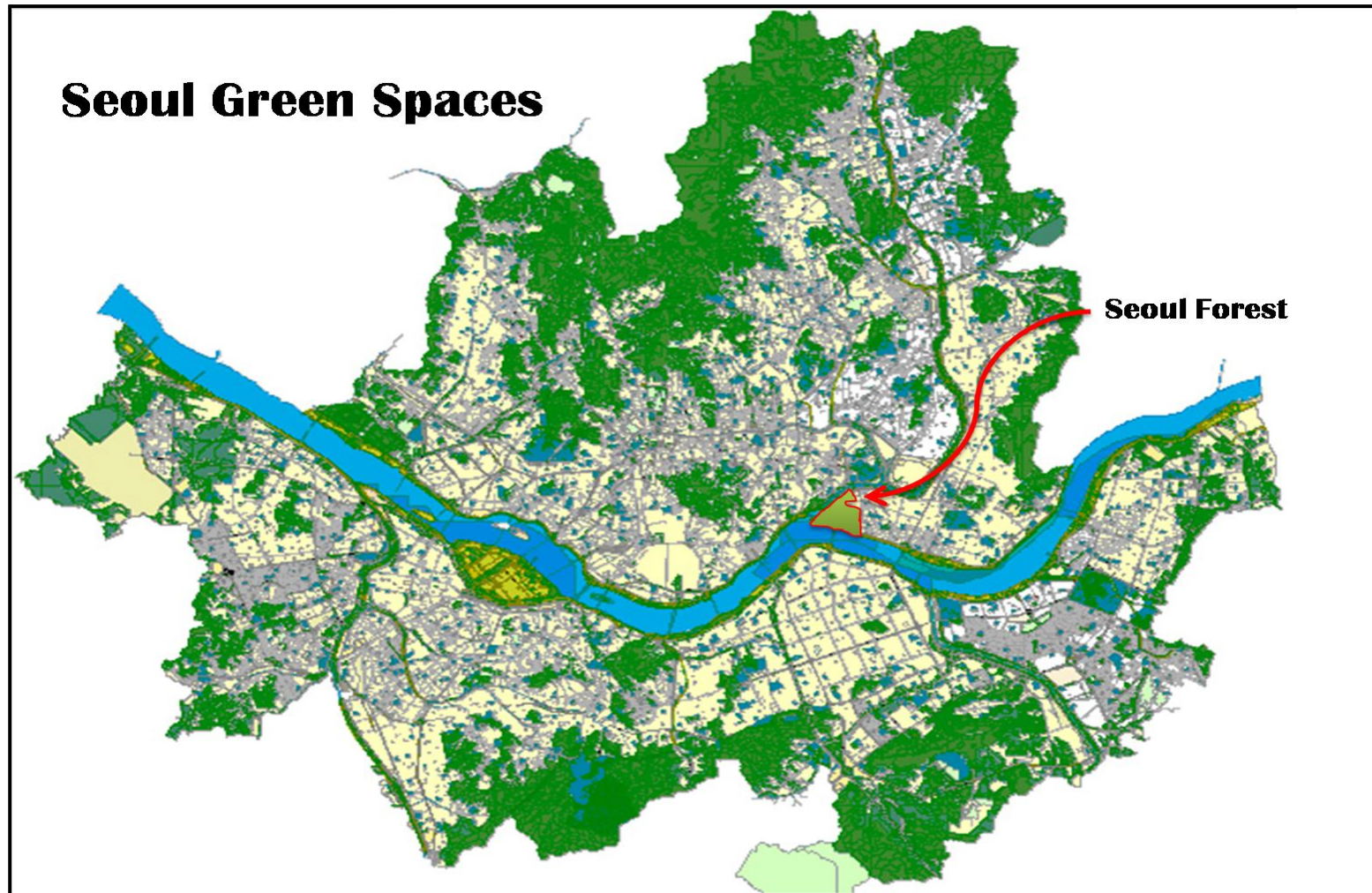


Figure 1.1: Map of Seoul Green Spaces in Korea

The map above illustrates the green spaces in Seoul with the location of my study site, Seoul Forest Park (SMG 2010).

Citizens with an environmentally friendly recreational spot. Also, recently the rest of the stream banks have been restored ecologically.

Seoul's green space consists of 16,605 hectares of parks, and 170 hectares of green zones (Figure 1.1). Beside the green spaces, Seoul has 15,651 hectares of the greenbelt to prevent urban expansion and preserve natural environment. However, more than 80% of the parks are concentrated in suburban areas in the mountains and forests, so citizens in the urban area feel the lack of green spaces. To eliminate imbalance in green space distribution, recently many sites have been restored as green spaces in the city.

Seoul has several different types of parks such as ecological parks, neighbourhood parks, river parks, cultural parks, history parks, athletic parks, children's parks, and pocket parks. Ecological parks are designed to preserve natural habitats, and neighbourhood parks provide an environmentally-friendly setting with diverse facilities. One example of an ecological park incorporates Yangjaecheon Stream. The stream had long been polluted with sewage and industrial waste, until being restored as an eco-friendly stream. Following some years of purification efforts by the metropolitan government, the stream now attracts many visitors.

The SMG has a vision for shaping its future as a "Clean, Attractive, and Global City." In order to do so, the Green Seoul Bureau works towards the goal of making "a city of environment where nature and people breathe together" (SMG 2010). To realize a powerful commitment to being a green

city, the Green Seoul Bureau established the Parks and Greenery of Seoul2020 Plan (Seoul Green Bureau 2008). The plan aims to meet a ratio of 1.75 hectares of park per 1,000 residents. The goal for total park area by 2020 is set at 17,226 hectares. Seoul Green Bureau established this goal based on its research for potential green spaces and reports from 25 local autonomous governments.

The Parks and Greenery Plans are divided into four green policies: expanding parks within residential areas, expanding open green spaces, redeveloping infrastructure, and restoring natural ecosystems. The Green Bureau expands parks within residential areas by developing large-sized parks, by remodeling existing parks, and by developing various kinds of thematic parks. 'Choonghyeon Oh', a Seoul Parks Advisory Committee, stated that the most commendable project to improve citizens' quality of life in Seoul parks is the Expanding Parks within Residential Areas project (Choonghyeon Oh 2010). A recent example of this project was 90.5 hectares of BukSeoul Dream Park, which was reopened in 2009. By 2015, 240 hectares of Yongsan USA army base will be turned into a park. Also, the Green Bureau expands open green-space, by building rooftop parks, by developing open green areas next to apartment buildings, and by creating school playgrounds.

Redeveloping infrastructure is also important for Seoul to be in greater harmony with nature. Gwanghwamun Plaza was expanded in 2009 to commemorate Seoul's historical place. Dongdaemun Stadium will be

transformed into a park by 2010, and 110 hectares of Magok Waterfront will be developed by 2011. The Restoring Natural Ecosystem policy includes many big projects, such as the Namsan Renaissance Project, the Hangang Renaissance Project, and Linking Broken Green Axis Projects. Through the Hangang Renaissance Project, 12 riverside parks (Size: Length 41.5km, area 39.9ha) in Hangang will be reborn as ecological parks with unique themes by 2010. The themes include a high-technology park, a family park, a historical park, water sports park, and a festival park.

Haeyeong Oh explained that the most significant action that can be done to improve biodiversity in Seoul is connecting green spaces (Personal communication, Feb. 25, 2010). The fragmentation of green spaces caused by the construction of buildings and roads destroys habitat and fundamentally impedes the urban biodiversity. Thus, the Bureau set up the Linking Broken Green Axis Projects to reconnect the long severed axis of green spaces throughout the city. Although Seoul has already reconnected the East and West axis through Hangan Riverside Parks, linking broken green axis of North and South from Bukhansan Mountain to Namsan Mountain has only recently begun under the guidance of the Seun Arcade Street Project. The Seun Arcade project is designed to connect nodes of green space.

The Green Bureau makes every effort to preserve or improve biodiversity in Seoul beyond its city parks by designating and managing Migratory Conservation Areas, Wildlife Conservation Areas, and Ecosystem

Landscape Conservation Areas. In order to preserve the significant conservation value areas in Seoul, the Green Bureau designated multiple Ecosystem Landscape Conservation Areas. Currently, 17 sites including 480 hectares have been designated and managed as Ecosystem Landscape Conservation Areas by the Seoul city (Haeyeong Oh 2010). Choonghyeon Oh pointed out that the most commendable project to preserve or improve biodiversity in Seoul parks is the Ecosystem Landscape Conservation Areas (Personal communication, Feb. 25, 2010). Once a site is designated, the area is carefully monitored for three years by specialists in universities to understand how to conserve its ecology and is then managed to allow it to become a major base for Seoul's biodiversity.

Haeyeong Oh explained that the Bureau needs to increase the budgets for wildlife monitoring to improve biodiversity in Seoul, though the Green Bureau does not experience budget problems for preserving nature and operating Seoul Parks (Personal communication, Feb. 25, 2010). Due to the sufficient budget for implementing their ambitious green projects, the Green Bureau does not encourage people to donate for parks. However, in some cases for special events, such as during the Seoul Forest Park restoration and BukSeoul Dream Park remodeling, the city requested donations for the parks via a nongovernmental society group, the Seoul Green Trust (Haeyeong Oh 2010). Both Haeyeong Oh and Choonghyeon Oh asserted that the most difficult challenge to managing Seoul's parks is the lack of citizen's participation (Personal communication, Feb. 25, 2010).

Therefore, recently the Green Bureau encouraged citizens to participate in park volunteer activities that provide opportunities for self-realization as well as an important means for citizens to contribute to creating a sound city.

1.3.1.1 Seoul Forest Park

General background

Seoul Forest Park, located in Ddukseom where the Hangang River and Joonglang Stream come together, is one of Seoul's most cherished public parks. The 1.2 million square-meter Seoul Forest Park was opened in 2005 as a new restoration model of an urban forest (Figure 1.2). The Seoul Forest Park project was realized through not only the strong environmental policy of the SMG, but also the active participation of citizens. The project included ways in which to facilitate citizen involvement in the project and promote participation on a voluntary basis. The citizen participation extended from the project-planning process to tree donations and volunteer-based planting.

To restore nature in the city and emphasize the eco-friendly image of the forest, a total of 420,000 trees of 104 different species were planted. Most trees were about 20 meters tall and 30 to 40 centimetres in diameter, and consisted of native species, such as oak, pine, hornbeam, and cherry trees. The forest consists of a multi-purpose space for people and nature organized under five different themes; Culture and Art Park, Ecology Forest, Wetlands Ecological Field, Hands-on Nature Learning Center, and Waterside Park.

Seoul Forest Park provides wildlife with urban habitat and people with a valuable arena for educational and cultural activities. The forest also contributes to the daily connection of people with culture and nature by promoting various artistic events all year round, such as music, plays, and dance performances, by operating various hands-on natural experiences, and by offering many leisure sports facilities. For these reasons, each year over 10-million green “refugees”, who want to escape from the metropolis and want to reflect and relax in the green oasis, visit the Seoul Forest Park.



Figure 1.2: Map of Study Area, Seoul Forest Park in Seoul, Korea

The map above outlines the boundaries of the study site for this project (SMG 2006).

History of Seoul Forest Park

The area of Seoul Forest Park, formerly known as Ttukseom, had been a royal hunting ground since the reign of King Taejo of Joseon in the 14th century. The King Taejo enjoyed hawking in the Ttukseom area, and whenever the king arrived at the hunting park, the ceremonial flag of the commander-in-chief, Dokgi, was raised to announce his arrival. The geographical feature formed by two of Seoul's major waterways, the Jungnangcheon Stream and the Hangang River, made the hunting ground almost an island. Therefore, the area name, Ttukseom, literally means "island (seom) of the ceremonial flag (dok)". The geographical location of Ttukseom area had long been a strategic point for transportation and logistics linking the capital with Gyeonggi and Gangwon regions, thus the area has been developed as a commercial center of the north-eastern part of Seoul (SMG 2006).

Ttukseom is also known as the place that accommodated Korea's first water purification plant, established in 1908 under the name of Gyeongseong Water Pumping Company in order to supply tap water to Joseon's royal palaces and common households in the central area of the capital. The foundation of the water purification and service system, in addition to transportation and electricity services, helped Seoul towards its development as a modern city. In 1989 the first water filtration building was changed into the Water Supply Museum, designated as the Seoul cultural property No. 72 to preserve the old building (SMG 2006).

In the 1950s, as part of Ttukseom was developed into an industrial zone, a horse racetrack was established in Ttukseom. Beside the horse racetrack, a public golf course was established in 1968. In 1986, a sports park was opened next to the golf course in Ttukseom. The sport facilities, such as a gymnasium, tennis courts, and a multipurpose stadium, brought greater popularity among people who sought outdoor leisure and sports activities (SMG 2006).

Since the early 1980s, after the horse racetrack was moved, the site of today's Seoul Forest had been a temptation for a number of development plans, including a new Seoul City Hall, a domed stadium, and a Culture and Tourism Town. However, new policy directions of the Seoul city government to provide a large-scale green space in the north-eastern part of Seoul and to expand residential green spaces by 3.3 million square meters, established a foothold for the new green project. Consequently, Seoul's city government and civil society groups decided to restore an urban forest in January 2003, instead of extending the business zone as initially planned.

Following the decision made in 2003, the basic plan for the Seoul Forest project was established through an international contest. A design from Dongsimwon, a Korean landscape design consulting company, was selected for the basic plan of Seoul Forest Park. After a series of advisory and public workshops to collect ideas and suggestions from experts and

local communities, a detailed action plan for the Seoul Forest Restoration was completed.

In 2003 the community memorial tree-planting event launched the forest restoration effort. Between 2003 and 2005, a total of 48,000 trees were planted by Seoul citizens through five large events. The planting events were organized and carried out through the participation and support of citizens along with the Seoul Green Trust, which was established in 2003 to create and maintain a greener and healthier Seoul city. On June 18, 2005, a hill where kings used to enjoy hunting was returned to citizens with expansive forest and outstanding landscape along the Hangang River (SMG 2006).

1.3.2 Vancouver Parks

Vancouver, located at 49° 16' N and 123° 07' W, is the largest city in the province of British Columbia and the eighth largest city in Canada with a population of 628,621 (2009 census). The total city area covers 11,470 hectares and is part of Metro Vancouver, the third largest metropolitan area in Canada, with a population of 2.3 million (2009 census). Vancouver is surrounded by water from three sides. The city climate is one of the mildest in Canada because Pacific Ocean and the prevailing south easterly winds keep Vancouver mild and humid. Average temperatures are around 3 degrees Celsius in January and 18 degrees Celsius in July (Vancouver City 2010, Metro Vancouver 2010).

The city of Vancouver, British Columbia, established the “Greenest City Action Plan” in 2009 to help the city become the greenest city on earth. To achieve environmental sustainability, the city set long-term socio-ecological goals and aims to collaborate with citizens, businesses, organizations, and governments to achieve these goals. One of the goals, termed “Greener Communities”, focuses on “providing incomparable access to green spaces, including the world’s most spectacular urban forest.” To meet this target for easy access to nature, the city suggests that every citizen live within a five-minute walk of green spaces by 2020 (Vancouver Board of Parks and Recreation 2009).

To achieve this 2020 target, the Vancouver Park Board is working to expand and enhance parks, green spaces, greenways, community gardens, and waterfronts. The core mission of the Vancouver Park Board is the preservation and enhancement of parks and recreation services to benefit not only the urban ecosystem but also the human community’s well-being. The Board operates and maintains more than 220 parks, 135,000 street trees, 350 playing fields and sports courts, 154 playgrounds, 184 tennis courts, eleven beaches, nine indoor and five outdoor pools, eight ice rinks, and six skateboard parks (Figure 1.3) (Vancouver Board of Parks and Recreation 2010).

The Vancouver Park Board does not have a plan specifically dedicated to the protection or enhancement of biodiversity. But the Board does have a document termed “Strategic Plan 2005~2010” which contains

sustainability directions for their managed areas (Rutgers 2010, Driessen 2010). In the first section, the Strategic Plan emphasizes the concept of integrated sustainability explaining the importance of native biodiversity and human well-being (Vancouver Board of Parks and Recreation 2005). To improve biodiversity in Vancouver Parks, Pieter Rutgers, the Director of Planning and Operations in the Vancouver Park Board, explained that the most important action that the Park Board has taken was purchasing more land and expanding the park space (Personal communication, Mar. 9, 2010). For this reason, during the last 10 years, more than 14 new parks have been added to the city (Vancouver Board of Parks and Recreation 2010).

Unlike the regional parks system, the municipal parks system the Vancouver Parks Board has focused more on citizens' well-being than on the biodiversity equation. Tilo Driessen, a Manager of Planning and Research in Vancouver Park Board, stated that the whole thing the Park Board carries out is related to enhancing the local residents' quality of life (Personal communication, Mar. 9, 2010). Rutgers also explained that the most significant action that can be done to improve citizens' wellbeing in Vancouver Parks is "listening to the people." Ian Robertson, a Vancouver Park Board Commissioner, stated that the biggest thing that can be done to improve the quality of life in Vancouver is expanding green spaces (Personal communication, Mar. 9, 2010). In addition, Driessen emphasized

that sufficient budget is essential to operate programs that make parks more useful for people (Personal communication, Mar. 9, 2010).

The Vancouver Park Board is faced with a budget problem because of the government funding reductions for park maintenance. The Park Board had been receiving significant funds for capital projects through the redevelopment process aimed at rezoning and developing the parks. But the Board needs more funds to maintain and operate their park system (Robertson 2010, Rutgers 2010).

The Vancouver Park Board encourages people to donate money for the maintenance of the parks, and the reason is somewhat related to the funding problem. The Board has three fundraising staff, whose main job is soliciting people and organizations to donate funds to purchase supplies, such as benches or trees for the parks. However, the amount of donated money is small compared to the Board's requirements for expenditure, except in special cases. For instance, during the Stanley Park Restoration from 2007 to 2009, more than \$10.6 million was raised from individuals, corporations, and all levels of governments, and the donated funds were enough to carry out the Stanley Park Restoration Project successfully (Vancouver Board of Parks and Recreation 2009). Another example of success in community donations was the eleven acres of Clark Park, donated by one individual (Rutgers 2010).

The Vancouver Parks Board encourages citizens not only to donate funds, but also to assist in stewardship as park partners (Vancouver Board

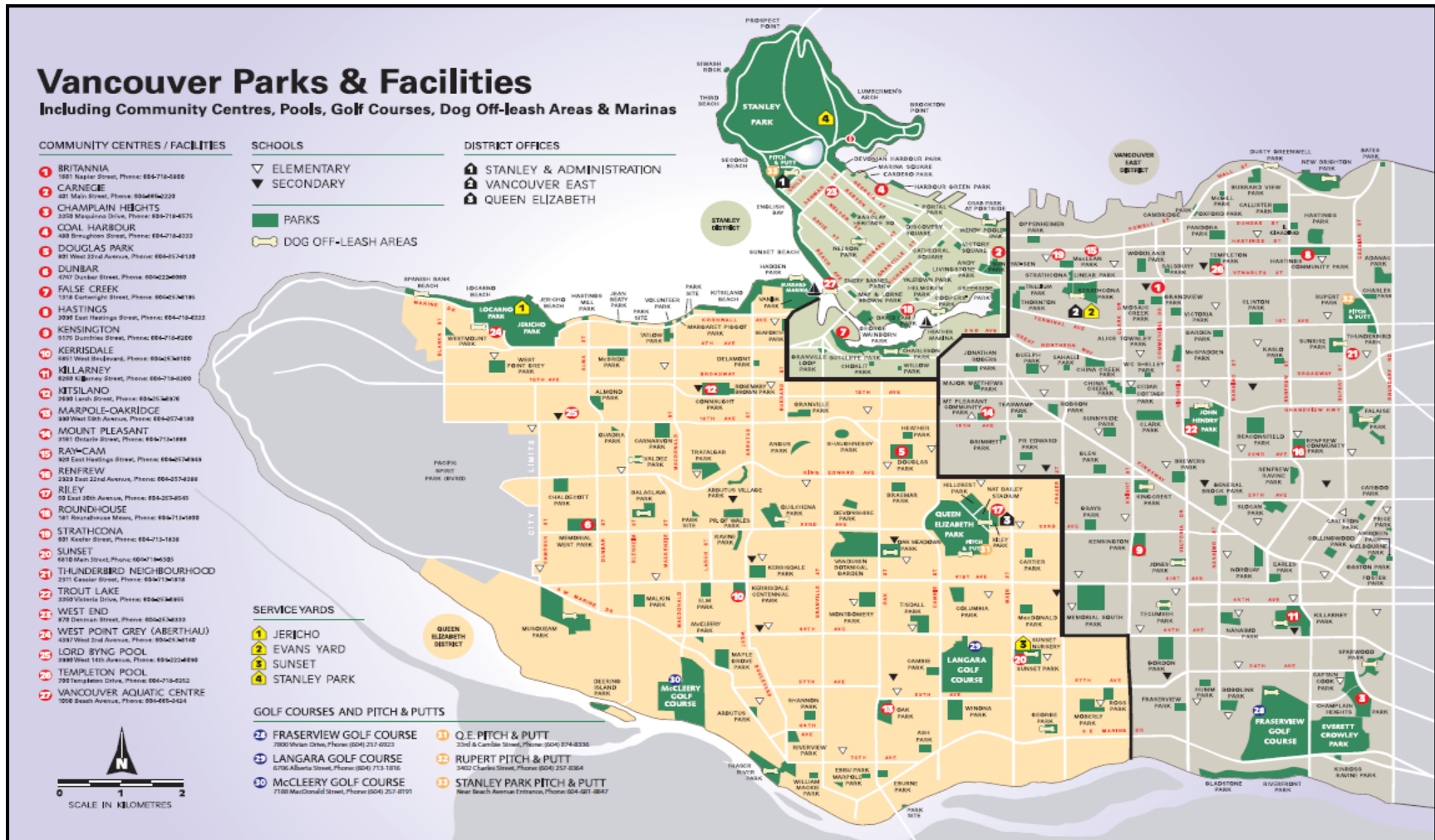


Figure 1.3: Map of Vancouver Parks and Facilities

The map above illustrates the Vancouver Parks with the location of my study site, Stanley Park (adapted from the city of Vancouver, 2010)

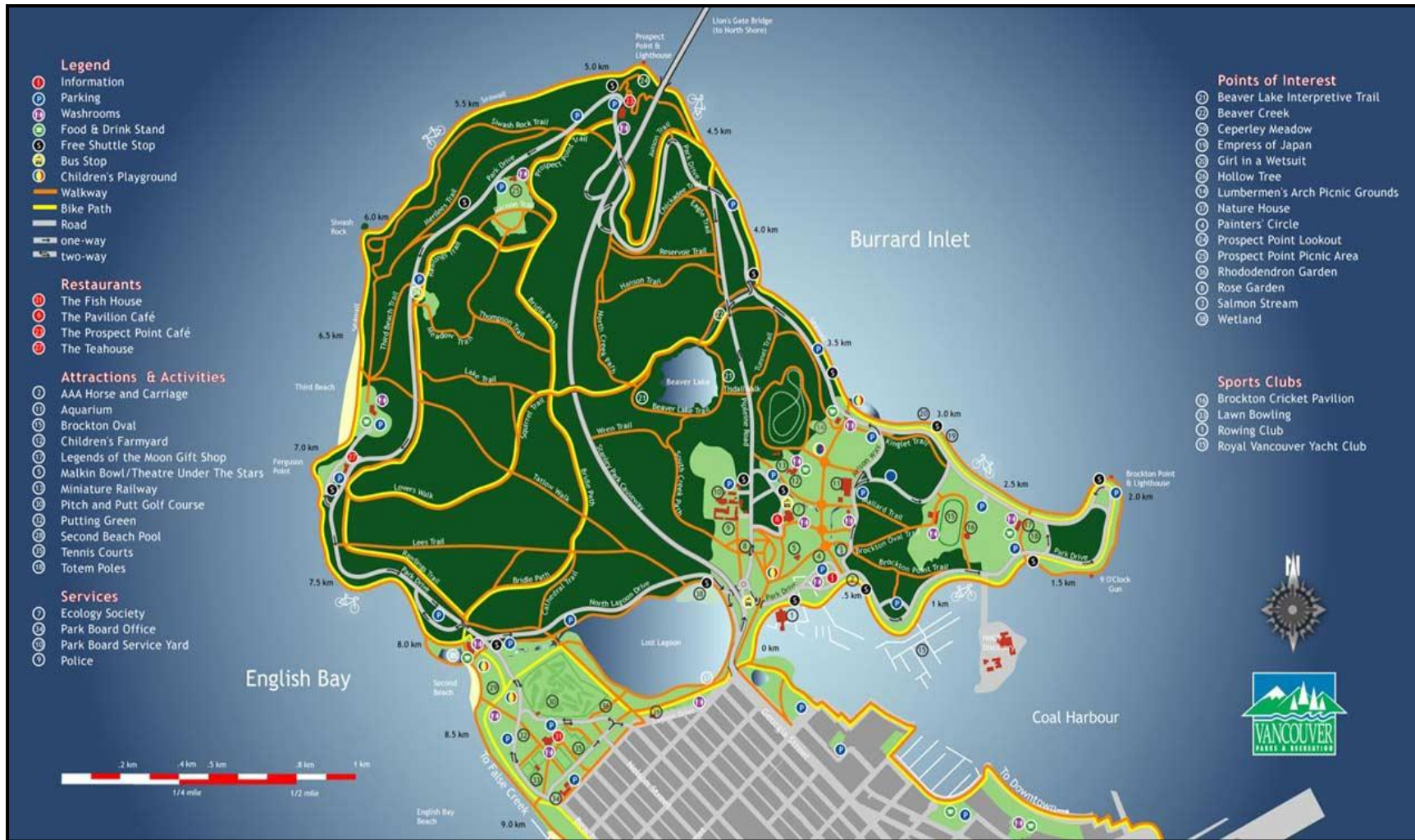


Figure 1.4: Map of Study Area, Stanley Park in Vancouver, British Columbia, Canada

The map above outlines the boundaries of the study site for this project (adapted from the city of Vancouver, 2010).

of Parks and Recreation n.d.). By joining the Vancouver park partners, participants have opportunities to maintain city parks, to participate in diverse activities in parks, to connect with neighbours, and to foster community leadership. City parks also get help through stewardship works. For these reasons, each year about 6,000 volunteers work in Vancouver's parks and recreation system (Vancouver Board of Parks and Recreation 2010).

