

Mediating the Conflict Between Outdoor Recreation and Nature
Conservation: *A Study of the Assiniboine Park Riparian Forest*

A practicum submitted to the Faculty of Graduate Studies
in partial fulfillment for the degree of
Master of Landscape Architecture

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**MEDIATING THE CONFLICT BETWEEN OUTDOOR RECREATION AND NATURE
CONSERVATION: A *STUDY OF THE ASSINIBOINE PARK RIPARIAN FOREST***

BY

Helen Fabbri

**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University
of Manitoba in partial fulfillment of the requirements of the degree
of
Master of Landscape Architecture**

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"Landscape is neither nature nor culture but rather 'suspended' between the two."

Peter Jacobs (1991)

Abstract

Riparian forests play a valuable role in our urban environments including water quality protection, flood control, bank stabilization, erosion control, nutrient and pollutant filtration and water temperature regulation. In addition, they provide valuable habitat for urban wildlife and provide a natural setting for educational and recreational activities for urban dwellers. In spite of their importance, riparian forests represent a threatened and endangered habitat type in the City of Winnipeg.

Heavy recreational use is one of the major impacts affecting the Assiniboine Park riparian forest. The impacts of outdoor recreation at the Assiniboine Park riparian forest include trampling and loss of vegetative cover, tree damage, soil erosion, introduction of exotic vegetation, soil compaction, trail-pitting, litter, and pollution of water resources. In addition, recreation can impact the quality of visitor experience including visitor crowding, conflicts between different user groups, reduction in visitor learning, and visitor displacement.

The Assiniboine Park riparian forest is an especially attractive location for various recreational activities. The presence of water, diverse vegetation, varied topography in a relatively 'flat' land, moderated climate and wildlife enhance the recreational experience of the trail user. However, as recreational use of the Assiniboine Park riparian forest continues, the environmental and recreational quality of the resource will further diminish. There is a need for protecting and conserving this sensitive riparian system in addition to providing recreational opportunities for the public.

The proposed strategy for the design and management of the Assiniboine Park riparian forest was to widen and reconnect the riparian corridor/buffer by reclaiming large areas of land within the Assiniboine Park adjacent to and within the Assiniboine Park riparian forest. Design recommendations and guidelines for riparian buffers and corridors were explored resulting in the application of a three-zone urban riparian buffer system approach to the Assiniboine Park riparian forest. Each zone serves a different biological purpose and different recreational uses are allowed in each zone. In addition, two multiple-use trails were designed taking into consideration the activity-type and location of trails within the riparian zones.

The design and management of the Assiniboine Park riparian forest mediates between resource protection and recreation provision focusing on understanding the needs of the recreational users and the sensitivity of the environment.

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Introduction

Introduction

A riparian forest community is defined as the corridor of vegetation situated between aquatic and terrestrial environments that is periodically influenced by flooding (Bentrup & Hoag 1998; Wissmar & Beschta 1998). Riparian forests play a valuable role in water quality protection, flood control, bank stabilization, erosion control, nutrient and pollutant filtration and water temperature regulation. They also provide wildlife habitat, and recreational and educational benefits (Riley 1998).

In spite of their importance, riparian forests represent a threatened and endangered habitat type in North America (Knutson & Klass 1998). Historically, riparian forests were used extensively by humans because of their abundance of food plants and wild game, and as transportation routes. Over time, agricultural practices, timber harvesting, dam construction and urban development have adversely affected riparian habitat. As a result, the structure, composition and role of riparian forests have changed markedly leading to an increase in water pollution, flooding hazards, habitat fragmentation, a loss of wildlife habitat, and a reduction in urban nature for human use and enjoyment (Moffat 2002).

In Winnipeg, approximately 85% of riparian habitat has been negatively affected by urban development (C. Heming pers. comm. 2003). As such, there is a significant interest in protecting and conserving riparian forests along many of its creeks, streams and rivers from further disturbance or clearing. Private landowners, stewardship groups, non-profit organizations, civil, provincial and federal governments have begun to recognize the degradation of riparian ecosystems and the importance of protecting them.

In 1993, an inventory of natural heritage areas within the city of Winnipeg was carried out as a cooperative project between the Manitoba Naturalists Society, the Canadian Wildlife Service and the City of Winnipeg's Parks and Recreation Department. As a result, five native habitat types were identified and the information collected during the inventory provided an overview of the status of these native habitats. It became apparent from the inventory that, despite the amount of waterfront property within city limits, examples of good quality riparian habitat were rare (Cowan 1993).