The Vancouver Park Board has a strong system for listening to citizens through the Park Board seven Commissioners, the only elected officials in Canada that are the overseers of the parks department itself. The Park Board Commissioners gather public opinion, and their weekly meetings allow any members of the public to come and speak about the park's issues (Stephen 2010).

1.3.2.1 Stanley Park

General background

Stanley Park, Vancouver's largest and most popular park, is located directly adjacent to downtown Vancouver, BC. Surrounded on three sides by saltwater and by 8.8 kilometres of marine walking trails, Stanley Park offers park users spectacular views of the Coast Mountain Range, the Port of Vancouver, and the city skyline (Figure 1.4). Because of the significant scenery, its widely renowned 400 hectares of natural landscape, as well as its good location, citizens and many visitors have been fascinated with the park since its creation in 1888. Combined with a children's water park, beaches, an outdoor swimming pool, two lakes, a comprehensive network of trails, three major restaurants, the Vancouver Aquarium, and approximately 500,000 trees of coastal temperate

rainforest provide a valuable and irreplaceable resource for Vancouver residents and all Canadians.

Approximately 65% of the park consists of coniferous and deciduous rainforest, such as Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata* Donn ex D. Don), big-leaf maple (*Acer macrophyllum*), and vine maple (*Acer circinatum*). The forest serves as critical habitat for urban wildlife and migrating birds while the remaining 35% has been developed into various sports, amusement, and convenient service facilities, such as the Vancouver Aquarium, the Children's Farmyard, Miniature Railway, a golf course, a water Park, outdoor swimming beaches, restaurants, the seawall, and grassy picnic areas. Each year an estimated 8 million people visit Stanley Park's natural environment and variety of park facilities (Vancouver Board of Parks and Recreation 2010).

History of Stanley Park

The area of Stanley Park was originally First Nation's villages, consisting of the home of the Burrard, Musqueam, and Squamish peoples in the mid-1800's (Vancouver Board of Parks and Recreation 2010, Steele 1988). Before Stanley Park was opened, this area was designated as a military reserve in the early 1860s to form the British west coast defence system to secure the flanks and rear of this site from potential battle. Between the 1860s and 1880s, the area was logged by six logging companies, but the military designation saved the land from development. When the threat of war had receded and the frontier community of

Granville was incorporated into the city of Vancouver in 1886, the military reserve was retained. Therefore, on May 12, 1886, the first Vancouver city council requested permission from the Dominion Government of Canada to grant the military reserve to maintain the area as the city's first park (Steele 1988). On June 8, 1887, the Vancouver city council's request was granted; 400 hectares of forested peninsula was to be used as a public park, but the ownership of the land remained under the federal government. A Park was officially opened on September 27, 1887. In 1888, city council decided to set up an autonomous and separately elected committee to administer the Park because the city was not big enough to manage the 400 hectares of park at that time (Rutgers 2010). The city appointed a six-man park committee, which was replaced with the Vancouver Park Board in 1890.

In 1889, the park was named after Lord Stanley, the Governor General of Canada at that time. The Vancouver city had wanted to name the park after Lord Strathcona, but Strathcona himself suggested that Stanley would be a better name (Matthews 1948). On November 1, 1908, the Minister of Militia granted a 99-years lease of Stanley Park to the city of Vancouver for park purposes for \$1.00 a year and this arrangement is still in effect today. The federal government retains the right to reclaim use of the lands in the event they are required for purposes of national defence (Steele 1988).

After Stanley Park was opened, city council began construction of Vancouver's first civic sports fields in 1889 at Brockton Point, the east end of Stanley Park, though the Park Committee had protested the city council's

development plan. In 1912, construction of a new Stanley Park Zoo began. By 1913 Stanley Park was firmly established not only as the city's main recreation area but as Southern British Columbia's prime tourist destination, as the Park Board intended. In 1916, Lost Lagoon was created by the closing of the final gap in the Causeway at the Stanley Park entrance. The next year, construction of one of Stanley Park's most heavily used features, the seawall, started, and later in 1980 the longest seawall walkway in Canada was completed. During the 1920's, several major changes happened in Stanley Park. For example, the Kiwanis Rose Garden and the first putting green were created in 1920, the children's playground at Second Beach was opened in 1924, and the only private property in Stanley Park at Lumberman's Arch was acquired in 1925. From 1890 to 1930, approximately 100 hectares of forest in Stanley Park was converted to recreational uses (Steele 1988).

During the Great Depression in the 1930's, although the Board struggled through the economic depression, Stanley Park fared somewhat better than most Vancouver parks by being provided a continual pool of Relief workers. In 1932, the first golf course and saltwater swimming pool were opened, and several thousand feet of seawall were constructed. In 1934, the park suffered a major damage from a severe storm, and the Park Board began to reconstruct the forest by removing many fallen trees using a large injection of relief funds (Steel 1988). However, their attempt was limited to be a resilient forest (Vancouver Board of Parks and Recreation 2009b).

The next year another disaster occurred: the Park Board agreed to permit construction of the Lions Gate Bridge and a highway linking through the forest to Georgia Street that would bisect Stanley Park. Since mid-1920's the bridge and highway had been proposed, but the plan had been sharply resisted by protesters. However, the pressure to undertake a project that would alleviate unemployment allowed the project to succeed. Dividing the core of Stanley Park in half forever, the bridge and road link were opened to traffic in 1938, and the route became a major provincial highway and an important commuter route for servicing the city (Steele 1988).

During the Second World War, Stanley Park was once again a military camp with artillery positions at Ferguson Point. The National Defence Department took over the Third Beach as a barracks and training area.

In 1947, the Miniature Trains went into operation with acclamation from children and adults as well. The miniature Train now carries approximately 200,000 passengers a year during its regular season and over 50,000 during the Christmas holiday period when it meanders to the sound of carols along a route ablaze with thousands of coloured lights (Steele 1988). With the opening of the first Children's zoo in North America in 1950, Stanley Park attracted international interest. Throughout the 1950's, the Park Board continued to expand high-profile attractions, including the Children's Zoo and the Vancouver Public Aquarium, which opened in 1956.

In 1962, a severe hurricane damaged Stanley Park and cut a swathe of destruction across the Lower Mainland. Taking advantage of clearings opened

up in the surrounding forest, the board opened a new Children's Zoo in 1963 (Steele 1988).

In the early 1970's, the Park Board began to construct the first bicycle path and jogging track in response to the upsurge in popularity of sport which had been avidly practiced in the park since the bicycle craze of the 1890's. In 1980, the seawall was expanded and divided into cycling and walking lanes with funding assistance from Devonian Foundation group of charities. In 1987, the board began actively promoting the formation of an independent society for the future development of the Stanley Park Zoo and early the following year the non-profit Stanley Park Zoological Society was created. However, in 1994, the residents of Vancouver voted against keeping the Zoo and the Ecology Society replaced the Zoological Society. The Children's Farmyard is the only remnant of the Stanley Park Zoo (Steele 1988).

After receiving some funds from the international forest-products company, MacMillan Bloedel, in honour of Stanley Park's centennial, the first forest management study of the park was initiated. In 1989, a report entitled "Stanley Park Forest Management Plan" was prepared. In the same year, Stanley Park was designated as a national historic site by the Minister of the Environment to restore and preserve this area of historical, geological, archaeological, and ecological importance for present and future generations.

In the winter of 2006 and 2007, another severe windstorm struck Stanley Park. After the windstorm damage, the Vancouver Park Board turned the crisis into an opportunity for the long term restoration and renewal of the park through

the partnerships with all levels of governments, the public, NGOs, and academia. More specific restoration works are demonstrated in Chapter 5. Despite some history of disturbance, such as partial logging in the 1800s, windstorms in 1934, 1962, and 2006, recreational developments, and tree removal, Stanley Park is still a good example of relatively undisturbed old-growth forest (Vancouver Board of Parks and Recreation 2009d).

1.4 Summary

In this chapter, I described the objective of this research that examines successful strategies to improve biodiversity and citizens' quality of life in urban parks. For the purpose of this research, I first examined the general backgrounds of my study areas: Seoul Parks and Seoul Forest Park, Korea, and Vancouver Parks and Stanley Park, Canada. The research is important because this study can be applied as a resource to understand urban biodiversity and human well-being in urban parks. Also, these comparative case studies will contribute a framework for decision-makers with effective guidelines for biodiversity conservation and local residents' quality of life in Seoul Forest Park as well as Vancouver Stanley Park.

The following chapter reviews the literature that applies to this research. This literature review in Chapter 2 is drawn from a number of areas, including urban ecology and biodiversity, ecological restoration, and urban parks and stewardship work. Chapter 2 provides a foundation to analyze and discuss the results from this study.

Chapter 2 Literature Review

In this chapter, I examine the distinctive characteristics of urban environment, approaches to good ecological restoration in urban areas, and propositions for improving biodiversity and citizens' quality of life in urban parks. The chapter begins with an overview of urban ecology, the uniqueness of urban biodiversity, and various biodiversity strategies in urban areas. In the second section I explore the core principles of good ecological restoration, and then examine the processes of ecological restoration. I review also the necessity of and the methods for ecological restoration in urban areas. The third section explores the advantages of urban parks especially for biodiversity and human well-being. In the fourth section, I investigate urban park management to enhance biodiversity and the quality of life of local residents. Finally, I summarize the importance of community-based stewardship and the primary responsibilities of community-based stewardship groups in relation to shared stewardship partnerships.

2.1 Urban ecology & Biodiversity

2.1.1 Urban ecology

In the book, *Advances in Urban Ecology*, Alberti referred to urban ecology as ecosystems that co-evolve with humans and urbanizing landscapes.

She argues that the integration of sciences and humanities must become the pivot of urban ecology (2008). Human activities in urbanizing regions obviously influence an overall urban ecology (Figure 2.1). Many ecologists have described the city as complex ecological entities, which are extremely influenced by external inputs (Odum 1963, Boyden et al. 1981, Collins et al. 2000). Cities evolve as the result of myriad interactions with a complex mosaic of biological and physical patches in a matrix of infrastructure, human organizations, and social agents. These complex interactions generate distinctive ecological forcing functions.

Urbanization affects the microclimate and air quality. By altering the nature of the land surface and generating large amounts of heat, cities cause an inadvertent climate modification such as an urban heat island effect (Horbert et al. 1982, Oke 1987). Urbanization also affects hydrological function by the increased impervious land areas, which cause more water run-off (Leopold 1968, Arnold and Gibbons 1996). Therefore, unlike natural ecosystems, urban ecosystems have unique biophysical characteristics through the dynamic interactions among social, economic, institutional, and environmental factors. Urban natural habitats are fragmented, isolated, and degraded. There are large numbers of non-native species, and ecological succession is disturbed in urban areas (Trepl 1995). Thus, urban areas present distinctive ecosystems and the disturbance generated by human activities are not easily reversed if they can be reversed at all. For example, trees in urban core have lower survival rates and a much shorter lifespan than rural trees due to great stress from pollution, drought, and flood

(Bradley 1995, Garber 1987). The result of urbanization processes threatens biodiversity and ultimately affects human well-being (Alberti and Waddell 2000).

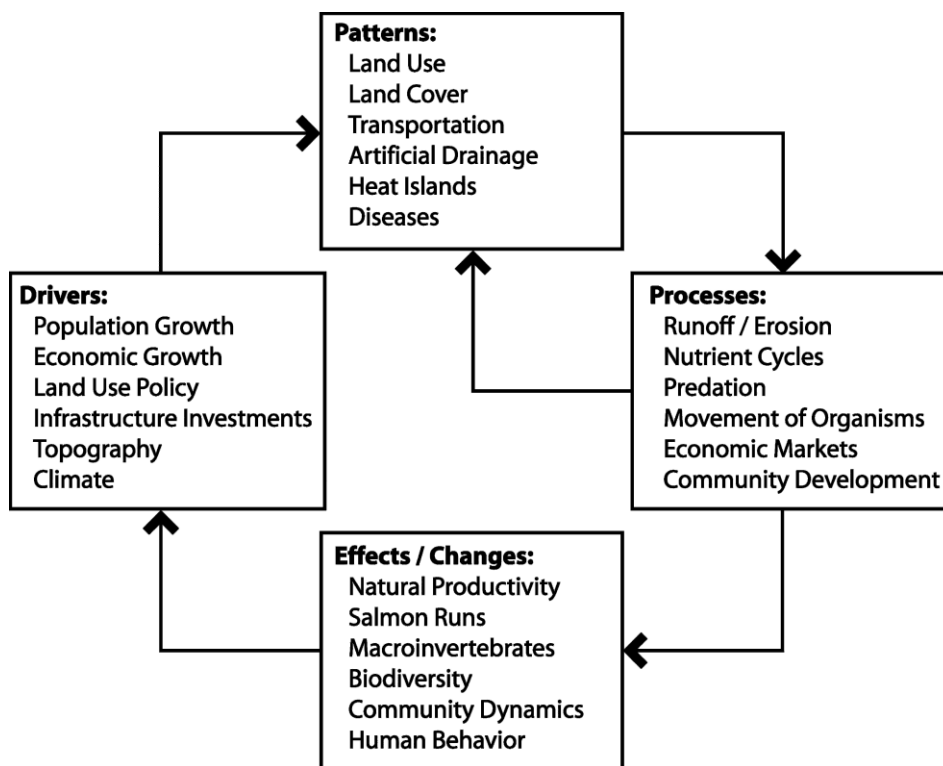


Figure 2.1: Urban ecology conceptual framework

(Alberti et al. 2003)

2.1.2 Biodiversity

Definition of Biodiversity

According to the Millennium Ecosystem Assessment, an international work program initiated in 2001 under the auspices of the United Nations,

biodiversity is defined as “the variability within species, between species, and among ecosystems, which includes terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part” (Millennium Ecosystem Assessment 2005). Biodiversity in our parks, urban gardens, waterways, wetlands, farms and forests contributes to our quality of life and the ecosystem services provided by nature.

Biodiversity forms the foundation of a vast array of ecosystem services (figure 2.2). These services include regulating temperature, capturing carbon from the atmosphere, reducing stormwater runoff and flooding risks, preventing soil erosion, and protecting water quality (Daily 1997). Also, biodiversity critically contributes to human well-being by providing many social and health benefits. Healthy and diverse ecosystems provide humans with not only essential services for the basic life offering clean air, clean water, and healthy soils to grow food and pollinate fruits, but also a healing benefit. For example, hospital patients’ recovery from surgery included a shorter hospital stay, lower intake narcotic pain drugs, and more favourable evaluation by nurses when their windows overlooked trees rather than a brick wall (Ulrich 1984, Kaplan and Kaplan 1989). Thus, looking after and caring for biodiversity are essential to keep our ecosystems healthy and functioning.

Characteristics of Urban Biodiversity

Urban environments suffer tremendous losses in biodiversity through the developments of town, industry, and transportation (Vale and Vale 1976, Luniak

1994, Kowarik 1995, Marzluff 2001). More than 75% of the terrestrial biosphere has been altered as consequence of human activities (Ellis and Ramankutty 2008). This development results in fewer and smaller places for native species to live, and diminished ecological functions and services. Natural land covered by buildings and roads increases temperature, decreases the capacity of the land to intercept rainfall, reduces stormwater, and filters pollutants. Also native plant species are removed and replaced by exotic non-native species that can cause havoc with ecological integrity. These two major factors reduce the ecosystem diversity, and result in extinctions of native species and biotic homogenization (Thomas 1984; Health 1981).

According to McKinney, in the urban core, the number of species is reduced to less than half of that found in the rural (2002). For instance, although there are over 350 bird species found in the Metro Vancouver region, less than 50 species are commonly found in the city (Schaefer 2004). Furthermore, with the increased population in the world, today approximately 82% of Northern America population lives in urban areas. By 2050, an additional 100 million people will live in urban areas of Northern America (UNFPA 2009). Our cities will obviously continue to grow in size and number. Therefore, urban biodiversity losses are an important issue, and implementing a comprehensive global biodiversity conservation strategy is of critical importance.

Urban Biodiversity Strategy

Preserving and improving biodiversity is very difficult in urban areas

(Schaefer 2004). There are many agencies and interests involved. The land is usually privately owned and expensive. Politicians usually favour development over protection. What actions can be taken to conserve biodiversity and promote human well-being in urban areas?

The Millennium Ecosystem Assessment integrated the findings concerning global biodiversity. The Assessment demonstrates available actions to improve conservation and sustainable use of ecosystems and their contributions to meet human needs. This research was carried out by approximately 1,360 experts from 95 countries and more than 2,000 authors and reviewers all over the world (2005). The Millennium Ecosystem Assessment suggests extraordinary implementation strategies which are:

- Mobilize knowledge. Ensure that the available knowledge is presented in ways that can be used by decision-makers.
- Recognize complexity. Responses must serve multiple objectives and sectors; they must be integrated.
- Acknowledge uncertainty. In choosing responses, understand the limits to current knowledge, and expect the unexpected.
- Enable natural feedbacks. Avoid creating artificial feedbacks that are detrimental to system resilience.
- Use an inclusive process. Make information available and understandable to a wide range of affected stakeholders.
- Enhance adaptive capacity. Resilience is increased if institutional frameworks are put in place that allow and promote the capacity to

learn from past responses and adapt accordingly.

- Establish supporting instrumental freedoms. Responses do not work in a vacuum, and it is therefore critical to build necessary supporting instrumental freedoms-enabling conditions like transparency, markets, education-needed in order for the responses to work efficiently and equitably.
- Establish legal frameworks. A legally binding agreement is generally likely to have a much stronger effect than a soft law agreement.
- Have clear definitions. Agreements with clear definitions and unambiguous language will be easier to implement.
- Establish principles. Clear principles can help guide the parties to reach future agreement and guide the implementation of an agreement.
- Elaborate obligations and appropriate rights. An agreement with a clear elaboration of obligations and rights is more likely to be implemented.
- Provide financial resources. Availability of financial resources increases the opportunities for implementation.
- Provide mechanisms for implementation. Where financial resources are not sufficient, market mechanisms may increase the potential for implementation.
- Establish implementing and monitoring agencies. The establishment of subsidiary bodies with authority and resources to undertake specific

activities to enhance the implementation of the agreements is vital to ensure continuity, preparation, and follow-up to complex issues.

- Establish good links with scientific bodies. As ecological issues become more complex, it becomes increasingly important to establish good institutional links between the legal process and the scientific community.
- Integrate traditional and scientific knowledge. Identify opportunities for incorporating traditional and local knowledge in designing responses (2005).

To achieve greater progress toward biodiversity conservation to improve human well-being, it will be necessary to strengthen and implement these options that are designed for the conservation and sustainable use of biodiversity. Especially, to prevent the loss of urban biodiversity and contribute to enhance the quality of life of many urban dwellers, more vibrant preservation and restoration activities are required.

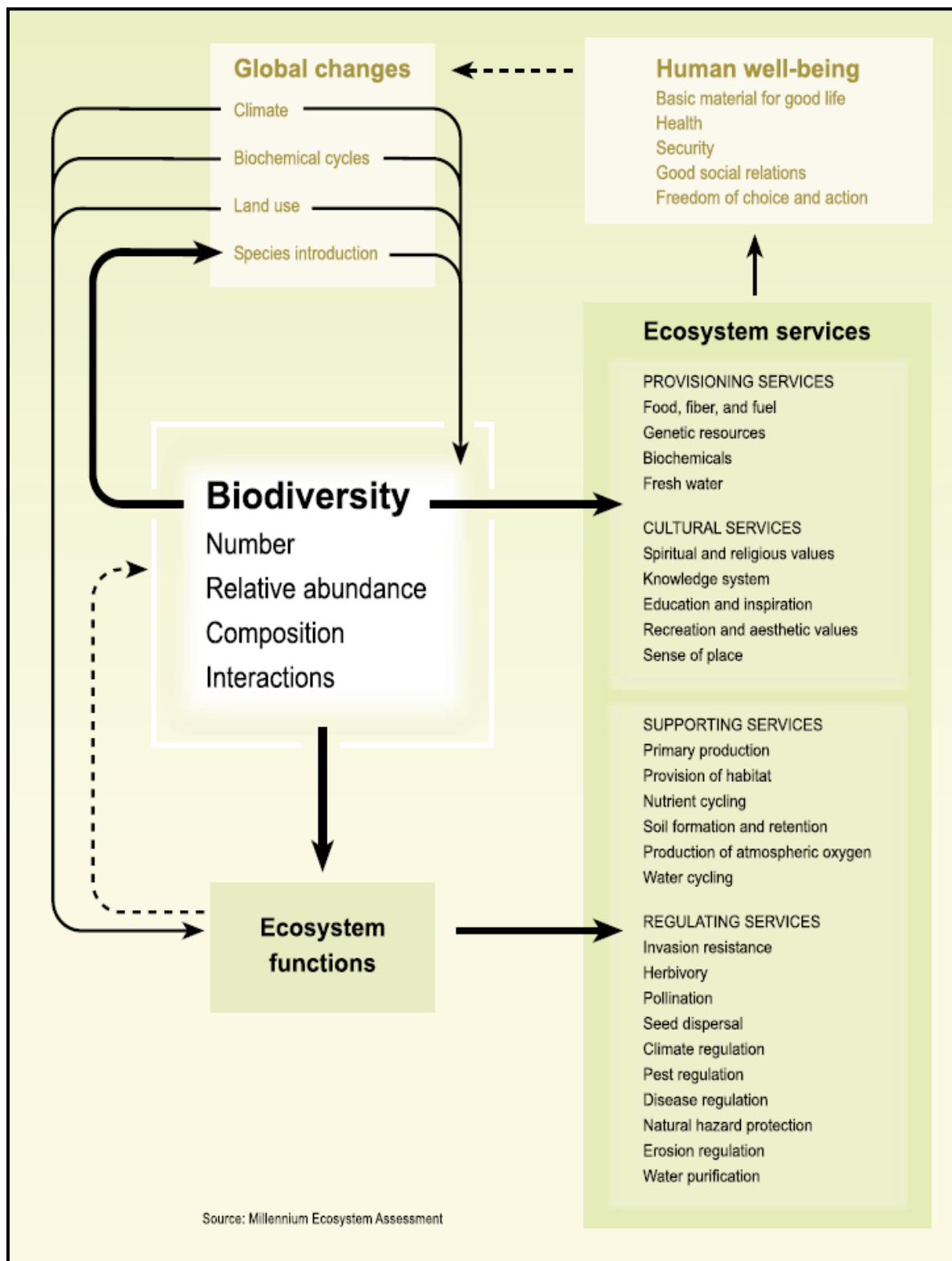


Figure 2.2: Biodiversity, ecosystem functioning, and human well-being
(Millennium Ecosystem Assessment 2005)

2.2 Ecological Restoration

2.2.1 Principles of Ecological Restoration

According to the Society for Ecological Restoration International Science and Policy Working Group (SER), ecological restoration is described as “the process of assisting the recovery of damaged, degraded, or destroyed ecosystems (SER 2004).” Ecological restoration is an essential component recovering and maintaining biodiversity. Thus, ecological restoration should not only be operated on site-by-site basis but should grapple with the large scale of ecosystem recovery, too. Restoration should form a part of an overall strategy for regional and local land management, rather than take place independently.

Sometimes the term restoration ecology is used as synonym to ecological restoration, but they have differences. Ecological restoration is the operation of restoring ecosystems as performed by practitioners at specific project sites. On the other hand, restoration ecology is an applied science of ecological restoration (Higgs 2003, Davis & Slobodkin 2004, Choi 2007).

Ecological restoration encompasses a multi-disciplinary ideas and practices, incorporating our outlook to social, aesthetic, economic, political, and moral values (Higgs 2003).

Higgs demonstrates in the book *Nature by Design* the four components of ecological restoration, which are wild design, focal practices, ecological integrity, and historical fidelity (Figure 2.3). He explains that ecological integrity incorporates the idea of recovering undisturbed conditions. Historical fidelity is described as loyalty to unimpaired conditions. Higgs emphasizes that to make

ecosystems resilient, fidelity should include replication, functional success, and durability. Focal practices are the antidote to technological restoration, building strong correlation with human and natural process. Interconnecting between ecology and culture is necessary to evaluate good restoration and produce positive value. Lastly, beyond conventional ecological design, wild design considers the relationship with people and ecological process needed for successful restoration projects (2003).

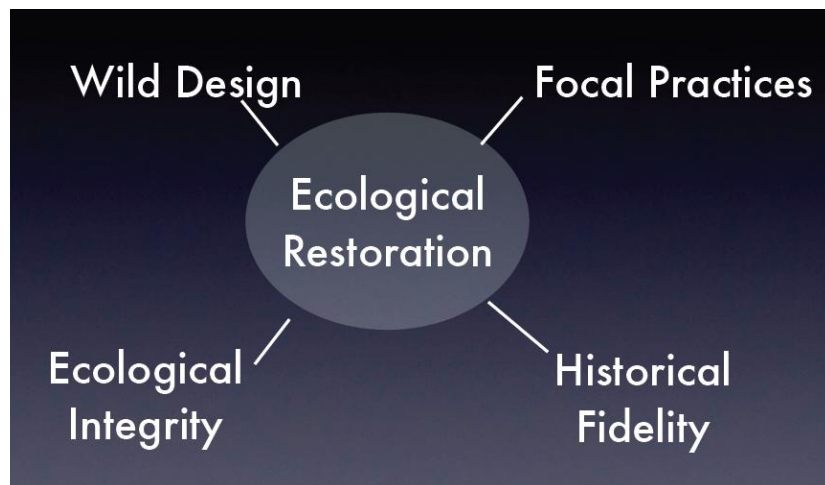


Figure 2.3: Four concepts of ecological restoration
(Higgs 2003)

2.2.2 Direction for Ecological Restoration

Ecological restoration plays a vital role in mitigating lost ecosystems, conserving biological diversity, and improving productive capability in degraded sites (Bradshaw 1983, 1987, Jordan et al. 1987, Cairns 1993, Naveh 1994, Cairns & Heckman 1996, Hobbs & Norton 1996). Also ecological restoration

contributes to enhanced conservation values in protected landscapes as places for recreation, aesthetics, education, and social relations. Furthermore, ecological restoration provides opportunities to connect people to natural ecosystems through meaningful engagement and experiences (Higgs 2003, SER 2004, Parks Canada 2007). For these reasons, understanding what ecological restoration should be and setting appropriate restoration goals are necessary for the evaluation of restoration projects.

In the Primer of the Society for Ecological Restoration there are several key attributes for a restored ecosystem:

- The restored ecosystem should include a special assemblage of the species that can be seen in the reference ecosystem.
- In the restored ecosystem, indigenous species should grow in widespread areas.
- The restored areas should be functional completeness and sustainable along the desired trajectory.
- The restored ecosystem apparently functions normally without any dysfunctions.
- The restored ecosystem should be integrated into a larger ecological matrix.
- Potential threats to the health ecosystem should have been eliminated or reduced.
- The restored ecosystem should be resilient to periodic stresses in the local environment.
- The restored ecosystem should be self-sustaining to the same

degree as its reference ecosystem (SER 2004).

Like these characteristics, restoration goals should focus on recovery of ecological functions for the future ecosystem to sustain itself structurally and functionally. In addition, restoration projects should be adaptive; set multiple goals and trajectories to succeed the changing and unpredictable future (Hobbs & Norton 1996). Therefore, ecological restoration goals and plans require a synthetic approach to be economically, ethically, socially, and politically acceptable and qualified for all these sections (Hobbs & Norton 1996, Higgs 2003, Choi 2004, Halvorson 2004, Throop 2004, Choi 2007).

2.2.3 Ecological Restoration Process

For ecological restoration to be successful, it is essential to identify key processes. Many guidelines for ecological restoration have been developed, but the one applicable to Canada and also gaining ground internationally, was developed by Parks Canada that established the Principles and Guidelines for Ecological Restoration to protect Canada's natural areas (Parks Canada 2007). This document clearly depicts the Ecological Restoration Planning and Implementation Framework, consisting of seven steps to support the logical sequence of specific restoration projects (Figure 2.4).

In the first step, the framework emphasizes that ecological restoration should identify natural and cultural heritage values by developing engagement and communication strategy. The second step in the ecological restoration planning process should define the problem before detailed planning can

proceed. Various research methods such as the information collection, site evaluation, and data analysis enable to recognize and diagnose the challenges of restoration. In step 3, setting appropriate goals is essential based on a shared vision with stakeholders, partners, local communities, and the general public. The framework in step 4 illustrates that measurable project objectives are developed based on the project goals. In step 5, detailed restoration plan should develop including experimental design with cost, feasibility, and impact analysis. The restoration plan in step 6 is implemented under the detailed restoration plan with communication of results and lessons learned from stakeholders and partners. In the last stage, Parks Canada emphasizes the importance of monitoring programs, to evaluate data, and to report results (Parks Canada2007). Although details of specific elements may not always be applicable, this guideline can be effectively applied as appropriate not only to Canada's protected areas, but also to any ecological restoration projects.

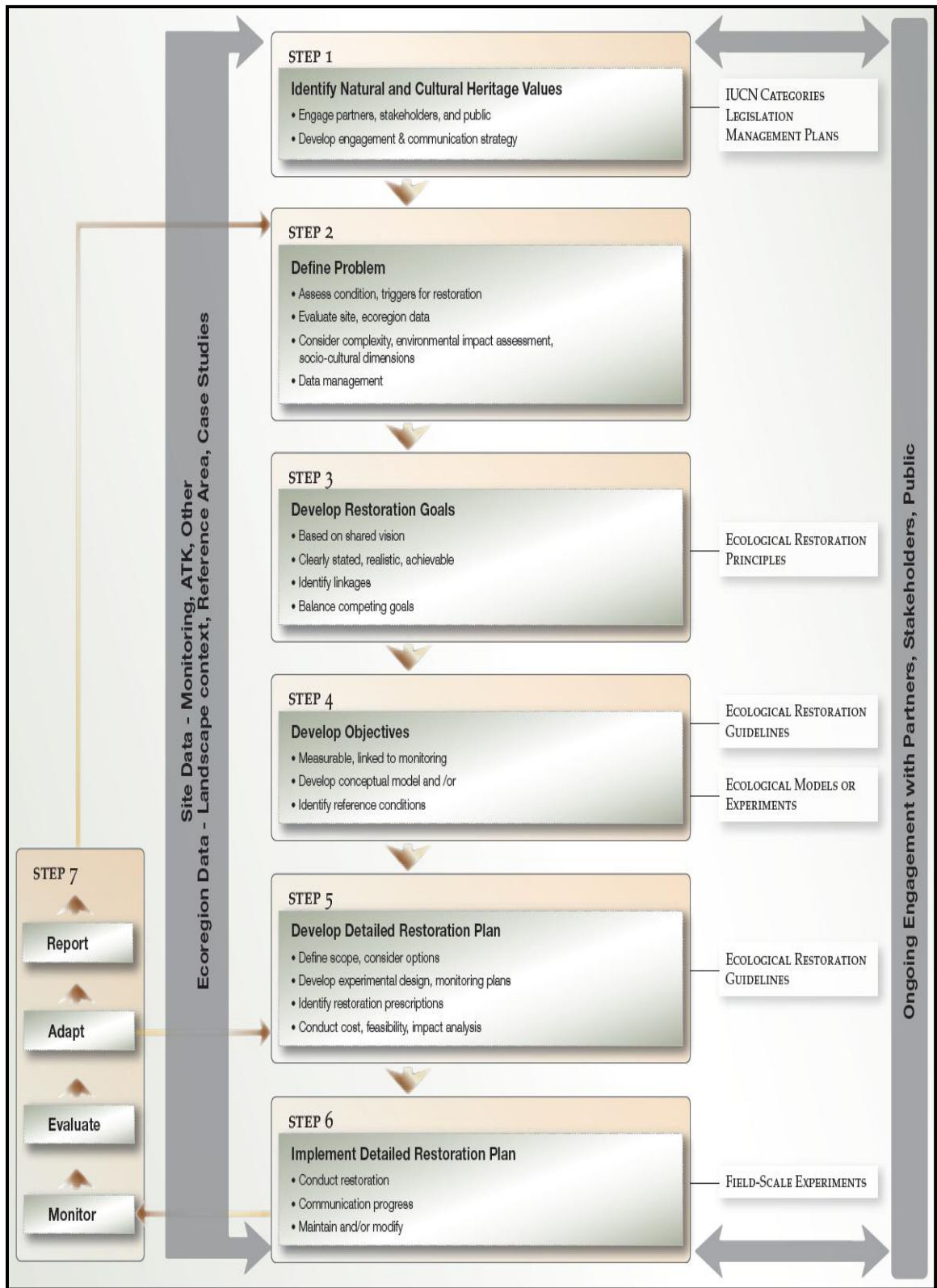


Figure 2.4: Ecological Restoration Planning and Implementation Framework (Parks Canada 2007)

2.2.4 Ecological Restoration in Urban Areas

Because of considerable anthropogenic developments, most urban ecosystems, especially in metropolitan settings, are severely degraded, and therefore are in need of active environmental management (Miller & Hobbs 2002). Also, the increasing number of urban populations makes people have little direct experience of nature and the ecosystems that support us. These challenges cause a negative influence on urban communities, but provide a great opportunity for ecological restoration.

In urban areas, ecological restoration is indispensable for the survival of both city dwellers and urban ecosystems (Cairns 2002). For example, urban restoration reduces the urbanization impacts such as urban heat island effect, air pollution, habitat loss, and urban runoff and promotes urban ecosystem function. Moreover, the restoration plays significant role in connecting human with natural environment by offering environmental education, social relations, and recreation opportunities.

There are many methods to restore urban green spaces from small community group's projects to large-scale regional restoration projects. The various urban restoration projects include revegetating with native plants in urban parks, corridors, and riparian areas. The good examples of urban restoration are daylighting and river corridor restorations projects. By uncovering buried watercourses and restoring natural habitat, restoration projects improve not only urban ecosystems, but also enhance citizens' well-being and urban aesthetic value. For example, 5.8 kilometres of Seoul Cheonggyecheon stream was

restored in 2005. After removing a highway and road, environmental-friendly stream was reborn at the core metro city. With the completion of the stream restoration work, the surrounding temperature went down by up to 10~13% (3~4 degrees Centigrade) during the hottest days of summer. The overall level of air pollution was decreased, and fish returned in the stream naturally. Also, many people working in downtown enjoy their spare time and exercise walking along the new stream, and children learn about the value of nature in the stream through various environmental education programs (Seoul Metropolitan Government 2005).

Another example of ecological restoration is the Garry Oak Restoration Project in Greater Victoria, BC. Started in November 1999, the project is aimed at not only restoring Garry Oak habitat, but also educating community to be aware of Garry Oak ecosystems. The project is supported by a sponsor organization and managed by the Municipality of Saanich. Over 10 years, the project has significantly improved the ecosystems, created successful volunteer stewardship programs, and advanced knowledge and planning for ecological restoration. The project is still continuously implemented in nine restoration sites on municipal park land (Garry Oak Restoration Project 2010).

Higgs emphasizes that ecological restoration is synonymous with the restoration of hope (2003). Especially, urban restoration projects provide more hopeful expectations not only for citizens, communities, organizations, and cities themselves, but also for urban wildlife. As a result, an urban restoration is a win-win strategy for both people and nature.

2.3 Urban Parks

2.3.1 Benefits of Urban Parks

Numerous studies have demonstrated that urban parks are immensely valuable for urban ecosystems and human well-being (Burgess et al. 1988, Maller et al. 2005, Sherer 2006, Walker 2004). Urban parks make a huge contribution to the protection of biodiversity and play a major role in maintaining ecosystems. Parks help people better understand our natural environment. In addition, city parks provide citizens with the opportunity not only to engage in physical activity and cultural events, but also provide sanctuaries for quiet relaxation. The benefits of parks are endless from improving our physical and psychological health, to strengthening our communities, and making our cities and neighbourhoods more attractive places to live and work. However, for the purposes of this research, two aspects of urban parks' function are considered, which are biodiversity and human well-being.

Benefits to Biodiversity

Parks in urban environments play a vital role in improving ecological conditions within cities. Urban parks improve the biological diversity of local plants and animals by providing critical habitat. Park ecosystems provide important services such as water and air filtration, and habitat for pollinating species. For example, Forest Park in Portland, Oregon is one of the largest urban parks in the U.S.A. The 5,000 acres of natural forested area connects a major metropolitan area to the forested Pacific Coast Range. The park serves as

the anchor for Portland's regional parks, trails, and green spaces system. For these reasons, an abundance of wildlife, which includes 112 species of birds and 62 species of mammals, thrives in Forest Park (Portland Parks and Recreation 2010). In addition, Forest Park's extensive system of trails, fire lanes, and roads provides excellent opportunities for hiking, walking, running, and simply escaping the urban atmosphere. The Forest Park Conservancy offers an annual series of guided hikes emphasizing the natural and cultural history of Forest Park and surrounding areas (Forest Park Conservancy 2010).

As with Forest Park in Oregon, when urban parks are connected strategically with riparian areas, wetlands, and other urban green spaces, the ecological value far exceeds the value of any one park. Isolated urban green spaces have fewer native plants and animal species and suffer from the disruption of natural ecological processes. Connected green areas enhance wildlife habitat benefits and restore and maintain vital ecological functions and services. The connected network of local, regional, state, and across the country provide permanently protected wildlife habitat corridors for thousands of indigenous and migratory bird, fish, and animals. Therefore, linking urban green spaces is essential for biodiversity improvement (Erickson 2006, Rudd et al. 2002, Benedict & McMahon 2006).

Benefits to Human Well-being

Increased urbanization in metropolitan areas increases the longing of residents to contact with nature. Moreover, health studies have shown that urban

parks positively influence on enhancing the quality of life for people of all ages (Burgess et al. 1988, Maller et al. 2005). For example, spending time in or near nature lowers blood pressure and cholesterol levels, enhances survival after a heart attack, recoveries from surgery more rapidly, and reduces anxiety and stress, enhances one's ability to function effectively (Kaplan & Kaplan 1989, Ulrich 1984, Ulrich et al. 1991, Frumkin 2001, Pretty et al. 2007). Also, contacting with natural environments has also been linked to the reductions in crime and aggression (Kuo 2001). Contact with nature significantly improved the symptoms of children with attention disorders and teens with behavioural disorders (Frumkin 2001, Louv 2005). Furthermore, exposure to nature when engaging in physical activity is shown to increase health even more greatly (Bodin & Hartig 2003, Pretty et al. 2007). Physical activity is an indispensable part of staying healthy, reducing stress, fighting obesity, and preventing chronic conditions that lead to coronary disease, high blood pressure and diabetes. City parks enable citizens to keep healthy by providing sports facilities and their sports programs.

In addition, participating in environmental stewardship activities provides people with the higher levels of health and well-being. Many studies show that volunteering for outdoor stewardship activities increases social connections and greater community cohesion than those not involved (Miles et al. 1998, 2000, Maller et al. 2005; Moore et al. 2006; Pretty et al. 2007; Stone 2006). Therefore, stewardship activities in parks benefit not only for the park's environment, but also the healthy life of individual and community.

The diverse range of recreational programs offered through urban parks adds to the overall quality of life of participants. Urban parks programs provide a multitude of opportunities to engage in nature, arts, music, and sports for all ages. Especially, urban parks offer children direct motivations to explore, discover, and learn about natural environment. Another benefit from parks for youth is that community recreation programs contribute to building self-esteem and health knowledge, creativity and a sense of efficacy, and leadership skills (Turner 2004). In addition, by participating in a variety of social and recreational opportunities, older adults get benefit from the social connections and interactions that are fundamental to their well-being.

Urban parks also lead to greater social cohesiveness as the focal point of communities. Parks have long been recognized as key contributors to the aesthetic quality of neighbourhoods by providing green spaces. Urban parks also play a special role in providing meeting places where community members can interact with each others. Many researchers point out that nature plays an important role in creating vital neighbourhood spaces that not only bring neighbours together, but that also strengthen neighbourhood social ties (Sullivan et al. 2004, Kweon et al. 1998).

2.3.2 Urban Park Management

Urban park management is a multidisciplinary field that includes landscape architecture, horticulture, turf management, forestry, ecology, plant pathology, hydrology, civil, electrical, mechanical, and chemical engineering, as

well as business and personal management. However, for the purpose of this research, this chapter examines what maintenance principles are required to enhance both biodiversity and local residents' quality of life. Municipalities have dual responsibilities in their parks, which are offering opportunities for leisure experience for people and preserving park's ecosystems. Both obligations seem somewhat contradictory, but when both goals are accomplished, an urban park is considered as a successful park (Sternloff & Roger1998).

To Improve Biodiversity

The first step to improve biodiversity in an urban park is developing and establishing appropriate vision, plans, by-laws, and strategies (Schaefer 2004). The management plans must provide high standards for guidelines to preserve a park's ecosystem. The guidelines must be concerned with the impact of a park's recreational uses and ecological processes. A common next step to conserve biodiversity is ensuring the protection of natural recourse when parks are developed for recreational uses. Many park users need to provide more recreational facilities, such as playgrounds, athletic fields, paths, and restaurants. Thus, park's facilities must be planned and constructed after careful consideration of natural environment to avoid disturbing park's ecosystems (Sternloff and Roger1998).

In addition, connecting urban green spaces between parks and other open spaces is vital to improve biodiversity. By strengthening green networks, wildlife refuges and seasonal migrants have an opportunity to move, interbreed

with others, and prevent diseases (Noss 1983, Rudd et al. 2002). This increases possibilities for finding a breeding partner and enhancing genetic diversity of the species and improves resilience of the species (Erickson 2006, Schaefer 2004).

To Improve Human Well-being

In order to improve citizens' quality of life in urban parks, parks must meet the requirements of its users. Carr et al. state that highly used and valued parks are able to meet visitor's basic needs, which include access to washroom, seating, shelter, a restaurant or food concession, and a sense that the park is safe. Urban dwellers need places to go to escape from the stress of busy city life. Thus, urban parks allow their users to relieve their stress and relax from daily life by providing natural landscapes. In addition, parks provide its users with various recreational cultural facilities and programs (Carr et al. 1992).

Beyond these basic functions of urban parks, we need to examine changes to other aspects of urban parks (Sternloff & Roger1998). Changes in education have the potential to produce profound benefits in leisure use patterns. The need to educate for leisure-centered living is now being realized and translated into programs at all educational levels. Advanced technologies enable park users to have an additional satisfaction. An example of this is internet services for park users. Bryant Park has allowed parks users to connect the free wireless Internet service from the summer of 2002, making the park the first in New York City to offer free Wi-Fi access to visitors (Bryant Park Corporation 2010).

Need to Work in Partnership

Urban parks need to be managed at a planned scale if they are to provide a full range of environmental, social, and healthy benefits to wildlife and urban dwellers. Thus, without collective commitment, without ethics based on the acceptance of responsibility, efforts to provide a healthy urban park for both environment and human cannot succeed. For these reasons, we need effective and integrated working relationships between governments, non-government organizations, corporations, and individuals (Dearden 2009, Benedict 2006). One of the best ways to create a partnership in urban parks is the community-based stewardship. Stewardship groups make a great contribution to maintain urban parks. Therefore, next section explores stewardship and their roles in urban parks.

2.4 Stewardship in urban park

2.4.1 Definition of Stewardship

The Stewardship Centre for British Columbia defines environmental stewardship as the following:

Stewardship is an ethic and practice to carefully and responsibly manage natural resources and ecosystems for the benefit of current and future generations. Stewardship demonstrates a commitment by governments, communities, corporations, non-profits, and individuals to voluntarily act in an environmentally, socially and economically

sustainable manner. Governments promote the concept of “shared stewardship,” that is, that caring for the environment is a responsibility shared among all sectors of society (2007).

Stewardship includes a wide range of activities that involve individuals, communities, organizations, and businesses acting to maintain natural environment. Community-based environmental stewardship groups are the most obvious partners for governments in sharing the stewardship of urban parks.

2.4.2 The Role of Stewardship

Community-based stewardship activities are an effective and popular tool to get citizens involved in the management of urban parks (Dearden 2009). Stewardship groups in parks take a wide variety of activities to enhance the quality of park ecosystems and local residents. These include undertaking on-the-ground activities, monitoring wildlife, operating educational program, and engaging in project planning (Stewardship Centre for British Columbia 2007). Stewardship Centre for BC suggests that the primary responsibilities of community-based stewardship groups in relation to shared stewardship partnerships are:

- to encourage voluntary compliance with regulatory requirements;
- to deliver education and information programs that promote shared stewardship;
- to collect information, promote awareness and build community support for and arrange for community contributions to shared

stewardship activities;

- to undertake stewardship initiatives and to encourage and manage volunteerism;
- to utilize scientific, technical and instructional information in the design and completion of their activities;
- to ensure that their projects and activities are consistent with land, water use, species and/or habitat management plans, best management practices, policies and laws;
- to report on their activities and evaluate their work as required;
- to suggest new ways to address local issues;
- to share their methodologies and experiences with other stewardship practitioners;
- to provide recognition and credit to their partners-volunteers, governments, funders and industry;
- to engage in local decision making processes (regarding land use on sensitive habitats);and
- To provide opportunities for community members to become involved in local stewardship (2007).

All in all, a partnership with community-based stewardship groups enables to combine different strengths and aspirations to conserve and improve our natural environment. By doing so, it creates more powerful synergy to sustain biodiversity and human well-being (Benedict 2006, Dearden 2009).

2.5 Summary

In this chapter, the literature review focused on: 1) the theoretical foundations of the distinctive characteristics of urban environment; 2) approaches to effective ecological restoration in urban areas; 3) propositions for biodiversity conservation; and 4) urban park management and stewardship. Current literature in this chapter provides constructive theoretical guidelines for enhancing urban biodiversity and local residents' well-being. Therefore, this chapter provides the framework for my research strategy and methods. The next chapter presents the methodology for this study, which includes the research design and direction for later data analyses and interpretation.

Chapter 3 Methodology

The following chapter outlines the research methods used in this study. Research for this project was conducted from July 2007 to March 2010 using a mixed methodological approach. The main procedures include a literature review, key informant interviews, field research, and participation in park management. Also, this research entails comparative case studies of two well-known city parks, Seoul Forest Park in Korea and Stanley Park in Vancouver, Canada.

3.1 Research Design

In order to underpin this research, I conducted a review of relevant literature. This research required several fields of study including urban ecology and biodiversity, ecological restoration, urban park management, and stewardship in urban parks. This involved a comprehensive search of journals, books, and web sources. I also researched various management plans and documents for Vancouver and Seoul parks, regarding policies, major projects, management strategies, and various implementation efforts for urban parks. Especially, I concentrated my data collection on restoration strategies and implementations for enhancing urban biodiversity and citizens' quality of life in both city parks. I then carried out field research for Stanley Park to explore restoration work and management systems. I also conducted preliminary research on Seoul Forest Park through my firsthand working experience from

July 2007 to July 2008 at the Seoul Forest Park management office (prior to the start of my formal graduate studies). Next, qualitative data was collected through interviews with fourteen people working in government and non-government organizations. Ranging in length from one to one and half hours in duration, each interview was semi-structured in format and was conducted in effort to gain greater insights into the research topics. Also research participants in Seoul, Korea responded to questions in person by internet videophone. Finally, I conducted a content analysis of my research using comparative case studies of Seoul Forest Park and Stanley Park. My practical fifteen- year experience at Seoul Parks Division enabled me to grasp particular issues with respect to park management, although I realized how important it was to be aware of my closeness to the subject.