In 1997, the Manitoba Naturalists Society, as part of the Urban Habitat Stewardship Project, and its natural areas inventory partners, began to examine the condition of riparian forests along Winnipeg's waterways. The study focused on identifying major impacts and establishing a baseline of information for various riparian forests across the City, including the Assiniboine Park riparian forest. Heavy recreational use was found to be one of the major impacts affecting the Assiniboine Park riparian forest (Fabbri & Jurkow 1997).

In 2004, the Assiniboine Park will be celebrating its hundredth year. Annually, the Assiniboine Park attracts hundreds of thousands of park-users (de Graaf 2000). Although the exact number of those that use the Assiniboine Park riparian forest each year has not been recorded, it can be said that it is well used, as there has been a marked decline in the quality of the forest environmentally and aesthetically, in part due to recreational activity.

Recreational use can cause adverse physical and biological impacts on riparian areas. The impacts of outdoor recreation at the Assiniboine Park riparian forest include trampling and loss of vegetative cover, tree damage, soil erosion, introduction of exotic vegetation, soil compaction, trail-pitting, litter, and pollution of water resources. In addition, recreation can impact the quality of visitor experience including visitor crowding, conflicts between different user groups, a reduction in visitor learning, and visitor displacement (Manning et al. 1996).

Riparian areas however, are especially attractive locations for various recreational activities (Welle & Baer 1997). The presence of water, diverse vegetation, varied topography in a relatively 'flat' land, moderated climate and abundant wildlife enhance the recreational experience of the trail user. The City of Winnipeg encourages the use of rivers and riparian areas stating in Plan Winnipeg's 2020 Vision on Managing Parks, Open Space, and Waterways in Section 5C-02 "*Promote the Use of Rivers and Riverbanks:*"

The City shall promote the use of its rivers and riverbanks by facilitating public access to rivers and riverbank lands and encouraging the use of Winnipeg's rivers for transportation and recreation through the provision of boat launches, docks, and other accessibility improvements (City of Winnipeg 2002).

Of the 240km of waterfront property within City limits, the City of Winnipeg owns about 45% (108km). Of that, only 35% (85km) are publicly accessible (Planning, Property & Development Department 2000). As recreational use of riparian areas increases, and the

abundance and quality of the resource decreases, the need for protecting and conserving remaining riparian forest in Winnipeg increases, for humans and wildlife alike.

The impacts of outdoor recreation on riparian forests in Winnipeg are to some extent recognized, however, nothing has been proposed thus far, to minimize this conflict.

This practicum intends to build on existing knowledge and research of the Assiniboine Park riparian forest gathered from the Fabbri & Jurkow (1997) study, focusing primarily on the issues of outdoor recreation and nature conservation. The objectives of this practicum are:

- 1) To review existing literature on the subject of riparian forests and outdoor recreation
- 2) To build on an existing baseline site analysis
- 3) To investigate the values and needs of trail-users
- 4) To develop a site program
- 5) To generate design proposals and recommendations for the Assiniboine Park riparian forest which aim to minimize the impacts of outdoor recreation on riparian areas, while considering the recreational experience of the trail user.

Chapter 1: *Riparian Forests*

Chapter 1

Riparian Forests

The term 'riparian' means 'affected by the river' (Malanson 1993) and as the name suggests, the composition and structure of riparian vegetation is determined by the frequency, magnitude, duration and seasonal timing of flooding as well as soil type (Bentrup & Hoag 1998).

1.1 Structure and Composition of Riparian Forests

Riparian forests are divided into three zones (Figure 1.1.1): the riverbank, floodplain and terrace as well as three layers: the upper canopy which is comprised of trees and large shrubs; the mid-canopy which is mainly comprised of shrubs; and the groundcover layer which is comprised of herbaceous annuals and perennials (Essenberg 1991; Bentrup & Hoag 1998).