3.2 Field Studies and Literature Review

Early in my research, prior to becoming involved with this project, I worked for Seoul Forest Park for over one year. While working at the park, I made every effort to enhance the park ecosystems by implementing the dead tree replanting program, opposing a new building for badminton to protect park ecosystems, and improving children's playground with herb garden. I also contributed to improving park users' well-being by enhancing various sports facilities and park signage. During that time, I investigated overall performance of Seoul Forest Park including the park restoration projects, various park's amenities for citizens, and park user's satisfaction and requirements. In addition,

I studied Seoul Forest Park after I left the park through related documents that my colleagues sent me.

Next, I visited several major city parks in Canada and the USA in 2009 to observe restoration projects, current trends for preservation of city parks' ecosystems, and park management strategies. The major parks included Waterfront Park and Tommy Thompson Park in Toronto; several parks along the Rideau Canal and Rockcliffe Park in Ottawa; Mount Royal Park and Olympic Park in Montreal; Battlefields Park in Quebec; Stanley Park, Queen Elizabeth Park, and Pacific Spirit Regional Park in Vancouver; Central Park and Battery Park in New York; Charlesbank Park in Boston; President's Park and The National Mall in Washington DC, Olympic Park, Freeway Park, Gas Station Park, and Water front Park in Seattle; Forest Park, Tom McCall Waterfront Park, Washington Park, and Tualatin hills nature Park in Portland. After I came back from these long journeys, I decided to research more on Stanley Park and compare between Seoul Forest Park and Stanley Park. The important reason was an apparently successful model of restoration in Stanley Park that might be adopted by other governments. The Restoration Project turned the crisis caused by the destructive windstorms that struck Stanley Park during the winter of 2006-2007 into an opportunity to remake a long term resilient coastal forest.

During the literature review, I also examined Vancouver Parks system including Stanley Park through the government documents, books, journals, and web sources. I could find easily their major policies, projects, and strategies through the Vancouver Park Board website. The Park Board website contains

various data including park information and all Park Board meeting agendas, so this allowed my research to go on smoothly. At the same time, I carried out field research for Stanley Park four times from July 2009 to March 2010. I visited the park each season; July 2009, October 2009, January 2010, and March 2010. I conducted interviews during two of the occasions. I observed the restoration sites, major attractions, and convenient facilities to examine the park management efforts by the Park Board and SPES.

3.3 Interviews

In order to collect qualitative data, I conducted a series of interviews. In light of my project objectives and core questions, the participants for this study were selected from the following four core groups related to city park management.

- Current Park Board Commissioners in Vancouver city and Parks Advisory Committees in Seoul city
- Current directors and managers involved in city parks in Seoul and Vancouver city governments
- Current supervisors and managers of Seoul Forest Park and Stanley Park
- Current directors and employees at non-government organizations involved in Seoul Forest Park and Stanley Park

The purpose of these interviews was to identify with current efforts to improve biodiversity and citizens' well-being in urban parks. Thus, interviewing

individuals within these four groups enabled me to get definitive responses to my research questions. Because they have responsibilities for city park management, and they are key decision-makers in park management. They have a decisive effect on urban biodiversity and citizens' well-being in city parks. For this reason, seven key figures were selected from each city, and total fourteen interviewees from above groups were chosen to participate in this study. Ethics approval for this research was granted by the University of Victoria (Protocol No. 10-006, Approved January 6, 2010).

The individuals chosen in Stanley Park were Ian Robertson, a Vancouver Park Board Commissioner; Pieter Rutgers, the director of Planning and Operations in the Vancouver Park Board; Brian Quinn, the supervisor of Stanley Park; Bill Stephen, a superintendent of forestry in Stanley Park; Tilo Driessen, a manager of Planning and Research in Vancouver Park Board; Michel Desrochers, a planner in Vancouver Park Board; and Patricia Thomson, the executive director of the Stanley Park Ecology Society.

The individuals chosen in Seoul Forest Park were Choonghyeon Oh, a Seoul Parks advisory committee; Haeyeong Oh, the director of Landscape Division in Seoul Metropolitan Government; Wonyoung Lee, the supervisor of Seoul Forest Park ;Hyunhee Kang, a superintendent of green area in Seoul Forest Park; Munju Lee, a manager of facilities in Seoul Forest Park; Keunhyang Lee, the executive director of the Seoul Forest Park Conservancy; and Hanah Lee, a program manager in the Seoul Forest Park Conservancy.

During the interview with a Vancouver Park Board Commissioner, the director and managers of Planning and Operations in the Vancouver Park Board, my advisory committee members, Dr. Eric Higgs and Dr. Valentin Schaefer, accompanied the interviews in Vancouver Park Board Office. To interview the supervisor of Stanley Park, the superintendent of forestry in Stanley Park, and the executive director of the Stanley Park Ecology Society, Dr. Valentin Schaefer accompanied me again to Stanley Park. I conducted Korean interviews using the internet videophone. Some of Korean interviewees worked together with me as my co-workers in Seoul Forest Park. Thus, they were quite enthusiastic to be involved in this research. Interviews were conducted between January 21 and March 9, 2010. Each interview was conducted approximately from one to one and half hours in duration, and the interviews were recorded on tape and analyzed afterwards.

The questions of these interviews were divided into three contextual categories: 1) ecological aspect, 2) community well-being aspect, and 3) park operation aspect. A Park Board Commissioner in Vancouver city and a Park Advisory Committee in Seoul city were asked which project to preserve or improve biodiversity in each park was most commendable. Current directors involved in city parks in each city governments were asked if they had any plans to improve biodiversity and citizens' quality of life in each city parks. Current supervisors and managers of Seoul Forest Park and Stanley Park were asked if they had any plans to improve biodiversity and citizens' quality of life in each park. Current directors and employees at non-government organizations involved in

Seoul Forest Park and Stanley Park were asked how they had improved biodiversity and local residents' quality of life in the park, how they were doing this presently, and what were their future plans. In addition, all interviewees were asked what they thought were the most significant actions that can be taken to improve biodiversity and citizens' quality of life in each city park and what was the most difficult problem in managing this park. The particular questions asked are contained in Appendix A.

3.4 Data Analysis

In order to answer the research questions, the interviews were transcribed into documents after the semi-structured interviews were completed. The analysis techniques included re-reading the interviews and categorizing the responses with similar themes, such as two city park's strategic plans to improve biodiversity and citizens' well-being, challenges to managing the parks, and the role of community-based stewardship groups (Ristock & Pennell 1996, Patton 2002). This technique allowed the result to be compared easily between Seoul Forest Park and Stanley Park.

In this project I used comparative case studies method. Case studies reveal how community-based stewardship and governance of urban park benefit various aspects of interest in real-life contexts. From my experience, case studies are particularly effective when "how" or "why" questions are posed. I make frequent use of case studies whenever I design and process a new project in Seoul. Case studies can reveal themes, explain intricate dynamics, and

answer questions about how and why things happen as they do in city region. Case studies are also useful for turning generalizations into concrete documentation, bringing to light successful projects that can be replicated elsewhere. The case studies presented in this research provide guidance for implementation strategies, showing how community-based stewardship and governance of urban parks benefit the communities.

Lastly, much of the analysis here is borne out of reflection on my experience in Seoul Parks. My practical fifteen-year experience at Seoul Parks Division enabled me to analyze what I heard with a particular kind of depth. At the same time I was aware that my experience and expertise might obscure my understanding of some points. Thus, I worked hard to maintain sufficient circumspection for a well-balanced understanding of the dynamics of urban park restoration and management.

Chapter 4 Seoul Forest Park in Seoul

This chapter highlights Seoul Forest Park in Seoul, Korea. Beginning with the regulatory framework for biodiversity conservation of Seoul Forest Park, I examine how the park was created and what the characteristics of the restoration project are. The latter portion of the chapter discusses how the Seoul Forest Park Office and the park's conservancy manage and operate the park to enhance biodiversity and local residents' quality of life.

4.1 Regulatory Framework

Establishing appropriate legislation and policies is essential to improving biodiversity (MA 2005). In the case of Seoul, Korea, various legislative tools enacted by all levels of governments are related to biodiversity conservation. However, in this research, I explored the regulatory framework for biodiversity conservation of Seoul Forest Park. A variety of biodiversity conservation efforts within the regulatory framework include:

- Central Government
 - Framework Act on Environmental Policy
 - Natural Environment Conservation Act
 - Urban Parks and Green Spaces Act
 - Wildlife and Plant Protection Act
 - Environmental Impact Assessment Act
 - Drinking Water Management Act
- Seoul Metropolitan Government
 - Natural Environment Conservation By-law

- Urban Park By-law
- Green Space Conservation By-law
- Environment By-law
- Environmental Impact Assessment By-law

4.2 Governance

The Seoul Metropolitan Government established the Seoul Forest Task Force in 2003 to implement the Seoul Forest Restoration Project more effectively. The Task Force actively carried out its missions from planning the Forest Restoration Project to the oversight of construction work. After Seoul Forest Restoration Project was completed in 2005, the city government established the Seoul Forest Park Management Office to manage and operate the Seoul Forest Park. Under the vision to manage an urban forest as “a living body in harmony with nature and culture,” the Park Management Office endeavours to improve the park’s ecology and the citizens’ quality of life (SMG 2006).

Based on the belief that the forest will benefit from stewardship, the Seoul city government has promoted the active participation of citizens in park management. Seoul Forest Park is co-managed by the SMG and Seoul Forest Park Conservancy (SFPC) under the Joint Operating Agreement between the SMG and the SFPC. The Joint Operating Agreement was the first trial of devolution of public park management to citizens in Korea. The Seoul Forest Park Office manages park’s facilities and property, and the SFPC operates educational programs and public relations activities (Figure 4.1).

To provide park users with the best service, the Seoul Forest Park Office always reviews and applies park users’ opinions. Citizen can report their

inconveniences and suggest their ideas at anytime through various ways in person, by letter, by phone, or via the park's website. Some examples of the inconvenience report include a request for free bicycle rental, sport facilities reservations, and spaces for dogs. When a citizen's opinion is beneficial for the park's ecosystem or park users, the Seoul Forest Park Office applies the idea as far as its circumstances permit (Lee Munju 2010).

The Seoul Forest Park Office does not encourage citizens to donate funds to help operate the park. This is because the park presently has a sufficient management budget, which is provided by the city government. The SFPC, on the other hand, encourages citizens to donate money for the park. However, when donors really want to contribute their money and materials for the park, the Office accepts the donation after an evaluation (Kang 2010). The Park Office has less of a budget problem, but Munju Lee, a manager of park facilities in Seoul Forest Park, explained that the most difficult problem in managing the Seoul Forest Park is the park users' reduced satisfaction during the peak season. Because many citizens visit Seoul Forest Park in the summer, the Office cannot provide the adequate park service for all park visitors (Lee Munju 2010).

The Seoul Forest Park Conservancy

The Seoul Forest Park Conservancy, a non-profit organization, was created in February 2005 with support from Seoul Green Trust just before Seoul Forest Park was opened (Yang & Lee 2008). Unlike with other parks in Seoul, this NGO, the Seoul Green Trust, has taken a very important role in supporting the Seoul Forest Project. Involved from the very first stages of the project, Seoul

Green Trust participated in creating the park design, fundraising, and tree planting along with community members and citizens. In partnership with the Seoul Forest Park Management Office, the SFPC plays a significant role in making connections between citizens and the city government through a variety of citizen participation activities. These activities include visitor service, volunteer projects, environmental education, event management, fund raising, and public outreach.

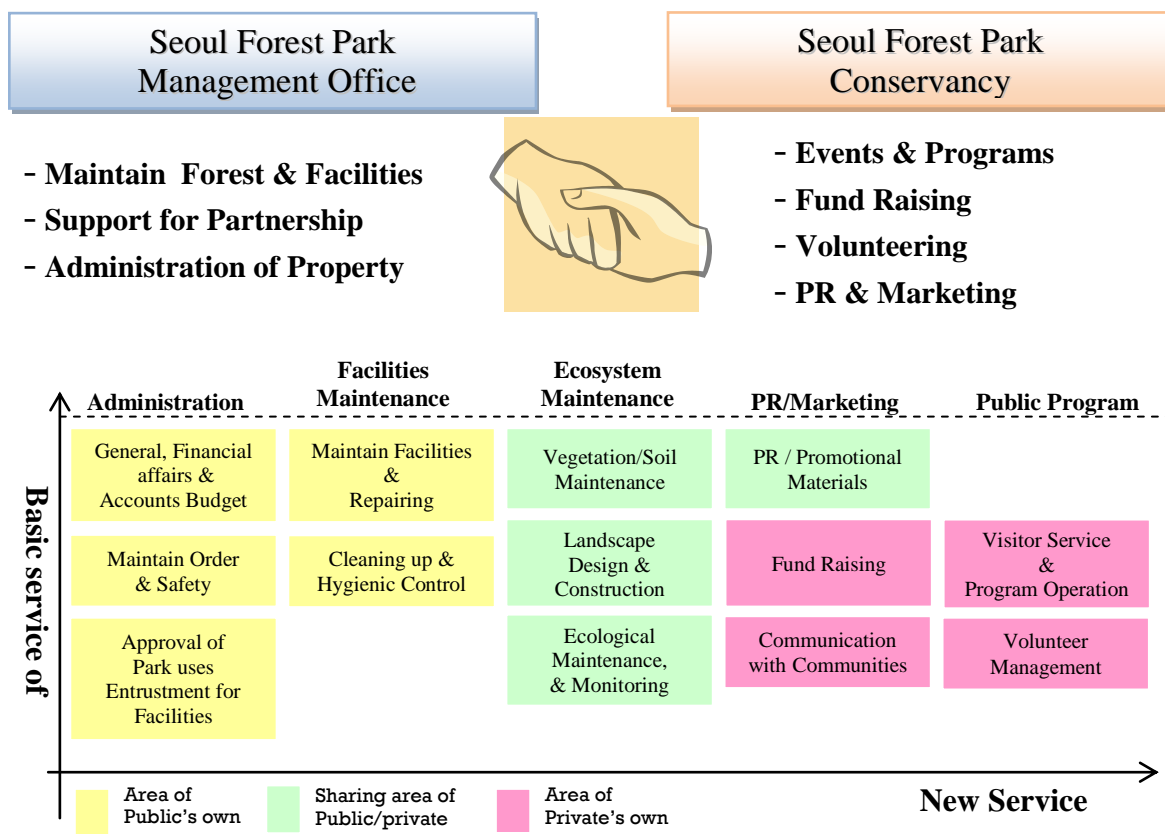


Figure 4.1: Seoul Forest Park Partnerships

The images above outline the role of Seoul Forest Park Management Office and the Seoul Forest Park Conservancy (Yang & Lee 2008).

In the beginning, the Conservancy started to work with only four fulltime staff and twelve volunteers, but now nine fulltime staff and over 150 voluntary staff are working regularly (either once a week or once a month). Through the encouragement of citizens to participate in the stewardship activities, each year approximately 5,000 volunteers from companies, schools, local community groups, and other NGOs, are involved in stewardship work at the Seoul Forest Park (SFPC 2009). The Society doesn't provide any financial incentive to stewards, but the stewards state that working in green forest itself is incentive because the forest provides the stewards "with vitality in their life" (Lee Hanah 2010). Hanah Lee explained that self-realization through the sharing abilities and time is the motivation for involvement in stewardship activities (Personal communication, Feb. 17, 2010).

The Conservancy encourages citizens and companies to donate funds for their work because the Conservancy's primary revenue is generated from foundation grants and private donations. However, the city government subsidizes 50% of the Conservancy's revenue through the matching fund system. In 2008, the Conservancy received \$0.3 million from the city government, which greatly enhanced the Conservancy's ability to carry out stewardship activities (SFPC 2008). Yet the most difficult problem in managing stewardship in Seoul Forest Park is that the Conservancy cannot set the long-range plan for their stewardship work. According to the Seoul City Park ordinance, the Joint Operating Agreement between the SMG and the SFPC is not available. Currently, under a new contract in 2009, the partnership is valid until 2012, but the

Conservancy may not work for Seoul Forest Park continuously after the contract period (Lee Keunhyang 2010). Also, recently under the city government's new policy that promotes creative ideas in administration, the Seoul Forest Park Management Office is directly operating new environmental programs and special events which were originally the Conservancy's role. Consequently, the partnership system is somewhat diminished, but the Conservancy still makes every effort to contribute to build a partnership of park management system, which is the first trial in Korea.

4.3 To Improve Biodiversity

Before Seoul Forest Park was created the built urban spaces biologically and ecologically isolated surrounding parks and reduced ecological connectivity. Seoul Forest Project was implemented to improve the city's biodiversity by restoring natural vegetation that represents the unique ecosystems of Seoul. Through the Seoul Forest Restoration Project, the park now plays an important role in linking the city's green areas for wildlife passages and increased habitat. Built at the junction of two waterways, the Hangang River and the Jungnangcheon Stream, Seoul Forest helps Seoul city to revive ecological processes by supporting a healthy aquatic and terrestrial ecosystems in the surrounding area. Seoul Forest Park provides a wildlife-friendly environment in which various native plant species offer shelter and food for birds and other small mammals (SMG 2006).

Seoul Forest Park Management Office has various guiding documents to improve the park's biodiversity, such as the Wildlife Management Plan, the Fish

Management Plan, and the Green Area Improvement Action Plan. The Office updates these detailed management plans every year or before they start a project. The Wildlife Management Plan is aimed at improving wildlife habitat, introducing new wildlife, and promoting wildlife programs for visitors, focusing on fallow deer and roe deer that inhabit the Ecological Forest area (Seoul Forest Park Management Office 2010d). The Fish Management Plan targets the improvement of the fish habitat, including three ponds in the park (Seoul Forest Park Management Office 2010b). To enhance the park's green infrastructure, the Green Area Improvement Action Plan includes the implementation of soil exchanges, fertilizer inoculation treatments, replanting, drain repairing, and slope stabilization (Seoul Forest Park Management Office 2010c). Hyunhee Kang, a superintendent of green area in Seoul Forest Park, explained that the trees in Seoul Forest are still young, so the most significant step to improving biodiversity in Seoul Forest is having a mature forest (Personal communication, Feb. 5, 2010). Hanah Lee, a program manager in Seoul Forest Park Conservancy, explained that while Seoul Forest Park maintenance is focused on taking care of the park's landscape, preserving forest is much more important for improving biodiversity in the park (Personal communication, Feb. 17, 2010).

The most important ecological education programs in this park are the Insect Programs, which are operated by the Seoul Forest Management Office, not the Conservancy. The Insect Garden building in the park provides visitors with a variety of opportunities to observe a range of insects. Kang stated that the Seoul Forest Management Office endeavours to facilitate Insect Programs that

are representative of Seoul Forest Park (Personal communication, Feb. 5, 2010). To encourage citizens to participate in ecological programs, the Office offers the programs at no or reduced cost.

4.3.1 Restoration Project

The Seoul Forest Restoration Project, dubbed as “a Central Park in Seoul” or “an urban forest where fallow deer and roe deer roam,” is acclaimed by citizens as a great success that meets the citizens’ desire for green spaces (SMG 2006) (Figure 4.2). The project has attempted to improve the site’s ecological function by connecting fragmented area by roads and providing an ecological forest, cultural and educational spaces for citizens, and wetland spaces. Not only through the improvement of ecological function, but also through collaboration, partnership and participation by a wide variety of people such as professionals, local residents and communities, companies, NGOs, and citizens, the restoration was a significant and successful project.

For the tree planting in Seoul Forest, approximately \$5 million has been raised through donations from individuals and corporations, and an additional \$235 million was expended for the restoration project by the city government (SMG 2006). For these reasons, from its opening, Seoul Forest Park has positioned itself as one of landmarks in Seoul. Jongsang Lee, an Assistant Mayor for Infrastructure Management when Seoul Forest was being restored, stated that the Seoul Forest Restoration Project is a new model for a desirable urban park in the 21st century created by a wide range of collaboration (SMG 2006).

The goal of the Seoul Forest Restoration was “to create mature forest as a living body in harmony with nature and culture.” (SMG 2006) As such, Seoul Forest was restored not only to provide natural habitats for urban wildlife, but also to serve as a lung for urban dwellers who want get in touch with healthy natural environment. For these reasons, the park was designed with the active participation of citizens to incorporate their suggestions in the park design (SMG 2006).

In order to cultivate a successful forested ecosystem in the long term, native trees were planted rather than dwarf or medium-height ornamental trees. Systematic soil improvement efforts were made to provide the optimum conditions for plant growth through soil exchanges and fertilizer inoculation treatments (SMG 2006). To enhance the ecological health and meet aesthetic expectations, the forest contains a lot of water landscaping, such as waterfalls, pebbled creek-beds, streams and ponds teeming with water plants and marshes. Rainwater is drained off through ditch-style open channels rather than underground pipes to create more ecologically appropriate conditions. The channels were built with natural materials such as turf, stone, and pebble in order to facilitate water seeping into the ground, maintaining the local aquifer. The park has rainwater collection surfaces and storage tanks for harvesting the water and using it on site (SMG 2006).

In addition, Seoul Forest was guided principally by environmentally-friendly practices, so all the buildings in the park have rooftop gardens. The rooftop gardens reduce energy costs for summer cooling and winter heating,

reduce urban heat island effect, improve air quality, provide habitat for birds and insects, and promote urban biodiversity. Also, Seoul Forest Park building systems for air conditioning, heating, and lighting use alternative energy systems, such as geothermal and solar. These alternative energy systems contribute to coping with energy shortages, reducing dependence on fossil fuels, and generating sustainable growth (SMG 2006).

Seoul Forest is composed of five different areas under the special themes: Culture and Art Park, Nature Experience Area, Ecological Forest, Wetland Ecological Garden, and Hangang Waterside Park. Among them, Ecological Forest Area, Hangang Waterside Park, and Wetland Ecological Garden are closely linked with biodiversity.

Ecological Forest Area and Hangang Waterside Park

Ecological Forest Area was restored for wildlife habitats where once there used to be an uninhabited stream. For wildlife conservation, an ecological forest and a pond were restored, and citizens' access to this area is limited (SMG 2006). The area connects two natural waterways, the Hangang River and the Jungnangcheon Stream, so this area provides a healthier and safer environment for fish and other wild animals. However, in the planning stage, this area was separated from other park areas by two major roads through Seoul Forest. Thus, two connectors, a tunnel type and an over pass type, were built to link green ecosystems. These connectors act as migration routes for animals. They connect

the Ecological Forest Area and the Culture and Art Park, which play a pivotal role to improve urban biodiversity (SMG 2006).



Figure 4.2: Seoul Forest Park Restoration Project

(Above left) Wildlife in the Ecological Forest Area. (Above right) The restored Seoul Forest Lake. (Bottom left) The Forest Path. (Bottom right) Citizens participating in the Tree Planting Event.

When the park was opened, wild animals were rare in the park. Approximately 120 native wildlife species, including fallow deer, roe deer, squirrels, and mandarin ducks were released into the forest that would have been present prior to this area being developed. For the protection of the wildlife,

visitors have only limited access to this area. However, visitors can enjoy exciting panoramic views of the forest through a long suspension footbridge (472 meters), which connects the Hall of Wind and Hangang Riverside Park. Through the long passage, people can be reached the restored Hangang Riverside Area. The Hangang River, one of the longest rivers in Korea, features impressive scenery with nearby Eungbong Mountain, which is famous for forsythia blooms in the spring. This area offers benefits for both nature and people by providing safe habitat for wildlife, and a cruise boat wharf and a long cycle trail along the river for citizens.

Wetland Ecological Garden

By utilizing the existing reservoir and its fortunate proximity to Jungnangcheon Stream, Wetland Ecological Garden was restored with little engineering (SMG 2006). Not only creating valuable wildlife habitats, but also providing ecological learning opportunities, the garden comprises various thematic spaces, such as a wetland flower garden, an aquatic plant garden, a bird observatory, an eco-friendly playground, an outdoor nature classroom, and an Ecology Learning Center. A platform built in area adjacent to the lower streams of the Jungnangcheon provides a bird watching point. The wooden deck, carefully designed to harmonize with the original natural features of the site, offers a fine observation point for wetland wildlife.

4.3.2 Replanting and Green Area Improvement Action Plan

The Seoul Forest Restoration Project was completed in only two years due to the policy of a mayor of Seoul to finish the project during his time in office. The limited time for the restoration work caused some negative side effects to some of the trees planted. Some trees, which could not be supplied at the original planting time, had to be replaced by other trees, which include non-native trees. In order to create the appearance of luxuriant forest, an additional 1,000 trees had to be planted during the restoration (Park 2006). In addition, some parts of the land in Seoul Forest were used as a horse-racing stadium for a long time, so the soil was exchanged during the restoration work. However, the ground still contains some salinity which is not suitable for the young trees. For these reasons, many trees have withered after the park was opened. The Park Management Office had a hard time replanting the withered trees, and approximately 30,000 trees were replanted over a two year time period (Seoul Forest Park Management Office 2008).

In order to establish counter-measures and also to enhance the park's green infrastructure, Seoul Forest Park Management Office set up the Green Area Improvement Action Plan in 2010 (Seoul Forest Park Management Office 2010b). The plan is aimed at improving the growing conditions for the trees in the park through soil inoculation, replanting, drain repairing, and slope stabilization. However, this plan regrettably does not have a detailed long-term forest management strategy to be a resilient forest focused on the tasks that should be

done this year. For the implementation of the plan, \$ 0.7 million will be expended in 2010 (Seoul Forest Park Management Office 2010b).

4.3.3 Wildlife Management Plan

Every year or before a new project is implemented, Seoul Forest Park Management Office updates detailed management plans to set up plans adapted for new circumstances. The Wildlife Management Plan is aimed at improving wildlife habitat, introducing new wildlife, and promoting wildlife programs for visitors, focusing on fallow deer and roe deer that inhabit the Ecological Forest area (Seoul Forest Park Management Office 2010d). The Fish Management Plan aims to improve the fish habitat, which includes three ponds in the park (Seoul Forest Park Management Office 2010a). Because two keepers are taking care of wildlife in Seoul Forest, the park is a good place for deer, birds, and fish. The keepers not only care for the wildlife, but also operate wildlife programs for visitors for free. Thanks to the keepers' role, the populations of deer and fish are increased every year. Thus, both plans contain wildlife control strategies, including how to parcel out the increased populations.

4.4 To Improve Citizens' Well-being

In order to restore an urban forest as a living body in harmony with nature and culture, Seoul Forest Park was designed with spaces for culture that offer people environmental learning, healthy exercise, joyful recreation, and mental relaxation. Seoul Forest is composed of five different areas under the special themes: Culture and Art Park, Nature Experience Area, Ecological Forest,

Wetland Ecological Garden, and Hangang Waterside Park (SMG 2006). Among them, Culture and Art Park and Nature Experience Area are closely related to citizens' well-being. Located in a central part of Seoul Forest, Culture and Art Park consists of recreational and athletic spaces. This area offers a great venue for various outdoor leisure activities that bring relaxation and physical refreshment for anyone seeking an escape from the hustle and bustle of busy city life. The Culture and Art Park contains Seoul Forest Plaza, a sculpture park, Philosopher's Road, waterside rest area, a family yard, a visitor center, an outdoor theatre, children's playgrounds, a disabled-friendly playground, and various sport facilities. In order to provide an environmental learning space, the old water purifying facilities were reformed as the Nature Experience Area. In this place visitors gain hands-on knowledge of nature and observe various plants and insects. This experience area includes an Insect Garden, a Wild Flower Garden, and a Gallery Garden.

The Seoul Forest Park Management Office establishes detailed management plans, every year or before they implement new projects, aimed at improving the local residents' quality of life in the park (Lee Munju 2010). Some examples of the plans include a children's library, a children's sand playground, a garden for the disabled, and 'Ubiquitous Free Zone,' which is ubiquitous information services through wireless networking and radio-frequency identification (RFID) tags technologies. The information system provides various services for park users, such as Ubiquitous Health Check, Safe System for children, and Ubiquitous Ecology Learning programs (SMG 2008). Also, the

Management Office and SFPC supply various convenient services for visitors, such as wireless internet service, baby care room, and strollers. To offer the best park service, all these services are provided to visitors for free. In addition, the Seoul Green Bureau carries out a survey of Seoul Parks' users every year for the purpose of improving parks' service (Seoul Green Bureau 2009).

Munju Lee, a manager of facilities in Seoul Forest Park, explained that the most significant action that can be done to improve local residents' quality of experience in the park is providing more environmental learning areas so that visitors can become more aware of the importance of nature easily during their time in the park (Personal communication, Feb. 8, 2010). Also, Kang argued that providing a variety of valuable programs is a significant contribution to citizens' well-being. She emphasized that "urban parks are a symbol of vitality and enhance the local residents' overall quality of life through the programs that parks provide" (Personal communication, Feb. 5, 2010).

The SFPC promotes not only ecological programs, but also cultural and artistic events all year round, contributing to the daily connection of people with culture and nature (SFPC 2009). The ample opportunities for cultural and artistic events focus on various subjects related to nature and ecology. Also, the Park Office designs and offers special events and programs for citizens independent of the park programs operated by the Seoul Forest Park Conservancy. Both the Park Office and the Conservancy encourage local residents to participate in these programs and get feedback from the participants to improve the quality of their programs through their website (Lee Hanah 2010).

4.4.1 Park Services

Sports Facilities

Seoul Forest Park offers facilities designed to improve citizens' quality of life and health. The sports field in Seoul Forest consists of various facilities including a soccer field, five tennis courts, a basketball court, six badminton courts, a croquet field, a skateboarding venue, and many fitness equipments. The skateboarding venue offers a location for extreme sports and games. With the skateboarding venue, Seoul Forest has attracted some of the capital's most energetic young sports people as a magnet for young admirers of X-games (Seoul Green Bureau 2010).

The athletics playgrounds next to the Insect Garden and Philosopher's Road offer quieter spaces for people who feel more comfortable doing solitary exercise. Both sporting areas contain a variety of fitness equipment, such as a knee raiser, fit board, leg extension machine, Limbo Gate, abdominal board, balance board, and jump facilities.

The greenway exercise courses in Seoul Forest plays an important role in linking other greenways from the heart of the capital city to the Hangang River via the restored Cheonggyecheon and Jungnangcheon Streams. Over 40 kilometres of the greenway exercise courses are connected by the Seoul Forest Greenway (Figure 4.3). Through the greenways, citizens can enhance their physical well-being by jogging, cycling, and walking.

To promote citizens' health, the Seoul Forest Management Office established the Ubiquitous Health Check System at the sports field in 2009.

facilities (Seoul Green Bureau 2010). The facilities include an insect garden, a 'Gallery Garden', an observation deck, a marsh plants garden, a bird observatory, an 'Environmental Playground', and an Open Air Nature Awareness School (Figure 4.4). The insect garden, a multi-purpose greenhouse, was converted from the old water filtration building. This newly designed insect garden offers an opportunity to see and learn about various garden insects including butterflies, cicada, diving beetles, and grasshoppers along with tropical plants. With no admission fee, visitors can observe a total of 2,233 trees of 200 species, 297 insects of 106 species, and 12,472 plants of 81 species in this garden. A 'Gallery Garden', incorporating an image of a Roman relic, was transformed from the precipitation tank of the old water purification plant. The garden is used as an artistic and environmental exhibition space (Seoul Green Bureau 2010).



Figure 4.4: Nature Experience Facilities

(Above left) The insect garden, a multi-purpose greenhouse, offers to see and learn about various garden insects with tropical plants. (Above right) A marsh plants garden.

Combined with the surrounding green environment, a marsh plants garden was restored in the reservoir of a filtration plant formerly located in Seoul Forest (Seoul Green Bureau 2010). The wooden deck and bird watching point in the marsh plants garden offer excellent observation spots for wetland wildlife and birds. Beside the Marsh Plants Garden, the Open Air Nature Awareness School and Environmental Playground provide students with an opportunity to engage in creative and exciting fun activities in an open-air educational space.

Culture Experience Facilities

Seoul Forest Park provides visitors with valuable arenas for cultural activities, from simple relaxation to more sophisticated art events, through which citizens of all ages can join together and enjoy refreshing cultural experiences (Seoul Green Bureau 2010). The cultural facilities consist of a Splash Fountain, a Family Yard, an Outdoor Theatre, Children's Woodland Playgrounds, a Waterside Conference Center, a Philosopher's Road, and a Seoul Forest Wharf (Figure 4.5). The Splash Fountain, consisting of a total of 100 nozzles, shoots water in various heights and forms. The fountain is considered as one of the most beloved attractions in Seoul Forest. The Family Yard, a spacious open-air theatre, serves as a great picnic area for citizens. The yard is often transformed into an outdoor stage for various cultural events including concerts and movies. Another Outdoor Theatre in Seoul Forest stages a great variety of performances every weekend. Five children's playgrounds in Seoul Forest offer children a wide variety of opportunities to indulge in a fantastic adventure. The five different

themes consist of a water playground, an environmental playground, a sand playground, a woodland playground, and a disabled-friendly playground. The Philosopher's Road, shaded by Metasequoia trees, forms an environment for people seeking a quiet rest, a spot for reading, or contemplation. Seoul Forest offers people various opportunities to take pleasure not only in the forest, but also in the river. Located at Hangang riverside, the Seoul Forest Wharf is a starting point for a one-hour river excursion along the s Hangang River.



Figure 4.5: Culture Experience Facilities

(Above left) Children playing in the Environmental Playground. (Above right) People enjoying the music concert in the Outdoor Theatre. (Lower left) Children playing in the Splash Fountain. (Bottom right) A photography exhibition in the Visitor Centre.

Seasonal management strategies play a significant role in attracting many citizens to the park. A good example was a sled park. Using the heavy snow in January 2010, the Park Office opened a sled park on a slant of the outdoor theatre stand. So many children and adults enjoyed sledding in the middle of the city for free.

Convenient Services

In order to maximize park users' satisfaction in Seoul Forest, the Seoul Forest Park Management Office and SFPC provide various convenient services for visitors who range from babies to the elderly and the disabled (Figure 4.6). All these convenient services that Seoul Forest are provided as free service for visitors. A good example of these services is a new high-performance wireless mesh canopy. The service offers a wide variety of digital services that allow users not only to access the wireless internet service in the peaceful surrounding, but also to check their basic health by the Ubiquitous Health Check System (Figure 4.7). The service also enables children to secure a safe play environment by the Safe System in Seoul Forest (Lee Munju 2010).

The SFPC offers parents with young children and people with disabilities a baby care room, baby carriages, and wheelchairs in the visitor center. The Conservancy operates the Children's Library and Book Carriages, in which park users can read and borrow some books, encouraging citizens to read books and providing a great opportunity to learn about nature and local ecosystems. The Conservancy also established special facilities for the disabled such as a

Disabled-friendly Playground in 2006 and a Fragrance Garden in 2009 supported by companies (SFPC 2010). The huge wheelchair-accessible statue in the playground delivers a message of love, hope, and courage to people with disabilities. The Fragrance Garden allows the disabled to feel, smell, and hear the nature by displaying fragrant herbs with waterscape facilities that make sound effects.



Figure 4.6: Convenient Services

(Left) Book Carriages. (Right) Disabled-friendly Playground



Figure 4.7: The Ubiquitous Health Check System

The images above illustrate the Ubiquitous Health Check System in Seoul Forest Park. Everyone can use the system for free (Photo from Munju Lee)

To ensure a safe park environment, the Park Office contracted with a security service company, and five security guards work in Seoul Forest 24 hours per day, all year round. The guards play an important role in maintaining a safe environment by giving park information, providing a warning about prohibited activities, and not allowing the homeless people to stay in the park.

In addition, for the purpose of improving the parks' service, the Seoul Green Bureau carries out Seoul Parks' user surveys every year (Seoul Green Bureau 2009). Through the results and recommendations from the surveys, Seoul Forest reflects public opinions on their stewardship work to enhance the park service that has a strong influence on citizens' well-being.

4.4.2 Educational and Volunteer Programs

Public Programs

To promote environmental awareness in urbanites and facilitate park users' amusement, both the Seoul Forest Park Management Office and the SFPC operate a wide variety of public events and programs (Seoul Green Bureau 2010). All of the programs they provide contribute to the daily connection of citizens with nature and culture. The Park Office offers special events and programs focusing on insects, herbs, and deer, using the resource and facilities the park has available. The SFPC also operates a variety of ecological & environmental education programs for visitors not only on weekends, but also on weekdays. Conducted by eco-guide volunteers, the eco-environmental education programs in Seoul Forest are divided into four different fields based on the natural resources of the park: a tree learning program, an insect learning

program, wetlands education program, and a park eco-tour program (Figure 4.8). The most important ecological program in this park is Friend with Seoul Forest for kindergarteners (Lee Hanah 2010). The program awakens children's sense of nature through the hands-on experience. The eco-environmental programs allow not only children and students, but also the handicapped, families, and general visitors to have first-hand experience with nature, and thus gain an appreciation for its value and beauty without putting pressure on the wilderness areas.



Figure 4.8: Public Programs

The images above illustrate the Insect Program and Ecology Program in Seoul Forest Park.

To enrich the quality of life for citizens of all ages, the Conservancy provides ample opportunities for cultural and artistic events focusing on various subjects related to nature and ecology (SFPC 2010). A multitude of opportunities, including artistic, musical, and seasonal events, has established Seoul Forest as a place for social and cultural exchange. Thus, Seoul Forest became a focal point of communities that contributes to the enhancement of the local

communities' overall quality of life. Both the Park Office and the Conservancy encourage local residents to participate in the park programs by providing free programs, operating special programs on holidays, and working together with local communities and the District Office. They also obtain and apply feedback from the participants to improve the quality of their programs through their website and the program monitors (Lee Hanah 2010).

Volunteer Programs

The SFPC plays a significant role in operating volunteer programs by planning the volunteer work, recruiting and training volunteers, and working with them in the park. The volunteers support a wide range of the park work, from assisting visitors to overseeing large-scale projects for special events (Figure 4.9). Starting with 12 volunteers, the SFPC has progressed to having more than 150 voluntary staff working regularly once a week or once a month. Also, an additional 5,000 dedicated volunteers work in Seoul Forest as stewards such as eco-guides, gardeners, cultural docents, photographers, and librarians (SFPC 2009).

The Conservancy encourages local residents to participate in stewardship work using its news-letters and website. However, Hanah Lee explained that while local citizens have worked together with the conservancy to plant flowers and to manage some portion of green areas in the park, having local residents volunteer is more difficult than encouraging corporations and other communities (Personal communication, Feb. 17, 2010). The reasons were

studied by Kim et al. and according to their study results, 41.8% of park users in the survey considered that the park should be managed by the Seoul city (2009). Thus, the Conservancy fosters corporations, schools, and NGOs to participate in team-volunteering works in Seoul Forest through their well-developed network with experts, corporations, NGOs, and the city government. The Conservancy does not provide any incentives to stewardship groups, but Hanah Lee stated that volunteers by themselves obtain satisfaction from their accomplishments working in the natural urban environment (Personal communication, Feb. 17, 2010).



Figure 4.9: Volunteer Eco-guides

(Left) Volunteer eco-guides operating the Environmental Programs in Seoul Forest Park.

(Right) Volunteers removing weeds in Seoul Forest Park (Photo from SFPC).

4.5 Summary

In this chapter, I reviewed Seoul Forest Park in Seoul, Korea through the data collected from the interviews, official documents of the park, and field research. The analyses show that the governance and operations of Seoul

Forest Park encourage not only biodiversity, but also citizens' quality of life by planning the park restoration project, restoring the ecological park, and providing various services for park users. The data also show that the community-based stewardship group SFPC plays a vital role in providing a wide variety of public events and park programs to enhance citizens' quality of life.

The next chapter will explain Stanley Park Vancouver, Canada the same way as this chapter did to compare the two city parks.

Chapter 5 Stanley Park in Vancouver

While the previous section explores Seoul Forest Park in Seoul, Korea, this section examines Stanley Park in Vancouver, Canada. This chapter outlines how the Vancouver Park Board and the park's society groups manage and operate Stanley Park to enhance biodiversity and local residents' quality of life. Beginning with the regulatory framework for biodiversity conservation of Stanley Park, I examine various exertions by the Vancouver Park Board and the park's society groups to preserve and improve park's ecosystems. In particular, I focus on how the restoration activities after 2006-2007 storms were carried out, what they have accomplished during the restoration, and how the new Forest Management Plan was established. Finally, I consider how Stanley Park has influence on Vancouver residents' well-being.

5.1 Regulatory Framework

To improve biodiversity of Vancouver, Canada, all levels of governments established the legislation and policies for biodiversity. However, in this research, I explored the regulatory framework for biodiversity conservation of Stanley Park. The regulatory framework prescribes a variety of biodiversity conservation efforts. Various legislative tools include:

- Federal Government
 - Canadian Environmental Protection Act
 - Canadian Environmental Assessment Act

- Canada Marine Conservation Areas Act
- Canada National Parks Act
- Canada Wildlife Act
- Fisheries Act
- Income Tax Act
- Migratory Birds Convention Act
- Oceans Act
- Species at Risk Act (SARA)
- Provincial Government
 - Agricultural Land Commission Act
 - Agricultural Land Reserve Use
 - Subdivision and Procedure Regulation
 - Drainage, Ditching, and Diking Act
 - Drinking Water Protections Act
 - Ecological Reserves Act
 - Environmental Assessment Act
 - Fish Protection Act
 - Land Act
 - Park Act
 - Riparian Areas Regulation
 - Waste Management Act
 - Water Act
 - Wildlife Act
 - Stewardship Bylaw
- Regional Government: Regional Growth Strategy
- Local Government
 - Official Community Plans
 - Tree Protection Bylaw
 - Watercourse Protection Bylaw
 - Integrated Environmental Bylaw
 - Zoning Bylaw

5.2 Governance

Since the beginning of Stanley Park, the Vancouver Board of Parks and Recreation has played a major stewardship role in the protection of Stanley Park and fostering appropriate developments within it for more than 120 years (Vancouver Board of Parks and Recreation 2010). Under the vision to keep Stanley Park a natural place for beauty, recreation, and exercise, the Park Board strives to improve the park's ecosystem and the quality of life for the visitors and residents of Vancouver. Stanley Park has many entangled issues. For these reasons, the Board does not have one guiding document to apply for an overall Stanley Park management. Therefore the Park Board always checks to make that its management fits with its vision (Quinn 2010). However, other management plans, such as the Forest Management Plan and the Restoration Plan, provide guidance and instructions for the operation of Stanley Park. With regard to these Plans, the details are demonstrated in Section 5.3

To identify the community's values and priorities concerning Stanley Park for long term planning purposes, the Stanley Park Task Force, a group of citizens selected by the Park Board, was established in 1991. The Task Force actively carried out public surveys, reviewed the extensive public input, and prepared the Stanley Park Technical and Final Report to the Park Board in 1992. The Task Force actively includes valuable recommendations that could improve not only the park's ecosystem and facilities, but also the citizen's well-being (Stanley Park Task Force et al.1992). However, some important recommendations, such as

appointing a Stanley Park Citizen's Advisory Council and creating a Stanley Park Charter, were not adopted (Rutgers 2010).

When issues occur, the Park Board receives input from the public in many different ways. They engage professionals on a volunteer basis, organize discussion groups, bring in organizations, conduct surveys on the webpage, and make wide open forums and presentations to listen to public suggestions. Bill Stephen, who is in charge of forest maintenance in Stanley Park and the main author of the Forest Management Plan, explained that the Park Board did an excellent job of integrating meaningful public opinions into the Forest Management Plan (Personal communication, Jan. 21, 2010).

Also, the Vancouver Park Board has a well-developed system to listen to citizens through weekly meetings of the Park Board Commissioners. The weekly meetings allow any members of the public to come and speak about the park's issues (Stephen 2010). Therefore, the Park Board does not involve the public on a day to day basis from a maintenance standpoint relying on the weekly meeting of the Park Board Commissioners or the assistance of the Stanley Park Ecology Society (Quinn 2010).

5.2.1 Challenges

Because of the increasing demands of many park users, most large urban parks have many difficult management issues, and Stanley Park is no exception. Stanley Park experiences the challenges of homeless people, increased human activities, and budget crunches. Stephen demonstrated that

there are many different user populations in the park, including sports groups and special event groups, so the biggest challenge in Stanley Park is managing the demand for park space (Personal communication, Jan. 21, 2010). Keeping a balance between the citizens' recreational expectations and preservation of the natural environment is a significant challenge in managing urban parks (Robertson 2010).

One of the greatest issues in Stanley Park, and indeed the entire city of Vancouver, is the homeless problem. Although camping is not allowed in Stanley Park, homeless people use the park as a place to camp, socialize, and salvage things because they have nowhere to live. Stanley Park has a Park Ranger Program, but the rangers have a limited ability to arrest and control the homeless population. Thus, the park staff sweeps the park regularly and monitors the homeless people, relying on the police to assist with patrolling the park (Quinn 2010).

The Park Board has several barriers to the successful preservation of the natural ecosystem, including roads and cars, the heat island effect, and forest fires, which have a significant effect on the biodiversity in the park. Increased numbers of passing cars on the highway and visitors' cars in the park causes serious air pollution and noise. Under certain exceptional conditions (dry summer, effective ignition, strong winds) a forest fires could have a serious impact on the existing biodiversity. Fire is not a common or widespread phenomenon in temperate wet forests of this type.

In addition, as the population increases in Vancouver, especially in the west end of Vancouver, local people themselves cause damage in the park, by compacting the soil, cutting vegetation, having fires, making trails that are not sanctioned by the park, or making trails through the forest. For these reasons, many of the species, including rare or key ecological species are gone, extirpated, and are not expected to be found in the park anymore (Stephen 2010).

The park's biodiversity is negatively impacted by invasive exotic species, which are an ever-growing problem for Stanley Park and throughout the lower mainland as well. Therefore, both the Park Board and the Stanley Park Ecology Society focus their work on controlling the invasive species. Brian Quinn, the Supervisor of Stanley Park in Vancouver Park Board, asserted that if the Park Board can control the growth of Himalayan blackberry (*Rubus armeniacus*), Stanley Park will have more diverse plant population (Personal communication, Jan. 21, 2010).

A limited Budget provides a big challenge for the Park Board. The Vancouver Park Board receives support from the City of Vancouver and by private donors and corporations to operate the Vancouver Parks (Quinn 2010). The Board has fundraising staff, whose main job is soliciting people and organizations to donate funds for park supplies, such as benches or trees. The Stanley Park Restoration Final Report demonstrates that the intensive two year restoration process would not have happened without an incredible donation of \$10.6 million from those who care about Stanley Park (Vancouver Board of Parks and Recreation 2009d).

The Stanley Park Ecology Society also encourages citizens to donate to support its stewardship works, which places strains on the limited funds available from local citizens and community groups. There are several challenges. When a big donor event happens, both the Ecology Society and the fundraising department in the Park Board encourage donors to give to Stanley Park even though many of the citizens already have donated to one of them. Also, the Ecology Society meets difficulties when the Park Board asks the Society to take the potential donors on a park tour and show them all the stewardship works. The Ecology Society realizes that most of the donations go to the Park Board. Consequently, during the restoration works in 2007~2009, the Society lost a lot of citizen funding because the donors gave to the Park Board, and people understood that the Society was one in the same. Patricia Thomson, the Executive Director of the Stanley Park Ecology Society, stated “there are so many benches in the park. The Park Board is trying to find a way to encourage people to consider education programs for the park, so we’re trying to see how we can collaborate. We are the only ones who do education programming in the park.” (Personal communication, Jan. 21, 2010)

5.2.2 The Stanley Park Ecology Society

The Stanley Park Ecology Society (SPES), a community-based non-profit organization, has been working in Stanley Park “to connect people with nature” since 1995 (Stanley Park Ecology Society 2010). The governance of Stanley Park is carried out by the Vancouver Park Board in close cooperation with the Stanley Park Ecology Society under the Joint Operating Agreement between the

Vancouver Park Board and the Society. The Agreement outlines terms and responsibilities related to the park partnership, provides the Ecology Society with the security of indemnity under the City of Vancouver, and promises the Society facilities use, such as operating programs in the Nature House and using the Pavilion as its office (Thomson 2010).

As a partner to the Vancouver Park Board, the Stanley Park Ecology Society promotes conservation and stewardship by providing park information and designing and delivering popular educational programs in order to help people understand the natural ecosystem. Quinn explained that the Ecology Society has helped the Park Board to identify where the Park Board should be focusing its attention as far as biodiversity goes (Personal communication, Jan. 21, 2010). The Society performs a tremendous amount of work in conjunction with the Park Board to help eradicate invasive species, to restore native plants, and to help control the park's biodiversity. The society also has been leading wildlife monitoring programs that continue to yield informative local results, and has been mapping the Stanley Park ecosystem, using GPS (Global Positioning Systems) and GIS (Geographical Information Systems) (The Stanley Park Ecology Society 2010).