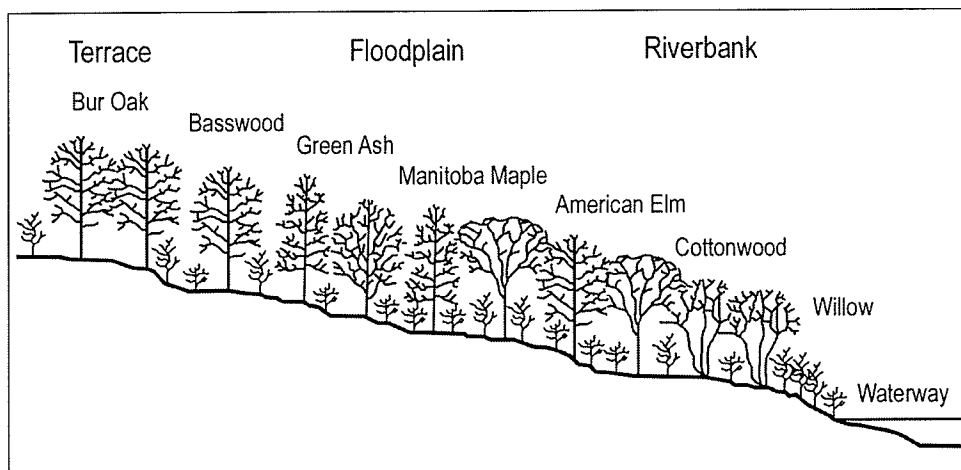


Figure 1.1.1: Profile of a typical riparian forest (Adapted from Canadian Forest Services, 1991).

Each riparian zone is associated with specific plant species that are adapted to the hydrology, soil type and microclimates characteristic of these areas (Daigle & Havinga 1996).

The riverbank is defined as the sloping area adjacent to the river (Essenberg 1991). In Manitoba, this riparian zone is dominated by tree species such as peach-leaved willow (*Salix amygdaloides*) and cottonwood (*Populus deltoides*) that can tolerate annual flooding and silt deposition. Shrub species such as beaked willow (*Salix bebbiana*) and sandbar willow (*Salix exigua*) also occupy this zone however few annual and perennial herbs are present.

The floodplain region is the relatively flat portion that lies above the riverbank and is subject to regular periods of inundation during flooding (Essenberg 1991). This zone usually contains the greatest variety of species and is inhabited by such tree species as Manitoba maple (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), basswood (*Tilia americana*) and American elm (*Ulmus americana*). The mid-canopy includes species such as red-osier dogwood (*Cornus stolonifera*), chokecherry (*Prunus virginiana*) and wild currant (*Ribes americanum*). Herbaceous perennials include Virginia creeper (*Parthenocissus quinquefolia*), false Solomon's seal (*Smilacina stellata*), moonseed (*Menispermum canadense*), carrion-flower (*Smilax herbacea*) and tall meadow-rue (*Thalictrum dasycarpum*).

The terrace is the highest elevated area above the floodplain region (Essenberg 1991). This riparian zone is not subject to periods of flooding and is dominated by bur oak (*Quercus macrocarpa*), which prefers drier habitats.

Appendix 1A shows a species list of common plant species found in riparian forest communities in Winnipeg.

1.2 Benefits of Riparian Forests

Riparian forests are valuable natural ecosystems that provide many important benefits including flood control, bank stabilization, erosion control, filtration of nutrients and pollutants, water temperature regulation, wildlife habitat, and recreational and educational benefits. These benefits are described in more detail below.

Flood control

An important benefit of riparian forests is its ability to reduce flooding hazards. Native vegetation absorbs floodwaters and reduces the velocity of flowing water (Hey & Philippi 1995). However, the potential for damage is dependent on the width of the riparian zone and the density of native riparian vegetation. When human activity causes the degradation of riparian forests, the flood storage capacity is compromised, aggravating the impacts from flooding (Bentrup & Hoag 1998).

Bank stabilization

Riparian vegetation plays a significant role in bank stabilization by anchoring the riverbank into place. The structure of riparian vegetation particularly along the riverbank is such that their deep root systems trap the soil and protects it from the eroding forces of the river (Cowan 1995). More specifically, plant roots provide stability by increasing the cohesion of the soil, through the binding action of the soil with the root network and by contribution of the tensile strength of the roots themselves. Lateral roots contribute most to binding because they occur in greater densities, whereas vertical roots provide most of the tensile strength (Tabacchi et al. 1998).