The Stanley Park Ecology Society originated from the Stanley Park Zoological Society, which had worked with the Stanley Park Zoo since February 1988. After the residents of Vancouver voted against keeping the Stanley Park Zoo, which led to the closure of the zoo in 1994, the Zoological Society was turned into the Ecology Society. However, the Stanley Park Ecology Society

maintains the original purpose of the Zoological Society: environmental education and conservation (Thomson 2010).

The organization of the Stanley Park Ecology Society consists of a Board of Directors, an Executive Director, and staff. The Board of Directors, constituted by various volunteer experts, assists the Society as advisors. The responsibility of the Board is “to uphold the Society’s constitution and by-laws, to develop policy to guide the growth of the organization, and to develop and monitor the implementation of a strategic plan.” The Board works together with the Society staff and accepts responsibility and liability for the organization, operating on a governance model. The Executive Director operates the Society’s projects in cooperation with three program managers and three coordinators (Stanley Park Ecology Society n.d.).

The Society’s revenue comes from a diversity of foundation grants and private donations. In order to relieve financial hardship when this funding is not abundant, the Society sells popcorn which is actually surprisingly effective during Halloween, Christmas, and the miniature train events (Thomson 2010). However, the Society’s annual report illustrates that approximately 50% of its revenue comes from three levels of governments’ grants. When the society suffered hardship to receive donations during the restoration works from 2007 to 2009, they got about 64% grants from the governments. Thomson explained that

We receive monthly service contract funds from the City of Vancouver via the Park Board to operate the Nature House and to operate the Co-Existing Coyotes program. With less certainty, we have received grants

for specific projects funded by various arms of the federal government. We used to receive annual support from the Provincial government under the Ministry of Environment, and also the Gaming Branch, but as of a year ago all of that provincial funding has been lost in the economic downturn (Personal communication, Jan. 21, 2010).

Stewardship initiatives by the Stanley Park Ecology Society are community-based, constructive, and cooperative. The society plays a dynamic role in the conservation and enhancement of the Stanley Park ecosystem through stewardship activities and environmental education. By offering educational programs about the park's ecosystem and providing local citizens opportunities to take action to preserve and enhance the natural aspects of Stanley Park, the society encourages stewardship of our natural world. Although they do carry out stewardship and outreach activities, the main mission of the Society is to provide environmental education for people all ages (Stanley Park Ecology Society n.d.).

In order to help people become aware of the interrelationships of urban ecology, the education programs include a range of topics from individual species biology to human and natural history. The Society has a variety of programs, such as on site curriculum for elementary school children, family workshops, Sunday Discovery Walks for adults, an urban camping program, seasonal events, and ecological stewardship projects. The programs provide a great opportunity to build knowledge of the urban ecosystem with a reasonably low-cost or no cost participation fee, so that everyone can be involved (Stanley

Park Ecology Society 2010). The society also visits school and make programs for students in the classroom in the winter time, especially when schools invite the society, when the weather is too wet, and when people are reluctant to visit the park. The society operates teacher workshops as well, so that teachers get comfortable sharing nature with their students (Thomson 2010).

The SPES encourages local residents to participate in the stewardship though the Society's newsletter, which is sent out to its membership of about 150 families, and is also distributed in the information booth at Stanley Park, at the Park Board office, and at local markets in community centers (Thomson 2010). The Society provides some incentives to stewardship groups, by offering students letters of accomplishment for their graduation requirement, having their group photo taken, or highlighting the stewards in the local newspaper (Thomson 2010). However, the most difficult problem in managing stewardship in Stanley Park is capacity. Usually there are ten people on payroll at the SPES, but only one full time person works for the stewardship initiative. Thus, everyone gets involved in each other's work (Thomson 2010).

5.2.3 The Hollow Tree Conservation Society

A recent example of public participation in Stanley Park is the Stanley Park Hollow Tree Conservation Society, organized in early 2008 to protest the plan to demolish the Hollow Tree, and to restore the tree (Stanley Park Hollow Tree Conservation Society 2009). The Hollow Tree, an ancient western red cedar (*Thuja plicata* Donn ex D. Don, Cupressaceae), existed on the west side of Stanley Park for over 700 years. Once the tree stood over 72 meters tall and was

approximately 12 meters in diameter (Burley boys Tree Service n.d.). Because it was large and one of BC's provincially-recognized trees, the Hollow Tree became a wonderful local reminder of the significance of BC's original forests, and also became a cultural heritage resource listed on the Vancouver Heritage Register and the Vancouver Heritage Tree Inventory (Heritage Vancouver 2009).

Unfortunately, the heavy winter windstorms in 2006 and 2007 splintered the Hollow Tree's supporting root flairs and battered it further, leaving the tree with a dangerous 11-degree tilt (The Board of Parks and Recreation of the City of Vancouver 2010). The Vancouver Park Board announced that the Hollow Tree was leaning over at a dangerous angle and might be a potential risk to park visitors, and voted to remove the tree in April 2008.

However, some of citizens opposed the plan to remove the Tree and display it, and then they composed the Stanley Park Hollow Tree Conservation Society. The Conservation Society joined forces with Heritage Vancouver, a non-profit society dedicated to the conservation of Vancouver's built, cultural and natural heritage, and lobbied the Park Board commissioners to get approval to retain the hollow tree. Finally, the Park Board approved the Hollow Tree Conservation Plan, which portrays a detailed engineering plan and a strategy to raise donations to conserve the Hollow Tree, from the Hollow Tree Conservation Society (Stanley Park Hollow Tree Conservation Society 2009). Recently the Hollow tree Restoration Project was successfully concluded with a lot of private financial support and material assistance, without any public funding from the

Park Board, Quinn explained (Figure 5.1) (Personal communication, Jan. 21, 2010).



Figure 5.1: The Hollow Tree Conservation Work

The image on the left illustrates an old picture of the Hollow tree.

(Photo from <http://www.savethehollowtree.com/id10.html>)

The image on the right illustrates the completion of Hollow Tree Conservation Work.

5.2.4 Other Community Groups

Vancouver Aquarium Association

The Vancouver Aquarium Association, a private, self-supporting non-profit society, was formed in 1950 before the Vancouver Aquarium was opened in 1956 to prepare for Canada's first public aquarium in Stanley Park. The Association is a registered charitable organization, receiving no government operational funding. The Vancouver Aquarium is operated by a volunteer board

of governors and two liaison commissioners appointed by the Park Board. The Association has approximately 44,000 individual members, and works together with about 980 volunteers. A new agreement between the Park Board and the Aquarium Association adheres to the Memorandum of Understanding signed in 1997. The agreement allows both the Board and the Association to enter the new millennium in a partnership that recognizes the Board's overall stewardship of Stanley Park and the Aquarium's independence and reputation as one of the City's prime attractions and educational facilities for residents and visitors alike (Vancouver Aquarium 2010).

The Association's mission includes the research of aquatic life through display and interpretation, education for school children, and direct action to conserve aquatic life. Aquarium staff and volunteers also have been involved in beach clean-ups, and wetland restoration and rehabilitation. Through hands-on programs that are curriculum-based with a focus on conservation, each year 80,000 school children learn about aquatic life. With subsequent expansions and over 70,000 animals, the Association made their aquarium the largest in Canada, designated Canada's Pacific National Aquarium by the Canadian Federal Government, and one of the five largest in North America (Vancouver Aquarium 2010).

Nature Vancouver

Nature Vancouver, previously known as Vancouver Natural History Society, is a non-profit charitable society registered under the BC Societies Act. The society was formed in May 1918 by the amalgamation of the Arbour Day

Society and the Natural History Section of the BC mountaineering Club to promote nature conservation and to disseminate knowledge of nature. The major missions of the Society also include promoting environmental enjoyment, boosting public education, and protecting endangered species and ecosystems in Vancouver and throughout BC. To carry out its objectives, the Society's activities are divided into Birding, Botany, Conservation, Geology, Marine Biology, and Photography. The Society publishes journals of natural history and some of them are directly related to the nature of Stanley Park (Nature Vancouver 2007).

The Society published *The Natural History of Stanley Park* written by the Society's members to commemorate the 100th anniversary of Stanley Park in 1988. The articles in the book document Stanley Park's organisms, species checklists, anecdotes, and photographs (Schaefer, V. and Chen, A. 1988). Also, in 2006, the society produced another book, *Wilderness on the Doorstep: Discovering Nature in Stanley Park*, to provide ecological and biological information about Stanley Park, particularly for new visitors to Stanley Park. This book explains the unique nature of Stanley Park, describing local plants and animals with detailed explanations, stories, photos, maps, artwork, and colour photography by local naturalists (Nature Vancouver 2010).

5.3 To Improve Biodiversity

Historically, many disturbances, such as development, storms, invasive exotic plants, insects, and diseases, have buffeted the Park's ecosystems.

However, the balance between people and nature in Stanley Park has on some

level been maintained for over 120 years by the stewardship of the Vancouver Park Board. As Vancouver's oldest and largest park, the natural environment of Stanley Park's forested area has played a significant role in providing important habitat for wildlife in an urban environment, especially for small mammals and birds by offering food, water, and shelter. Beside the wildlife habitat, about 250 hectares of Stanley Park forest, consisting of about 150,000 mature trees, performs a number of key functions. These functions include providing an important environmental education resource, becoming one of Vancouver's central symbols across Canada, and offering recreational and leisure opportunities for Vancouverites and tourists to enjoy walks, jogs, bike rides and drives through the forest (Vancouver Board of Parks and Recreation 2010).

However, Stanley Park's forest and wildlife today are not as diverse as they were when Europeans arrived 150 years ago. At that time, the forest had roughly equal quantities of western redcedar (*Thuja plicata* Donn ex D. Don), Douglas-fir (*Pseudotsuga menziesii*), and western hemlock (*Tsuga heterophylla*), as well as a population of Sitka spruce (*Picea sitchensis*), grand fir (*Abies grandis* (Dougl. ex D. Don) Lindl.), and western white pine (*Pinus monticola* Dougl. ex D. Don). Today the forest is dominated by hemlock, a tree which is less resilient to storms and diseases than cedar and Douglas-fir (Vancouver Board of Parks and Recreation 2009c).

Biodiversity plays an important role in ecosystem function and consequently contributes to human well-being. To improve ecosystem function, the Park Board does not have a single biodiversity plan; however, a significant

portion of the Forest Management Plan was dedicated to biodiversity through habitat and wildlife management. Although the Forest Management Plan is not focused on biodiversity, the plan is concentrated on how to manage the forest to provide better wildlife habitat (Vancouver Board of Parks and Recreation 2009c).

After the series of windstorms of December 2006 to January 2007, the Park Board set the Restoration Plan to formulate the park's restoration strategy. Robertson pointed out that without any doubt, the Restoration Plan in 2007 was the most commendable and collaborative work to preserve or improve biodiversity in Vancouver Parks. When the Board created the Restoration Plan, many people were involved in developing and reviewing the plan, including the Stanley Park Ecology Society, First Nations, forest management experts, forest management companies, the universities and colleges, and the wider public (Personal communication, Mar. 9, 2010).

Stephen claimed that the most significant action to improve biodiversity in Stanley Park would be managing the new succession areas within the forest by reducing the chance of forest fires and exotic insect infestations in a way that promotes the growth of the forest (Personal communication, Jan. 21, 2010). The reason is that during the restoration of 2007~2009, many trees were replanted at the edge of the blow-down areas, and diverse native trees were planted (Vancouver Board of Parks and Recreation 2009d).

Another significant action to improve biodiversity in Stanley Park is removing invasive species, which threaten the park's ecosystem by reducing overall species abundance and diversity (Quinn 2010, Thomson 2010). To

control the invasive species, the Park Board set up a new Invasive Species Management Plan. The plan illustrates the general characteristics of each invasive plant species with their photos, and also suggests treatment options, priorities actions, and potential native plant replacements (Vancouver Board of Parks and Recreation 2009c). The Park Board and the SPES are collaborating to remove and control invasive species in Stanley Park by monitoring, mapping, and taking action to remove them.

The nongovernmental organizations in Stanley Park, the Stanley Park Ecology Society and the Vancouver Aquarium Association, play an important role in assisting the Park Board to focus their attention on biodiversity through their research results. The Stanley Park Ecology Society does a tremendous amount of work in conjunction with the Park Board to control the Stanley Park biodiversity by operating conservation programs, eradicating invasive species, and restoring or introducing native plant populations. To continue to understand how to improve Stanley Park's biodiversity, the SPES also has held special forums, such as "Biodiversity in Stanley Park Symposium and Public Forum" in 2008, and "Toward Long-Term Ecological Management in Stanley Park Advisors Forum" in 2007 (SPES 2007c, 2008a). Through these forums, many people from public, governments, students, and NGOs, became aware of the importance of the Park's biodiversity, and have come up with effective strategies for dealing with biodiversity issues.

5.3.1 Restoration after 2006-2007 Storms

From December 2006 to January 2007, three violent windstorms caused significant destruction in Stanley Park (Figure 5.2). The storms blew down more than 10,000 trees, approximately 40 hectares (15% of the forest) was severely damaged, and another 40 hectares of the forest was moderately injured. Also, several portions of the seawall and trail system were destroyed, and escarpment above the seawall was weakened (Vancouver Board of Parks and Recreation 2007bc).

Stanley Park Restoration Plan

After the storms, most of Stanley Park was closed in order to clear the fallen trees and to repair the park's infrastructure. Following the removal of hazardous trees from public gathering places and forest trails, most forest trails in the park were re-opened for public use by April 1st 2007. During the period of park closure, an inter-disciplinary team of Park Board staff and consultants prepared the park's Restoration Plan utilizing broad community consultation, including citizens' opinions. Finally the Stanley Park Restoration Plan was approved by the Park Board on April 16, 2007 (Vancouver Board of Parks and Recreation 2007c).

The plan describes the goals and guiding principles of the Restoration Plan emphasizing a vision of the forest, and suggesting recommendations for implementation, including the schedule of major restoration activities and the budget. The three goals of the restoration plan are: "first, foster a resilient coastal forest, and protect not only the natural and cultural environments, but also park

visitors, workers, and volunteers, second, repair park infrastructure, third, create supporting legacies” (Vancouver Board of Parks and Recreation 2007c). The restoration plan illustrates more detailed recommendations for the restoration activities through each goal.



Figure 5.2: Stanley Park Windstorm Destruction

These images illustrate the significant destruction of Stanley Park occurring in the winter of 2006 to 2007. (Photo from the Vancouver Park Board 2010)

Restoration Work

Following the guidelines and recommendations of the Restoration Plan, a significant amount of work was accomplished before the restoration work was

completed in early 2009 (Figure 5.3). Approximately 10,000 logs, 75% of fallen trees from the forest floor, were removed. About 15,000 new and diverse native trees and shrubs were planted as the Restoration Plan recommended, including Douglas fir, western red cedar, Sitka spruce, grand fir, big leaf maple and red alder. About 25% of the trees and snags that survived the windstorms were removed to prevent the high risk they posed to workers or the public. At the edge of the blow-down areas, more than 2,000 newly exposed trees were replanted. The ignition source of a forest fire, small woody debris found within five meters of both sides of trails and roadways and within the blow-down areas, were collected (Vancouver Board of Parks and Recreation 2009d).

Not only the Stanley Park forest, but also the park's infrastructure was in need of repair and upgrade. To stabilize the steep slope along the seawall, trees, soil and rocks that were at risk of falling, were removed from the steep slope, and stabilizing plants and shrubs were planted. To improve drainage, about 40% of this 2 km segment was modified and made more stable. The seawall and Prospect Point, which were damaged seriously, were enhanced by structural repair of the road, parking lot, plazas, landscaping, and viewing areas (Vancouver Board of Parks and Recreation 2009d).

This ambitious and innovative restoration work provided an opportunity to forge strong partnerships with volunteers, consultants, contractors, non-profits, the public, and all levels of government. Consequently, the Stanley Park Restoration Project won two awards, the BC Recreation and Parks Association PERC Award and the Canadian Parks and Recreation Association's Award, by being



Figure 5.3: Stanley Park Restoration Works from 2007 to 2009

(Above) The clearing of trails and logs during the Stanley Park Restoration Work (Photo from the Vancouver Parks Board 2010)

(Bottom left) The Stanley Park restoration work at the Prospect Point

(Bottom right) The Stanley Park Restoration Donor Monument

recognized a successful model of effective crisis management that can be adopted by other municipalities and organizations (Vancouver Board of Parks and Recreation 2010d). In addition, the windstorms and the Restoration Project provided an opportunity to formulate the Stanley Park's forest vision to be a resilient coastal forest and a chance to establish a new Forest Management Plan.

5.3.2 Forest Management Plan

The Forest Management Plan was established to overview the types of management activities that are required to create balance between long-term forest function and a safe enjoyment of the park environment (Vancouver Board of Parks and Recreation 2009c). The plan provides forest managers with guidelines on how to steward the forest including ways to reduce the likelihood of forest fires, to decrease exotic insect infestations, and to prevent major catastrophes in the future. The whole process of the Forest Management Plan has had a very significant and positive impact on biodiversity in the park. Stephen articulated that the Forest Management Plan was written to guide managing the forest for the next 20 years and that a significant portion of the plan was dedicated to improve biodiversity through the management of the forest and wildlife habitats (Personal communication, Jan. 21, 2010).

In order to be a resilient forest, the management activities are divided into ten modules and each module illustrates its detailed goals and objectives. The modules include; 1) Tree Inspection and Safety Management, 2) Log and Debris Dispersal, 3) Windthrow Management, 4) Fire Management, 5) Invasive Species Management in Forested Ecosystems, 6) Forest Health Factors, 7) Managing for Wildlife and Habitat in Forested Ecosystems, 8) Establishing New Stands, 9) Established Plantation Treatments, and 10) Climate Change. These modules are categorized three somewhat separated functional sections:

- Forest maintenance modules speak of day to day activities not much different from what has been done for the past twenty years. They

include the tree hazard and wood debris management programs.

- Forest protection work modules, whose need was clearly demonstrated by recent storm events, outline essential objectives that seek to reduce the likelihood of large-scale forest changes which would compromise the forest's value to Stanley Park for many years. Rapid changes should also be guarded against because of significant costs associated with their correction. The windthrow, fire, forest health, and invasive species modules fit into this category.
- Forest enhancement modules address opportunities to enhance the forest by undertaking work which is beneficial to wildlife or forest development, as achieved through habitat creation projects and the practice of silviculture (Vancouver Board of Parks and Recreation 2009c).

5.3.3 Invasive Species Management

Recently, invasive species have had a major impact on Stanley Park's environment, threatening the park's unique biodiversity and reducing overall species abundance and diversity. Both Quinn and Thomson explained that the most significant action to improve biodiversity in Stanley Park is removing invasive species such as English ivy (*Hedera helix*), Himalayan blackberry (*Rubus armeniacus*), English holly (*Ilex aquifolium*), and Japanese knotweed (*Fallopia japonica* (Houtt.)) (Personal communication, Jan. 21, 2010). The Park Board and the SPES make every effort to control invasive species in Stanley

Park by monitoring the species, taking action to remove them, and setting up a new Invasive Species Management Plan.

The Invasive Species Management plan is introduced in the fifth module of the Stanley Park Forest Management Plan. The detailed plan illustrates the general characteristics of the invasive plant species using photos, and descriptions of their habitat, and ecology. To reduce the invasive species, the plan also suggests basic treatment options, priority actions for Stanley Park, and potential replacement with native plants (Vancouver Board of Parks and Recreation 2009c).

An important example of invasive species in Stanley Park is English ivy. English ivy has detrimental impacts on trees: it is an aggressive climber. The species grows under harsh conditions, is evergreen, and establishes rapidly (Quinn, H. and Best, R. 2002). Currently, the most important ecological program conducted by the Stanley Park Ecology Society is Ivy Busters program (Thomson 2010). The stewardship work involves many activities such as removing and monitoring invasive species, and restoring reclaimed areas by planting native species (Figure 5.4). From July 2007 to June 2008, the Ivy Busters volunteers removed almost 1.3 hectares of invasive plants from the Park, and stewardship volunteers supported restoration work by planting 400 trees and over 190 shrubs and herbaceous plants (SPES 2008a).



Figure 5.4: Stanley Park Ivy Busters Program
Invasive species removal (Photo from SPES)

5.3.4 Wildlife Management Plan

The Wildlife Management Plan is established in the seventh module of the Stanley Park Forest Management Plan because wildlife management is closely related to wildlife habitat, such as forest ecosystems. Thus, the plan is not a wildlife plan directly, but a forest plan to help wildlife maintain or improve their numbers (Stephen 2010). To protect wildlife and provide better habitats, the plan describes wildlife management strategies, including wildlife management emphasis areas, a Stanley Park wildlife inventory, potential impacts of human activity, habitat requirements, species-at-risk in Stanley Park, and operations activities by location and ideal timing (Vancouver Board of Parks and Recreation 2009c).

The good example of Stanley Park wildlife management is the Great Blue Heron (*Ardea Herodias*), which is protected species by federal and

provincial legislation (Figure 5.5). To protect the Great Blue Heron, the park staff assembled a work team, including biologists in the Stanley Park Ecology Society and volunteer biologists who have regularly monitored the colony over the past 5 years. In 2006, The Park Board approved the Great Blue Heron Management Plan which illustrates the general information of the species and recommendations for management and stewardship activities for the Stanley Park Great Blue Heron (Vancouver Board of Parks and Recreation 2009h). The recommendations included guidelines for stewards to reduce the risk that community activities and maintenance projects adversely affect the success of the colony. As the plan recommends, the SPES in partnership with the Park Board monitors the Great Blue Heron each year and provides an educational program for the public (SPES 2009d).



Figure 5.5: The Great Blue Herons and an eagle in Stanley Park

The Great Blue Herons photo from Martin Passchier. An eagle photo from Mark T. White

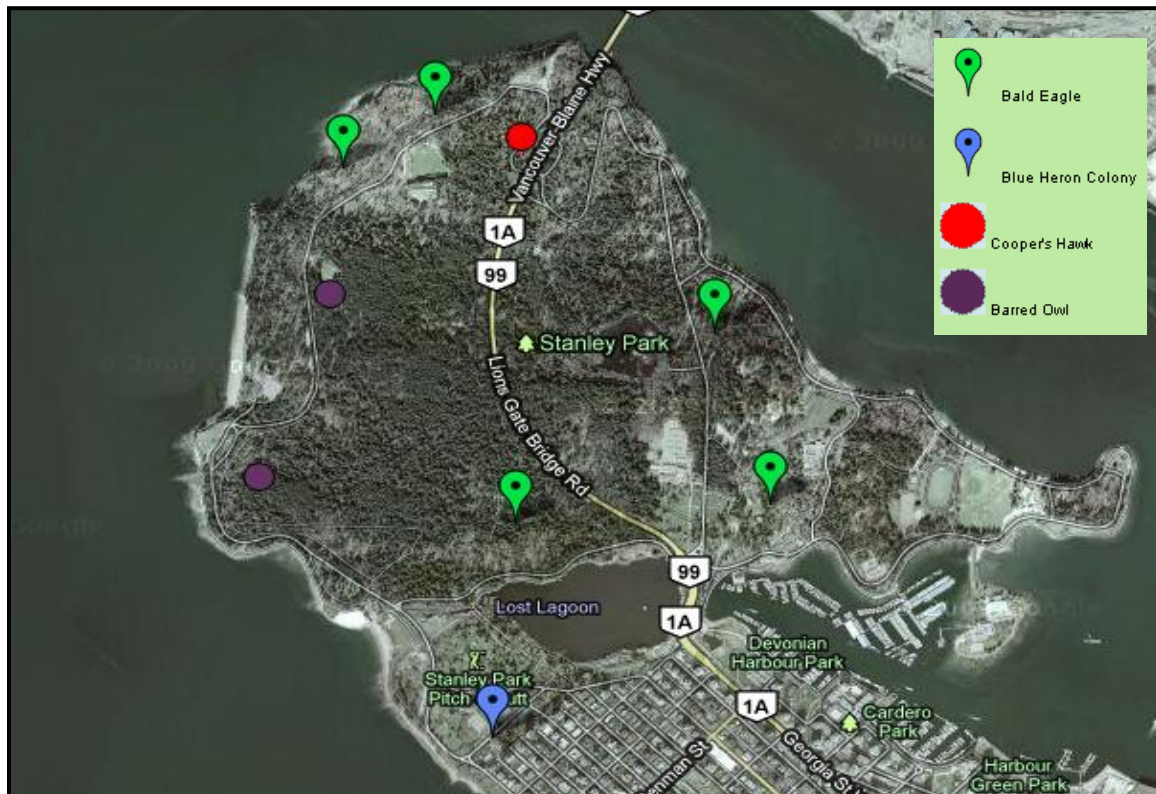


Figure 5.6: The Mapping Programs in Stanley Park

This map illustrates the nesting sites in Stanley Park (Map from SPES)

5.3.5 Conservation Programs

The SPES created conservation programs in 2007 to meet the increasing awareness of the importance of Stanley Park's ecosystems. The conservation programs play an important role in improving biodiversity in Stanley Park through invasive plant control, biological research, wildlife monitoring, and mapping (SPEC 2009b).