Erosion control and filtration of nutrients and pollutants

Riparian forests can reduce the impacts of non-point source pollution by trapping eroded sediments and pollutants from urban runoff and preventing them from entering the river system. The ability of the river or stream bank to filter sediments, nutrients and pollutants from urban runoff is dependent on the density and width of the vegetation corridor, the height and slope of the riverbank, and the volume and velocity of runoff. As a consequence of filtering, the system's water quality is improved (Cowan 1995).

Water temperature regulation

Riparian vegetation plays an essential role in regulating water temperature thereby contributing to the overall health of riparian systems. Riparian vegetation protects streams and rivers from summer and winter extremes that may be stressful or detrimental to aquatic life. Shade cast by riparian vegetation helps in maintaining cooler water temperatures in the summer, affecting the rate of nutrient cycling and dissolved oxygen levels. Cooler water temperatures hinder algal growth resulting in an increase in dissolved oxygen levels, further improving water quality (Bentrup & Hoag 1998).

Wildlife habitat/corridors

Riparian forests are among the most productive wildlife habitats. The diversity and productivity of these systems provides a rich diversity of habitat niches. This translates into a high variety of wildlife species in the riparian habitat (Bentrup & Hoag 1998). Losses and

degradation of habitat quality pose serious problems for wildlife, especially birds, which depend on these resources for survival (Knutson & Klass 1998). Riparian forests also serve as conduits or corridors for the movement of wildlife along the river and between diverse habitats (Forman & Godron 1986).

Recreational and educational benefits

Riparian areas are attractive locations for a variety of recreational activities such as canoeing, hiking, cycling, jogging and cross-country skiing. They also provide great opportunities for nature viewing, outdoor education and interpretation.

1.3 Impacts on Riparian Forests

Riparian forests are environmentally sensitive areas that are subject to a variety of impacts. Simply defined, environmentally sensitive areas are those that contain native vegetation and natural features and/or natural resources. They contain natural communities of plants and animals whose existence is determined by such factors as soil composition, hydrology, climate, solar conditions and site history. Environmentally sensitive areas are vulnerable in that further fragmentation, disturbance and development will negatively affect natural processes, composition, structure and function of these systems. Environmentally sensitive areas usually have one or more of the following conditions: 1) contain abundant native biodiversity and few exotics; 2) are of adequate size and cohesiveness to be biologically sustainable; 3) are a remaining example of a pre-permanent settlement natural community; 4) are considered rare; 5) contain sensitive geological and hydrological features; 6) contain or are adjacent to a wetland, river or stream and are critical in maintaining water quality, rare species habitat or flood control; and 7) contribute significantly to biological or hydro-geological functions such as wildlife habitat, air purification and erosion control (City of St. Cloud 2001).

Riparian forests in Winnipeg are subject to a variety of impacts that can have adverse effects. Some common causes of degradation include: urbanization/riverbank development, mowing, Dutch elm disease, exotic plant species, beavers and recreation.

Urbanization/Riverbank Development

Riparian forests have been significantly modified over time as a result of continuous urban development of riparian habitat (Moffat 2002). As a result, riparian forests are fragmented and remnant habitat is becoming further degraded. Figure 1.3.1 shows the extent of urbanization (developed riparian lots) along the Assiniboine River in Winnipeg. This figure can be compared with Figure 1.3.2, which shows the occurrence of parks along the Assiniboine River in Winnipeg. It is apparent that despite the number of parks and natural areas along the Assiniboine River, riparian habitat is significantly fragmented. Fragmentation reduces habitat for urban wildlife and interrupts valuable riparian corridors for use by both wildlife and humans (Moffat 2002). The City of Winnipeg recognizes the importance of riparian habitat and has included its protection, preservation and maintenance in *Plan Winnipeg's 2020 Vision on Managing Parks, Open Space and Waterways* in Section 5C-04 "Protect Environmentally Sensitive Lands." The policy states that:

The City shall protect environmentally sensitive lands that contain pockets of natural flora and fauna or that are susceptible to damage from flooding or erosion by:

- 1) Evaluating proposed developments that affect high-quality natural areas and encouraging the protection and preservation of such lands to the greatest extent possible;*
- 2) Developing a lands plan which designates natural areas that are environmentally sensitive and/or significant lands;*
- 3) Protecting floodplains and unstable riverbank slopes by identifying susceptible areas and employing protective and preventive measures, including the possible acquisition of such lands, to reduce the risk of property damage where appropriate; and*
- 4) Encouraging private landowner participation in support of riverbank management.*

The City of Winnipeg's Naturalist Services Branch is committed to following through Plan Winnipeg's mandate when carrying out all projects.