The wildlife monitoring programs gather wildlife information to help guide long-term ecological management through field photography and regular surveys. Beginning in 2004, eagle and heron monitoring programs have

conducted nest observations and monthly bird counts. In 2007, the conservation programs started to survey breeding birds, amphibians, nocturnal owls, and species at risk in Stanley Park with the help of dedicated volunteers and professional biologists.

To provide knowledge about Stanley Park wildlife and its associated habitat, the SPES carries out various biological research projects. The research projects facilitate partnerships with local universities, environmental consulting companies, and many other community organizations. The Society encourages local universities to participate in research relevant to the management of Stanley Park, so students' projects involve research regarding eagle nests, bird diversity, GIS mapping, and invasive species (SPES 2009b).

The society has created a visual database of Stanley Park using a geographic information system. Maps contribute not only to conservation program planning and activities, but also to creating a foundation for research and data collection in Stanley Park. The mapping programs gather and compile information on invasive plant species, wildlife habitat, environmentally sensitive areas, and species at risk habitat in Stanley Park (Figure 5.6). From 2008 to 2009, over 40 new map layers were created through the Stanley Park habitat surveys by 24 volunteers (SPES 2009b).

5.4 To Improve citizens' Well-being

Stanley Park offers a multitude of opportunities to enrich the quality of life for Vancouverites and tourists. The sports and recreational activities through the

Stanley Park's facilities help people to enhance physical and psychological well-being. By exercising regularly, interacting with other people, and contemplating themselves in the Stanley Park's natural environment, people can relieve their stress and improve their health.

Beyond the benefits of recreational and leisure activities, the environmental programs that the Stanley Park Ecology Society operates offer a multitude of opportunities to engage in nature and culture. Children who participate in the Stanley Park's various school programs learn about the importance of their local environment. Adults who participate in a variety of ecological and cultural programs benefit from the interactions between nature and people that are fundamental to their well-being. The Park Board does not have a specific Stanley Park management plan to improve the local resident's quality of life because the Park Board always works out for citizens' well-being. But the Park Board does have an overall vision that aims to keep Stanley Park a natural place for beauty, recreation, and exercise. So the Board refers to its vision whenever they carry out projects and deal with issues (Quinn 2010, Stephen 2010).

To improve people's quality of life, Stephen claims that the 8.8 kilometres of seawall, a path on the outside edge of the park along the seashore, is probably one of the most significant features for the local public (Personal communication, Jan. 21, 2010). Quinn also expressed that providing a safe place to come and enjoy the park is one of the most significant actions that can be done to improve the local residents' quality of life (Personal communication, Jan.

21, 2010). By operating a Park Ranger program, and having a mounted police squad in the park, the Park Board makes every effort to maintain safety. The major role of park rangers is giving information or providing a warning about the prohibited activities such as having a dog off leash, but they have limited power of arrest and can issue fines (Personal communication, Jan. 21, 2010). Thus, the Vancouver Police Department has a significant role in policing Stanley Park (Stephen 2010).

5.4.1 Park Services

Seawall Promenade

The Stanley Park Seawall, an 8.8km walkway around the perimeter, was mostly built in 1917 initially to stop shore erosion caused by the wakes of passing ships and the constant hammering waves. Later the last portion of the seawall in the northwest section of the Second Beach was completed in 1980, and the Seawall became the most popular place in the park as a major pedestrian corridor around the park.

The Park users' survey conducted by the Stanley Park Task Force showed that the top three features were the seawall (80.9%), wildlife (70.4%), and the forest (69.2%) (Stanley Park Task Force et al. 1992). Stephen concurred that the most significant feature for the local public's well-being was the seawall (Personal communication, Jan. 21, 2010).

Away from cars, the unobstructed view of Coal Harbour, Burrard Inlet, the North Shore, the Coast Mountain Range, and English Bay, gives people

unforgettable sights. To maximize enjoyment and convenience, the Seawall is connected with other pathways. As a major recreational corridor, the Seawall provides cultural resources offering visitors a place to jog, walk, rollerblade, and ride a bicycle. Sometimes cyclists and pedestrians together create dangerous situations, so some visitors consider the seawall unsafe; however, they do not want to prohibit cycling on the seawall (Stanley Park Task Force et al. 1992). For the safe usage of this corridor, the seawall should be modified so that pedestrian and cycle traffic are separated.

Sports Facilities

Stanley Park provides a variety of sports facilities. To offer convenient access, most of the sports facilities, including tennis courts, lawn bowling club, pitch & putt golf course, yacht club, and rowing club, are located only a few minutes walk from the downtown core. Under lease agreements with the Park Board, the facilities are operated largely by non-profit organizations (Vancouver Park Board 2010). Example of the sports facilities are the Vancouver Rowing Club, tennis courts, the Lawn Bowling Club, the Brockton Oval athletic fields, Pitch & Putt Golf Course, and the Royal Vancouver Yacht Club (Vancouver Park Board 2010).

Founded in 1886, the Vancouver Rowing Club is housed in a Heritage Building built in 1911, and the club sports now include rowing, rugby, cricket, yachting, jogging, tennis, and field hockey (Steele 1993). Stanley Park tennis courts are located in two places, which are free on a first-come, first-served basis.

However, during the summer season six of the 17 courts at the Beach Avenue entrance are operated as pay courts (Vancouver Park Board 2010). Located next to the Vancouver Park Board, the Stanley Park Lawn Bowling Club has providing the elderly with a great social and team-building activity since 1919 (Steele 1993). The Brockton Oval athletic fields offer the site of not only outdoor running track and field events, but also an indoor playing field and field house. Also, for public special events, the Brockton Cricket Pavilion can be rented (Vancouver Park Board 2010). Suitable for all ages with 18 holes ranging from 40 to 100 yards, Pitch & Putt Golf Course and Putting Green offers sculpted fairways, mature trees and lush greens surrounding the Rhododendron Garden (Vancouver Park Board 2010). Since 1905, the Royal Vancouver Yacht Club has provided opportunities to participate in sailing programs, boats, races, and family cruises (Royal Vancouver Yacht Club 2010).

Recreation Facilities

Beside sport facilities, Stanley Park's diverse recreation facilities provide an opportunity for visitors to experience the balanced relationship of natural and cultural values. The recreation facilities include Vancouver Aquarium (described above), Theatre under the Stars, picnic areas, Miniature Train, pools, playgrounds, and Children's farmyard. As Canada's largest aquarium, it provides not only the display and interpretation of the aquatic life, but also community programs, special events, and hands-on education programs, so visitors can have a unique opportunity to explore and learn about the rich marine life

(Vancouver Aquarium 2010). An outdoor theatre in Stanley Park, Malkin Bowl, was built in 1934. Since 1940, one of Vancouver's largest musical theatre companies, Theatre under the Stars, has been delighting audiences from around the world with musical theatre productions at Malkin Bowl in Stanley Park during the summer season (Theatre under the Stars 2010). Stanley Park offers seven picnic areas that provide space for a variety of occasions such as family reunions, getting the neighbours together, or children's birthday parties (Vancouver Park Board 2010). Created in the fallen trees place by Typhoon Frieda in 1963, the Miniature Train, one of Vancouver's most popular attractions, carries over 200,000 passengers per year in a picturesque journey through the forest (Vancouver Park Board 2010). Stanley Park's three beach pools boast one of Vancouver's best views, and offer bathers an opportunity to watch bald eagles wheeling overhead. Also, the second beach pool has a waterslide and other more adventurous special features (Vancouver Park Board 2010). Vancouver's largest outdoor spray facility, the children's Water Park, offers the best way to put a smile on children's faces during the summer. Built in 1982, the Children's Farmyard is home to over 100 farm animals, including exotic birds, reptiles, snakes and spiders. In some holidays, such as Halloween, Christmas, and Easter, the Farmyard provides more special seasonal events for visitors.

Amenities

Convenient services of the park allow park users to enjoy their leisure time to the fullest. Stanley Park provides many convenient services such as

horse-drawn carriage rides, a free shuttle bus, and food concessions. However, unlike other major urban parks in the North America, Stanley Park does not offer free wireless internet services for park users. The park users can use the wireless internet services near a building in the park, but the service is not available in the most areas of the park. Robertson also explained that Stanley Park is a large park, so a few areas, less than 1% of the park, do not have any cell phone coverage (Personal communication, Mar. 9, 2010).

Stanley Park allows visitors to access to the park conveniently with public transportation. Visitors can go into Stanley Park using the public transit, # 19 buses, and get off at the terminus near the Stanley Park Pavilion. To help visitors get around Stanley Park, the Park Board operated a free Stanley Park Shuttle Bus during the 2009 summer, but the Board is reviewing the service to determine whether they will continue the service this summer (Stephen 2010). However, visitors can tour inside the park using the city tour buses or the horse-drawn carriage.

Park visitors can enjoy a wide variety of foods with natural scenery of the sea and mountains at several food concessions in Stanley Park. According to the park user survey from the Stanley Park Task Force, the majority of the respondents felt that Stanley Park had enough commercial facilities, like the food concessions, and they opposed the expansion or reduction of the facilities (Stanley Park Task Force et al. 1992).

Visitors can discover many hidden aspects of Stanley Park in thirty-six various locations within Stanley Park, through the distinctive, illustrated Legacy

Interpretive Panels which were installed in September 2008 (Vancouver Park Board 2010).

5.4.2 Educational and Volunteer Programs

School Programs

The most popular education program in Stanley Park is the school program designed especially for preschool students up to grade seven (Figure 5.7). The hands-on ecology programs connect students with the natural world and inspire environmental stewardship. In the spring and autumn, many students participate in the environmental programs in Stanley Park, but in the winter when the school requests the programs, the SPES visit the school and operates the environmental programs indoors (Thomson 2010). One of the grade seven students explained in the SPES annual report “The whole experience was spectacular, but one of the things that I enjoyed the most was just being out in nature and being a part of it. It was a very inspirational and educational experience (SPES 2009b).”

The SPES teaches not only students, but also school teachers, with a specially designed CD-ROM called Urban Stewards, which contains detailed hands-on lessons, easy to implement action projects, and teacher tips. Also, to give teachers ideas and to assist them, the Society has held teacher workshops that provide teachers an opportunity to practice specific activities (SPES 2009b).

The Vancouver Aquarium also has been offering the school programs since its opening in 1956. Through the hand-on activities, students have an

opportunity to observe and handle live animals with the help of trained volunteer educators. The programs also provide teacher with useful materials and resources to support students in fostering a sense of interest in scientific investigation. The resources include various educators' guides, sustainability and stewardship initiatives for elementary school students, and conservation in action (Vancouver Aquarium 2010).



Figure 5.7: School Programs in Stanley Park
(Photo from SPES)

Public Programs

SPES provides diverse public programs that offer participants memorable experience and encourage urban ecological conservation and stewardship. Some examples of public programs include Stanley Park Environmental Art Project, Book a Discovery Walk, Discovery Walks, Birding in Stanley Park, ESL Wildside Walks, Eco Rangers, Special Evening Programs, Coyote Walks and Events, Overnight Adventures, Young Naturalist's Club, and

Birthday Parties (Figure 5.8) (SPES 2009b). A monthly event, Young Naturalist's Club, includes hiking, games, wildlife observation, and outdoor art, focusing specifically on very young children. Through the young naturalists, their parents often participate in the program, so it becomes a family event (SPES 2009b).

After the 2006 windstorm, the Stanley Park Environmental Art Project was born to respect the park as a special place in the core of Vancouver and to show the coexistence of human and nature. Using only natural materials, six talented artists created artworks that engage people through discussion and hands-on workshops. The SPES provides the public with guided walks that explore the artworks to inform and interpret the natural surroundings (SPES 2009b).



Figure 5.8: Public Programs in Stanley Park

(Left: Photo from SPES)

Figure 5.9: Volunteer Programs in Stanley Park

(Right) Eco Rangers helping with trailside weed removal at Lost Lagoon (Photo from Jillayne Peers)

Eco Rangers program, a volunteer training program, provides the participants opportunities to learn about ecology, but also public education and interpretation skills through hands-on experience. Also, the park visitors are served and gain a better understanding of the natural and cultural history of Stanley Park from the Eco Rangers (SPES 2009b). Thomson revealed that the public programs have an important role in enhancing people's well-being, saying that participants often say that they learned a lot and feel really good because they could contribute to Stanley Park (Personal communication, Jan. 21, 2010).

Volunteer Program

Volunteers play a key role not only in operating various programs, but also in improving Stanley Park's infrastructure. The volunteers perform a variety of duties, such as removing invasive species, maintaining the native plant garden, assisting the public at the Nature House, monitoring the species, roaming the park as Eco Rangers, updating the SPES website, and creating new volunteer training materials (SPES 2008b, 2009c). During the year of 2008~2009, 1,516 dedicated volunteers and 14,876 hours contributed to the stewardship works of Stanley Park through SPES. Their annual report clearly demonstrated that through these dedicated volunteers who have brought experienced skills and energy, SPES has gained considerable advantage (SPES 2009c).

5.5 Summary

In this chapter, I examined Stanley Park in Vancouver, Canada through the data collected from the interviews, official documents of the park, and field research in the same way as I did Seoul Forest Park. The results illustrate that the governance of Stanley Park encourages biodiversity conservation as well as local residents' quality of life by restoring the forest from the storm damages, establishing the Forest Management Plan, and providing various facilities for park users. Moreover, the data prove that the community-based stewardship group SPES plays an essential role in preserving park ecosystems and providing a wide variety of park programs to promote citizens' well-being.

In the next chapter, I will interpret the data and analyses as they apply to the research questions. After that, I will suggest some practical recommendations that can be applied not only for Stanley Park and Seoul Forest Park, but also other city parks to contribute a framework for decision-makers with effective guidelines for biodiversity conservation and human well-being.

Chapter 6 Discussion and Conclusion

This chapter provides an interpretation of how the data collected through my interviews relate to my research questions and how the findings relate to those from the literature. By integrating my interview data, field research, and personal experience in city parks with the theories derived from my literature review, I address my research questions.

After the data analysis discussion, there are two sections in which I make recommendations based on the findings of the study. Section 6.2 makes recommendations for Seoul Forest Park. Section 6.3 suggests recommendations for Stanley Park. Following these recommendations, Section 6.4 outlines limitations of the study. Section 6.5 explains the limitations and makes suggestions for future research. Finally, the conclusion section summarizes the key research findings in this study.

6.1 Responding to the Research Questions

In order to examine successful strategies to improve biodiversity and human well-being in urban parks, I investigated how community-based stewardship and governance of urban parks benefit both biodiversity conservation and local residents' quality of life, as my primary research question. I also conducted research into: 1) how governance and operations encourage biodiversity; 2) how governance and operations encourage citizens' quality of life; 3) how stewardship groups have improved biodiversity and local residents'

quality of life in city parks; and 4) what some problems in managing urban parks are. These secondary questions are in fact addressing the larger primary question.

6.1.1 How do governance and operations encourage biodiversity?

Regional Government Strategy

In order to establish effective biological conservation and enhancement zones, a connected and biologically diverse network of habitats is required (Metro Vancouver 2008). Therefore, at the regional level, both Vancouver and Seoul show regional collaboration by providing strategic guidelines for biodiversity preservation. Metro Vancouver enacted the Strategic Directions for Biodiversity Conservation in the Metro Vancouver Region in 2008 through the partnership of government agencies, municipalities and conservation groups (Metro Vancouver 2008). This Strategic Directions for Biodiversity Conservation provides a strong framework to improve biodiversity by demonstrating strategically ten directions to clarify and guide implementation. The Seoul Green Bureau also established the Ecological Restoration Guideline to improve biodiversity of Seoul in 2005 (Seoul Green Bureau 2005). The Guideline emphasizes the importance of biodiversity conservation and provides ecological restoration strategies to improve urban biodiversity. While the Strategic Directions for Biodiversity Conservation by Metro Vancouver focuses on its vision and action plans, the Ecological Restoration Guideline by Seoul Green Bureau

emphasizes the restoration theories and practices for detailed designs, which can be applied for various urban ecosystems.

Effective Plans

As the previous chapters demonstrated two city parks have various park management plans to improve urban biodiversity. Ian Robertson, a Vancouver Parks Board Commissioner, commented that unquestionably the most commendable plan to preserve or improve biodiversity in Vancouver Parks was the 2007 Restoration Plan (Personal communication, Mar. 9, 2010). The Plan played an important role in identifying the Stanley Park forest's vision and fostering a resilient forest with a diversity of native trees and other species and habitats (Vancouver Board of Parks and Recreation 2007c). Another praiseworthy plan in Vancouver is the Stanley Park Forest Management Plan (Vancouver Board of Parks and Recreation 2009c). The Plan has long-term forest management strategies and incorporates diverse in-depth management plans to improve the park's ecosystems such as invasive species management, wildlife management, and forest fire control. The Forest Management Plan provides guidelines for how to manage the park and contributes to preserving and improving biodiversity while managing the forest.

Similarly, Seoul Forest Restoration Plan contributed to realizing the desirable accomplishment of restoring an ecological forest in the city. Jongsang Lee, an Assistant Mayor for Infrastructure Management when Seoul Forest was being restored, stated that the Seoul Forest Restoration Project is a new model

for a desirable urban park in the 21st century created by a wide range of collaboration between local communities, companies, and citizens (SMG 2006). However, this research demonstrated that unlike Stanley Park, Seoul Forest Park's management plans, such as the Replanting and Green Area Improvement Action Plan and the Wildlife Management Plan do not include long-term guidelines to improve the park's ecology (Seoul Forest Park Management Office 2010c, 2010d). The plans are aimed at one-time implementation efforts, so the Seoul Forest Park Office establishes their management plans either every year or before they carry out specific projects. Although Seoul Forest was restored via the commendable restoration plan, without detailed long-term management strategies, the forest could not be sustained for the long term.

Actions to Improve Biodiversity

- **Monitor Wildlife**

Monitoring ecosystem threats is mandatory to establish priorities for biodiversity conservation and optimization of resources. In order to improve biodiversity, Bill Stephen argued that ceaseless efforts during the restoration to create more levels of ecological succession in the areas with newly planted trees is the most significant action that can be done in Stanley Park (Personal communication, Jan. 21, 2010). In the case of Seoul Forest, the most significant step to improving biodiversity in Seoul Forest is having a mature wooded forest because the trees in Seoul Forest are still young (Hyunhee Kang 2010). Therefore, both parks should be regularly monitored for changes in vegetation.

Also, ecological monitoring is essential to control invasive species in urban parks. Both Quinn and Thomson stated that if they could control invasive species, Stanley Park would have much more diverse vegetation (Personal communication, Jan. 21, 2010).

- **Protect from Development**

When parks are developed for recreational purposes, ensuring the protection of biodiversity is also necessary. Robertson stated that keeping a balanced relationship of natural and cultural values is one of the biggest challenges to improving biodiversity in urban parks. He explained that Vancouver Park Board had to cut down 50 trees that obstructed the view of the city in order to keep a tourist attraction in Queen Elizabeth Park (another prominent urban park in Vancouver). Thus, they replanted some trees two to one in another section of the park to provide wildlife habitat (Personal communication, Mar. 9, 2010). Another example of this can be found in Seoul Forest Park. Some sports groups required Seoul Forest Park Office to build a gymnasium for badminton. They convinced the Seoul city council and secured a \$0.6 million budget for the construction of this gymnasium in 2007. However, after careful research on the potential environmental impacts of this construction, the park office withdrew the original proposal. Persuading the sports groups and city council to abandon the gymnasium project was extremely difficult, but protecting 20 big trees was judged as much more important than building a sports facility (Seoul Forest Park Management Office 2007).

- **Green Spaces Network**

Moreover, linking green spaces between urban parks and other open spaces is crucial to preserve and improve biodiversity in urban areas (Erickson 2006, Rudd et al. 2002, Benedict and McMahon 2006). Fragmentation reduces the ability of the remaining habitats to support wildlife and plant communities that need larger, interconnected habitats to complete their lifecycles. Fragmentation also makes individual species less adaptable to changes in water, food, or shelter availability. Along the edge of Stanley Park, the Vancouver Park Board installed a greenway to connect the waterfront from the convention centre on Burrard Inlet to False Creek, past Granville Island, and Kitsilano Beach Park. However, a causeway, which comprises three traffic lanes of paved road through the middle of the park, effectively cuts the natural habitat of the park into two distinct parts. The disconnected areas causes a considerable barrier to mammals, reptiles, amphibians, and occasionally birds, including geese and ducks in eclipse plumage during molting and family units with young broods (Vancouver Board of Parks and Recreation 1992).

As contrasted with Stanley Park, two fragmented areas of Seoul Forest Park divided by major roads were connected during the Seoul Forest Restoration work in 2004-2005 by two eco-corridors that encourage wildlife movement (Figure 6.1). Along the eco-bridges, Seoul Forest connects two natural waterways, the Hangang River and the Jungnangcheon Stream, so this area provides a healthier and safer environment for fish and other wild animals.



Figure 6.1: An over pass type eco-corridor in Seoul Forest Park

6.1.2 How do governance and operations encourage citizens' quality of life?

Management Plan

Establishing appropriate park management plans is significant not only for conservation of biodiversity, but also for citizens' well-being. As mentioned in chapter 4, to provide park users with appropriate park services, every year the Seoul Forest Park Management Office reviews their detailed management plans and revises them appropriately for the year (Lee Munju 2010).

Pieter Rutgers stated that unlike the regional park system, municipal parks give greater emphasis to citizens' quality of life than biodiversity conservation (Personal communication, Mar. 9, 2010). However, according to a supervisor in Stanley Park, Brian Quinn, Stanley Park does not have a specific management plan for citizens' well-being because the Park Board is always striving to improve visitors and citizens' quality of life (Personal communication,

Jan. 21, 2010). Thus, when they carry out projects and deal with issues, the Park Board refers to the Stanley Park vision .

Actions to Improve Citizens' Well-being

- **Expand More Green Spaces**

As a manager of planning and research on the Vancouver Park Board, Tilo Driessen, pointed out, all activities carried out by local governments are intended to enhance residents' quality of life (Personal communication, Mar. 9, 2010). Among numerous projects, this research demonstrates that increasing green space is the most significant contribution to citizens' quality of life in both cities. In Seoul Parks, a Seoul Parks advisory committee, Choonghyeon Oh, stated that the Expanding Parks within Residential Areas project is the most praiseworthy project to improve citizens' quality of life. He emphasized that providing more neighbourhood parks is the most important means for improving citizens' well-being (Personal communication, Feb. 25, 2010).

Likewise, a Vancouver Park Board Commissioner, Robertson, argued that having a certain amount of green space is the biggest thing that can be done to improve the quality of life for Vancouverites. In order to do so, the Vancouver Park Board has a goal that ensures 2.75 acres of green space per 1000 people (Personal communication, Mar. 9, 2010).

- **Provide Various Park Programs**

This study has shown that various cultural and educational programs provided by city parks play a vital role in improving citizens' quality of life. Two

similar community-based stewardship groups in Stanley Park and Seoul Forest Park clearly prove that connecting people with nature and culture by providing educational programs for citizens is important role that parks can play. In the case of Seoul Forest Park, a manager of facilities in Seoul Forest Park, Munju Lee, pointed out that the most significant action that can be taken to improve local residents' quality of life is providing more environmental learning areas (Personal communication, Feb. 8. 2010). A Seoul Parks advisory committee, Choonghyeon Oh argued that establishing a community center in Seoul Parks is significant to improving citizens' well-being (2010). Moreover, Kang argued that even though Seoul Forest Park provides various educational places and programs, the park office is striving to offer a larger variety of programs for citizens' well-being (Personal communication, Feb. 5, 2010). Stanley Park also offers a multitude of opportunities to learn about nature through the environmental programs that the SPES operates.