Figure 1.3.1: Urbanization along the Assiniboine River in Winnipeg.



Figure 1.3.2: Parks along the Assiniboine River in Winnipeg (highlighted area is Assiniboine Park).

The Branch is involved in all aspects of natural areas within the City, co-managing various projects and forming partnerships with several non-profit organizations and stewardship groups. They are responsible for exchanging resources and providing technical advice to the public, environmental stewardship groups, other City of Winnipeg departments and all levels of government regarding issues of natural areas, sensitive lands and urban wildlife. Recently, an *Eco-gift* program was introduced to the City whereby property owners of ecologically sensitive lands can donate their land in order to protect ecological heritage from ongoing development. In return, the donor receives tax benefits for protecting this land (Naturalist Services Branch 2001).

Commercial developers wishing to develop facilities in natural areas must be sympathetic to the environment in terms of building styles, extent of development, management and operation (Norton & Roper-Lindsay 1992). They must also recognize that not all proposals will be compatible with the nature conservation values of a site.

Riverfront property owners must also be aware of the importance of riparian areas and through education, may be encouraged to conduct small-scale restoration efforts in their own yards.

Mowing

Replacing valuable riparian vegetation with turf grass and mowing to the river's edge commonly occurs along many riverfront properties and was also formerly practised by the City of Winnipeg. Mowing to the river's edge causes banks to become more susceptible to erosion, decreases wildlife habitat, and reduces water quality. In 1999, the City of Winnipeg's Parks Division in concert with the City Naturalist's Office established a no-mow policy in order to protect and preserve the natural landscape of the city. The policy prohibits mowing on City-owned property along all rivers and streams. It involves establishing a no-mow riparian buffer zone from the river's edge to the top of the bank that will allow for the naturalization of native trees and shrubs. In addition, there is to be no mowing where oak trees are stressed and where there is evidence of tip die back due to soil compaction from machinery (Naturalist Services Branch 1999).

The re-established vegetation has environmental, aesthetic and financial benefits. Environmentally, the policy would help stabilize the banks, provide additional wildlife habitat

and corridors, and improve water quality. Aesthetically, users of these spaces would enjoy increased richness and diversity of both plant life and wildlife that would be attracted to these areas. Financially, the policy would prove a more efficient expenditure of city tax dollars.

It will now become necessary to educate riverfront property owners about the importance of creating no-mow buffer strips in order to protect their property and riparian forests as a whole.

Dutch Elm Disease

Dutch elm disease is another major impact on riparian forests also affecting elm trees in numerous city parks, boulevards and residential yards within the city of Winnipeg.

The disease is caused by the ascomycete fungus *Ceratocytis ulmi*, which interferes with the conduction mechanism of xylem vessels, the principal water-conducting tissue in vascular plants. In Manitoba, the native elm bark beetle *Hylurgopinus rufipes* is the major vector of the fungus. However, the European elm bark beetle *Scolytus multistriatus* is another vector, although uncommon. The adult beetles breed underneath the bark of stressed, dying or dead elm trees. If the brood tree is infected with Dutch elm disease, the brood and larval galleries become infested with the fungus as well. The newly emerged beetles containing the fungus pass the disease to healthy elm trees upon feeding (Essenberg 1991). The resulting effect is leaf yellowing, wilting and drop, eventually leading to tree mortality.

The disease was first observed in Winnipeg in 1975 along the Red River and at present, continues to spread across the city. Since its appearance, the City of Winnipeg's Forestry Branch initiated the Dutch Elm Disease Control Program whose mandate is to ensure the well-being, longevity and enhancement of the urban elm forest within the City of Winnipeg through undertaking and maintaining excellent, effective and on-going disease control and tree maintenance procedures. Since 1975, the annual loss rate of elms within the city has remained at or below 2%. Of concern, recent losses have increased to approximately 3% per year, however steps are being taken to address the situation (Forestry Branch 2000). Dutch Elm Disease control efforts are limited to prevention of spread, and require numerous strategies. Unfortunately, there is no effective cure and partial implementation of the control