- **Security to Enjoy Parks**

In managing city parks, security for park users is one significant action that can be action. A supervisor of Stanley Park Management, Brian Quinn explained that to improve citizens' quality of life, maintaining Stanley Park as a safe place is very significant (Personal communication, Jan. 21, 2010). Therefore, the Park Board has park rangers to help park users find information and control dangerous activities. The Vancouver Police Department also plays a significant role in policing Stanley Park (Stephen 2010).

In contrast to Stanley Park, five security guards from a security service company assure a safe park environment by working in Seoul Forest 24 hours per day, all year round. In addition to this security service, Seoul Forest Park operates a program called Safe System for children that provides a position-tracking service (Lee Munju 2010). As a consequence, both city parks realize the importance of security in parks and provide special security programs for park users' well-being.

- **Listening to Park Users**

Listening to citizens' opinions is a highly significant action that can be done to improve citizens' well-being in Vancouver Parks, said a Director of Planning and Operations in the Vancouver Park Board, Pieter Rutgers (Personal communication, Mar. 9, 2010). For this reason, the Vancouver Park Board hears a lot of opinions through wide open forums and presentations, the park commissioners' weekly meetings, and surveys from their webpage. Bill Stephen explained that the Park Board is doing well at assimilating meaningful public suggestions (Personal communication, Jan. 21, 2010). However, the Board does not have recent information pertaining to park users' general level of satisfaction.

For the same reason, the Seoul Green Bureau surveys park users every year in major Seoul Parks to listen to public opinion. By doing so, the Seoul Parks system can contribute to improving citizens' well-being (Seoul Green Bureau 2009). In addition to this surveying, the Seoul Forest Park Office listens

to citizens' suggestions through an email link on their webpage, telephone calls, personal visits, or letters and applies these suggestions everyday all year round.

Comparing these two city parks, this research discovered differences in strategies for listening to the public. While Stanley Park Management Office does not absorb citizens' opinions on day-to-day management positions (Quinn 2010), Seoul Forest Park Management Office implements useful public suggestions day by day after careful reviewing (Lee Munju 2010).

- **Provide Advanced Park Services**

As observed earlier in the literature review, urban parks need some changes to maximize park users' satisfaction. To provide excellent park service, the Seoul Forest Park Management Office and Seoul Forest Park Conservancy provide various convenient services for park visitors beyond the basic functions of an urban park. Some good examples of these services are wireless Internet access, the Ubiquitous Health Check System, disabled-friendly playgrounds and garden, a baby care room, baby carriages, and wheelchairs. Park users have access to all of these services without any payment. The Seoul Forest Park Office continues their efforts to offer increasing cutting-edge services for park users.

However, by contrast, no such advanced services are yet found in Stanley Park. The park only provides some amenities to allow park users to enjoy the park such as horse-drawn carriage rides, a free shuttle bus, and food

concessions. It is unclear whether these differences result from different levels of resourcing, and older infrastructure, or a combination of these factors.

6.1.3 How have stewardship groups improved biodiversity and local residents' quality of life?

Present Role and Future Plans

In this research, as has been mentioned in the previous chapters, community-based non-profit organizations, especially SPES and SFPC, play a significant role in promoting stewardship work in each city park. From the planning stage of Seoul Forest Park a community-based non-profit organization, Seoul Green Trust, has participated in various activities, such as the park design, fundraising, and tree planting that contribute to ecological restoration in the park. Later, SFPC was created from the Seoul Green Trust. The Conservancy facilitates connections between citizens and the city government through a variety of stewardship activities, such as visitor service, volunteer projects, environmental education, event management, fund raising, and public outreach (SFPC 2010). SPES also clearly illustrate their role in their mission statement, "SPES promotes awareness of and respect for the natural world by providing a leadership role in the stewardship of Stanley Park through collaborative initiatives in education, research, and conservation" (SPES 2010). Thomson explained that through these activities, the Society strives to increase the health and ecological integrity of the park (Personal communication, Jan. 21, 2010). In brief, this

research found that a major role of SPES in Stanley Park is closely analogous to that of SFPC in Seoul Forest Park.

However, there is one major difference between the two in their roles in ecological restoration – SFPC mainly planted trees during the restoration and SPES mainly removes invasive species. Also, there are some differences in their stewardship activities. First, while SPES operates all educational programs in Stanley Park, Seoul Forest Park provides programs through two channels, the Park Management Office and SFPC. Second, SPES offers information to the Park Board to identify where the Board should focus their efforts in order to enhance the park's ecosystems (Quinn 2010). In contrast to SPES, in terms of preserving and improving park biodiversity, the Seoul Forest Park Office and SFPC do not collaborate with each other even though the Park Office subsidizes 50% of SFPC's revenue every year. Lastly, the most prominent feature of SPES's programs is that the Society operates their environmental programs not only in Stanley Park, but also at schools when requested. In addition to this, SPES educates school teachers by providing workshops and an informational CD-ROM called Urban Stewards (Thomson 2010).

Problems in Managing Stewardship

As we have seen, the Vancouver Park Board and SPES have a strong partnership. By contrast, the relationship between the Seoul Forest Park Office and SFPC faces some challenges. One important problem is that the Joint Operating Agreement between the Seoul Metropolitan government and SFPC is

in conflict unless the Seoul City Park by-law is revised. Thus, SFPC is faced with the unexpected difficulty that the Conservancy may not keep working in Seoul Forest Park after 2012 (Lee Keunhyang 2010). In addition to this challenge, the limited role of SFPC is changing because the Seoul Forest Park Office is now directly operating new environmental programs and special events, which were originally the Conservancy's role.

In this study, another predicament between local governments and NGOs can be seen in Stanley Park. Both SPES and the fundraising department in the Park Board encourage donors to give to Stanley Park. However, the fundraising department asks SPES to incorporate their fundraising events in donor tours where they are highlighting Stanley Park's conservation work. After the Society shows the potential donors their accomplishments, any donations go towards the Park Board not SPES; people give to the Park Board, and assume that the Society is one in the same. As a result, SPES experienced financial difficulty during the restoration work in 2007~2009 (Thomson 2010). Thomson also revealed that the most difficult challenge to managing stewardship work in Stanley Park is insufficient staff. She stated that the SPES needs more staff to administer their role in the park efficiently (Personal communication, Jan. 21, 2010).

6.1.4 What are challenges in managing urban parks?

As noted earlier in chapter 5, there are many challenges in managing Vancouver Parks, such as homeless people, increased human activities, and

budget crunches. In this chapter, I compare the biggest challenge in managing these city parks. In the case of Vancouver Parks, the main obstacle to operating their parks is a limited budget (see chapter 5). Although the City of Vancouver provides a budget for the Vancouver Park Board that creates challenges for administering their parks. Therefore, the fundraising staff in the Vancouver Park Board encourages people and organizations to donate funds for park supplies, and other features (Quinn 2010). This mix of public and private funding works in principle, but there is a perception that the present combination is not providing sufficient resources.

On the contrary, thanks to having a sufficient management budget, the Seoul Green Bureau does not need to encourage citizens to donate funds to help operate the Seoul Parks. This means that the Seoul Forest Park Office does not rely heavily on SFPC's activities. A difficult problem in managing the Seoul Forest Park is the park users' reduced satisfaction during the peak season. Because many citizens visit Seoul Forest Park in the summer, the Management Office cannot provide adequate park service for all park visitors (Lee Munju 2010).

6.2 Reflection on Ecological Restoration in Urban Parks

The framework of ecological restoration, with its holistic emphasis on protecting biodiversity and human well-being, offers a good model for managing urban parks. Parks located in heavily-urbanized areas face enormous visitation pressures, and this is certainly the case for both Seoul Forest Park and Stanley

Park. The intensity of use can deflect our intentions away from ecological goals: the urgency of meeting human needs and wants displaces the importance of protecting islands of biodiversity. Restoration helps us realize that benefits flow in both directions. People are enlivened by having functioning native ecosystems in cities, a fact that is well demonstrated in the literature on urban parks (see chapter 2). But, the reverse is also true: effective stewardship can protect and restore ecosystems. Thus, all activities can be measured against the benefits to biodiversity, human well-being, or both. For example, installing wireless internet in Stanley Park might end up being simply a convenience for Park visitors and bring little benefit to biodiversity. Done well, however, it might draw more people to the Park who grow to appreciate the importance of quiet, contemplative places and ultimately rise to the defence of biodiversity. If ecological restoration is used effectively in managing urban parks, a constant and creative relationship between biodiversity and human well-being will be realized.

What triggered the Seoul Forest Park restoration and Stanley Park restoration were different. While Seoul Forest Park restoration was initiated to enhance the city's environment despite the temptations for a number of urban development opportunities, Stanley Park restoration was launched to recover the damaged areas from three major windstorms. However, in terms of the approaches to ecological restoration, two city parks were very similar. Their restoration objectives and plans were excellent. They carried out their restoration works to enhance ecological integrity, to recover the unimpaired condition, to create wild design beyond conventional ecological design, building strong

connection between ecology and culture. They tried to restore resilient forests by planting a diversity of native trees and establishing natural habitats for wildlife. In addition, their restoration processes were similar in that their implementation procedures were commendable. They identified natural value of the parks, defined their problems, developed restoration goals and objectives, and established appropriate plans. The two cities also implemented their restoration work in company with individual citizens, corporations, and community groups. Therefore, Seoul Forest Park restoration and Stanley Park restoration works can be good ecological restoration models in urban parks.

However, the Seoul Forest Restoration Project faces the challenge of establishing a mature restored ecosystem. Because the then mayor of Seoul tried to finish the project while he was in the office, some trees that could not be supplied at the original planting time had to be replaced by other trees, which included non-native trees. In addition, although the soil in some parts of the land used as a horse-racing stadium for a long time was exchanged during the restoration work, the ground still contained some salinity (Kang 2010). Consequently, the Park Management Office had a hard time replanting approximately 30,000 trees after the park was opened (Seoul Forest Park Management Office 2008).

In the case of Stanley Park, while the causeway linking through the forest to Georgia Street became a major provincial highway and an important commuter route for servicing the metro city, it was a disaster for the park ecosystems. Dividing the core of Stanley Park in half forever, three traffic lanes

of paved road effectively cut the natural habitat of the park. The fragmentation caused a considerable barrier to wildlife movement and survival (Vancouver Board of Parks and Recreation 1992).

6.3 Recommendations for Seoul Forest Park

Establish the Forest Management Plan

Establishing the forest management plan is essential to developing healthy forested ecosystems. Although the Seoul Forest Restoration Project was successfully completed by a range of collaborators (Seoul Metropolitan 2006), the limited time for the restoration work caused some negative side effects for some of the revegetation (Park 2006). Seoul Forest Park Management Office has had a hard time replanting the withered trees every year by the Green Area Improvement Action Plan. However, the plan regrettably does not have a detailed long-term forest management strategy to be a resilient forest focused on the tasks that should be done each year. Therefore, conducting site analyses, making specific prescriptions, and developing a long-term management strategy are mandatory to preserve and enhance the function of the urban forest.

Wildlife Monitoring and Mapping

Seoul Forest Park should be regularly monitored for changes in wildlife. Ecosystem monitoring is necessary to establish priorities for biodiversity conservation and optimize resources. Currently, only a few wildlife monitoring projects have been conducted in Seoul Forest Park by SFPC simply because the forest is still in an early stage of forest succession. However, to improve the

biodiversity of Seoul Forest, continuous wildlife surveying is required and the results should be applied to the park management. Also, based on the monitoring results, development and integration of computer mapping by geographical information systems is required to the efficiently manage ecosystem information. Mapping information can be used as an important tool to integrate knowledge about biodiversity into the planning process and green spaces maintenance.

Advancing Partnerships

By revising the Seoul Urban Park By-law, the Seoul Forest Park Office should reestablish effective and integrated working relationships with SFPC. As observed through this research, cooperation and coordination with community-based stewardship groups provides maximum public benefits. According to the Stewardship Centre for BC Society, stewardship programs are ideally based on long-term commitments. That is one of the Governments' Responsibilities for Stewardship (Stewardship Centre for BC Society 2010). Good examples can be found in Stanley Park and Central Park in New York City. One of the important factors that make both of these city parks so successful is the good relationship between the city and the private conservancy.

Integrate Park Program Operations

The operation of Seoul Forest Park programs should be integrated under one organization. According to the Joint Operating Agreement between the Seoul Forest Park Office and SFPC, the Park Office manages park's facilities and

property, and SFPC operates educational programs and public relations activities. However, to provide ample opportunities for citizens, the Park Office also designs and offers special events and programs for citizens. This causes confusion for the stewardship workers, as well as to participants. To increase the efficiency of the park programs operations, following the Joint Operating Agreement promises good results.

Operate the Community Center and Park Program

The new community center in Seoul Forest Park should be actively operated. After the cafeteria was newly remodelled, only a few events and exhibitions have taken place in the community center. Establishing a community center in Seoul Parks is significant to improve citizens' well-being. Offering meaningful programs and services provided by community centers promotes a full range of cultural and environmental needs. Therefore, the center should be used dynamically as a community meeting and recreation place.

6.4 Recommendations for Stanley Park

Connect Fragmented Areas

The two divided sectors of Stanley Park should be connected with wildlife crossings by establishing overpass or underpass eco-bridges. Cutting the middle of the park, the three traffic lanes of paved causeway causes a considerable barrier to wildlife movement. By linking these two separated areas, individual species can be more adaptable to changes in water, food, or shelter

availability. Consequently, the corridor would contribute to the improvement biodiversity of Stanley Park. The plan requires a large budget. However, by persuading other people with convincing scientific data, this plan can be realized, and the condition of Stanley Park will be enhanced.

Survey Park Users Satisfaction

Knowing the level of park user's satisfaction provides meaningful data for park management. Although the Vancouver Park Board hears a lot of opinions through wide open forums, the park commissioners' weekly meetings, and surveys from their webpage, the Board does not have recent information of park users' satisfaction. By finding out the level of users' satisfaction, the Park Board can make priorities to improve the park management system, which eventually can contribute to enhancing citizens' well-being and biodiversity. These results also can make a strong case for requesting increases in the park budget. Furthermore, continued observation can provide critical information for understanding spot trends.

Provide High Technology Service

Providing technological service is important not only for citizens' quality of life, but also for the status of Stanley Park, as one of the renowned city parks in the world. For example, accessing the Internet, the health check system, and safe system for children contribute to park user's well-being. These also involve an increase in budget, but in case of Seoul Forest Park, partnership with other

city government departments, enabled to set up these technological services without any financial support from the Parks Division.

Maximize Available Budget

This research found that the most difficult challenge of Stanley Park is a limited budget. Apart from increases in the Park Board's funding, there are several other mechanisms to maximize available funding of Stanley Park. One idea is to sell advertising. Many cities are accepting advertising and facility naming in return for contributions, gifts, and fees. The new amateur sports stadium on New York's Randalls Island is named after financier Carl Icahn, who gave \$10 million. In Chicago's new Millennium Park it was impossible to avoid the names of corporate donors – from Tribune Rink to Wrigley Square to SBC Plaza to Bank One Promenade to BP Bridge to Exelon Pavilion. Another suggestion is to put concessions up for open market bidding. Through competitive bidding, annual concession income can be increased. A good example of this was already demonstrated in New York City's Central Park. A third suggestion is to build partnership with all levels of governmental departments, NGOs, and community partners. A good relationship with partners allows a greater chance to maximize the available budget. A fourth suggestion is to encourage the public and professionals to provide innovative ideas for the park system. Even small incentives can help maximize available budget and contribute to budget reductions. For example, the Seoul City Government operates a suggestion system to improve Seoul's policies and provides monetary

incentives that result in voluntary participation of citizens and civil servants. Participants not only receive monetary incentive, but also get psychological incentive through the self-awareness of participating in policy development. Consequently, from 2006 to 2009, 55,000 ideas were introduced, and 147 ideas were adopted and implemented. The suggestion system continually contributes to budget reductions (SMG 2010).

6.5 Limitations and Further Research

6.5.1 Limitations

As with any research, there are some limitations to this study. My research adopted a case-study approach to conduct an in-depth analysis of restoration, governance, and community-based stewardship in two well-known city parks. Although this study compares and contrasts two city governments' effort to improve biodiversity and local residents' well-being, this research design limits the implications of the findings to these two city parks. A broad-scale research and analysis of biodiversity and human well-being strategies in urban parks would not have been possible in this research.

With regard to choosing the study areas, Stanley Park is one of the oldest city parks, opened in 1888, so the park has a fairly intact wood forest. However, Seoul Forest Park is newly opened park restored in 2005. Also, while Stanley Park is managed by the municipal government, Seoul Forest Park is operated by the capital city government. In terms of the administrative agency

and governance, the city park operated by Metro Vancouver is more appropriate. For that reason, I researched several parks managed by Metro Vancouver and visited Pacific Spirit Regional Park before I determined that Stanley Park was the most suitable park for this study. Fewer similarities had been found between Pacific Spirit Regional Park and Seoul Forest Park in the context of the purpose of this study. As a result, there are subtle differences between Stanley Park and Seoul Forest Park in terms of administrative and political structures, socio-economic situations, and community dynamics. And, of course, the ecosystems, biophysical conditions, and cultural realities are different across the two parks, which makes their direct comparison challenging.

Despite these differences, the reasons why I chose these two parks were that they are well-renowned city parks, recently the parks undergone restoration work, both parks involve community-based stewardship work, and city governments are putting extensive efforts into improving not only the park's ecosystems, but also the connections between nature and humans.

My study would of course have been strengthened by conducting interviews with park users, although doing this would have expanded the scope of my project beyond the requirements of a Master's thesis project. The insights from people who use the park would have allowed me to make stronger claims about how ecological and cultural values are weighed. My focus on park managers refracted an understanding of these values and likely produced some distortions in how we understand the importance of parks for those who use them. While seasoned professionals offer distinctive and important insights, they

cannot be substituted for a more general understanding of the way people use and understand parks. My own professional experience tends to reinforce this bias, although I was constantly aware of this bias and worked to appreciate it in my interpretations.

6.5.2 Recommendations for Further Research

The following recommendations for future research would extend the findings of this study. First, it is recommended that comparative research on other city parks in Metro Vancouver and Seoul city would uncover superior results for understanding biodiversity conservation and citizens' well-being. Next, additional research is needed to better understand what good ecological restoration in metro city areas is through the comparison of case studies. Some theoretical approaches of ecological restoration in urban areas have been applied. However, this comparative case studies method can be used to bring practical results that would be applicable to other cities.

Moreover, beyond city parks, further research is required to find better solutions for preserving and improving biodiversity and citizens' quality of life in urban areas, particularly by comparing major metropolitan cities in the world. Through such comparisons, a greater understanding of the importance of urban biodiversity and human well-being could be gained.

6.6 Conclusion

This study has produced meaningful results about how community-based stewardship and governance of urban parks benefit both biological conservation and local residents' quality of life. To examine this issue, a theoretical framework was devised from the literature to investigate the distinctive characteristics of urban environments, the key principles of good ecological restoration, the benefits of urban parks, and stewardship in urban parks to improve biological conservation and citizens' quality of life. This research adopted a case-study approach to conduct an in-depth analysis of community-based stewardship and governance of two big city parks. Through the analysis of literature and case studies, this study drew out several effective guidelines for biodiversity conservation and human well-being in urban parks that would be applicable in other cities. The following summary of main findings is based on the literature review and my field research.

- Supportive legislation and policies enacted by central governments provide influential directions for sustainable biodiversity management at local levels.
- Biodiversity conservation strategies and plans established by regional and local governments have a decisive effect on the implementation of biodiversity improvement.
- Regular ecosystem monitoring is mandatory in order to establish priorities for biological conservation and optimize resources.

- When parks are developed for recreational uses, ensuring the protection of biodiversity is necessary.
- Linking fragmented areas within urban parks and between parks and adjacent open spaces is crucial to preserving and improving urban biodiversity.
- Establishing and implementing appropriate park management plans is significant not only for biological conservation, but also improving for citizens' well-being.
- Increasing the quality and quantity of urban green spaces can contribute to biological conservation as well as citizens' quality of life.
- Various cultural and educational programs provided by city parks play a vital role in improving citizens' quality of life.
- Ensuring the safety of park users is a significant action that can be taken in city parks through the park ranger program, security guards, and the safe system.
- Listening to citizens' opinions contributes to understanding how to enhance citizens' well-being in urban parks.
- Offering cutting-edge services for park users maximizes park users' satisfaction, such as the wireless Internet, the health check system, and safe system for children.
- Community-based stewardship groups play an essential role for improving biodiversity and citizens' quality of life in urban parks by providing opportunities for citizen participation in planning, operating

various cultural and environmental programs, educating people to be aware of nature, monitoring park ecosystems, and direct involvement in conservation programs.

This study also touched on the relationship between the parks department in city governments and community-based environmental stewardship groups. Good partnership between these sectors generates maximum public benefits through cooperation in managing various roles as parks' stewards. Through this research, the results indicate that one of the most important factors that make a city park so successful is having an excellent relationship between the city and its community-based conservancy. All in all, a successful partnership with community-based stewardship groups creates more powerful synergy to sustain biodiversity and human well-being.

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Appendix A

1. Interview Questions for current directors and managers involved in city parks in Seoul and Vancouver city governments

EXPERIENCE IN THE PARK

- **Tell me about your experience about city parks. How have you been involved in city parks?**

ECOLOGICAL ASPECT

- **Do you have any plan to preserve or improve biodiversity in Seoul/Vancouver parks?**
- **What do you think is the most significant action that can be done to improve biodiversity in Seoul/Vancouver parks?**

COMMUNITY WELL-BEING ASPECT

- **Do you have any plan to improve citizens' quality of life in Seoul/Vancouver parks?**
- **What do you think is the most significant action that can be done to improve citizens' quality of life in Seoul/Vancouver parks?**

PARK OPERATIONS ASPECT

- **What budget problems do you face in preserving nature and operating Seoul/Vancouver parks?**
- **Are you encouraging citizens to donate funds to help operate this park? Why?**
- **What do you think is the most difficult problem in managing Seoul/Vancouver parks?**

2. Interview Questions for current Park Board Commissioners in Vancouver city and Parks Advisory Committees in Seoul city

EXPERIENCE IN THE PARK

- **Tell me about your experience about city parks. How have you been involved in city parks?**

ECOLOGICAL ASPECT

- **In your opinion, which project to preserve or improve biodiversity in Seoul/Vancouver parks is the most commendable? Why?**
- **What do you think is the most significant action that can be done to improve biodiversity in Seoul/Vancouver parks?**

COMMUNITY WELL-BEING ASPECT

- **In your opinion, which project to improve citizens' quality of life in Seoul/Vancouver parks is the most commendable? Why?**
- **What do you think is the most significant action that can be done to improve citizens' quality of life in Seoul/Vancouver parks?**

PARK OPERATIONS ASPECT

- **What do you think is the most difficult problem in managing Seoul/Vancouver parks?**

3. Interview Questions for current supervisors and managers of Seoul Forest Park and Stanley Park

EXPERIENCE IN THE PARK

- **Tell me about your experience in this Park. How have you been involved in this park?**

ECOLOGICAL ASPECT

- **Do you have any management plan to preserve or improve biodiversity of this park?**
- **What do you think is the most significant action to improve biodiversity in this park?**

COMMUNITY WELL-BEING ASPECT

- **Is there opportunity for community input on park management and to apply their suggestions?**
- **Do you have a management plan to improve local residents' quality of life in this park?**
- **What do you think is the most significant action that can be done to improve local residents' quality of life in this park?**

PARK OPERATIONS

- **What budget problems do you face in preserving nature and operating this park?**
- **Are you encouraging citizens to donate funds to help operate this park? How?**
- **What do you think is the most difficult problem in managing this park?**

4. Interview Questions for current directors and employees at non-government organizations involved in Seoul Forest Park and Stanley Park

EXPERIENCE IN THE PARK

- **Tell me about your experience in this Park. How have you been involved in this park?**

ECOLOGICAL PROGRAMS

- **What is the most important ecological program in this park? Why?**
- **Are you encouraging local residents to participate in ecological programs? How?**
- **Do you usually get some feedback from the participants in ecological programs?**
- **What do you think is the most significant action to improve biodiversity in this park?**

STEWARDSHIP PROGRAMS

- **How did stewardship begin in this park? Tell me about its background.**
- **How are stewardship groups doing this presently, and what are future plans?**
- **What enables citizens to participate in stewardship? What is the motive for their action?**
- **Do you provide any incentives to stewardship groups?**
- **Are you encouraging local residents to participate in stewardship? How?**
- **What is the most difficult problem in managing stewardship?**

PARK OPERATIONS

- **Are you encouraging citizens to donate funds for this park? How?**