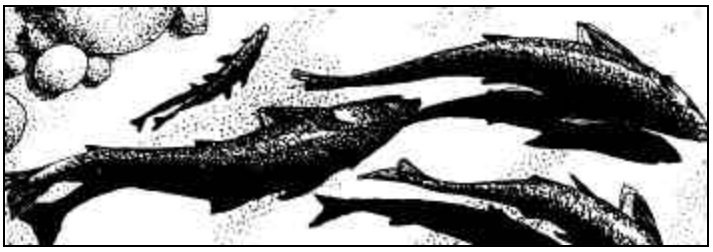
Corridors of Green and Gold
Impact of Riparian Suburban Greenways on Property Values



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Foreword

This report examines the economic effect of riparian greenways on adjacent property values in several suburban communities in the Lower Mainland and east coast Vancouver Island. This research was initiated in response to demands for economic valuations of the impact of riparian setbacks or streamside protection measures on property values in local urban/suburban areas.

The protection of riparian areas is essential for maintenance of viable fish bearing streams, however application of this fundamental ecological requirement meets with significant resistance in settlement areas where stream setbacks for conservation purposes are perceived to have negative economic impacts on property values.

This paper explores some of these economic concerns. It presents recent, relevant, empirical data on the economic effect of greenways in several urbanized areas of BC. This assessment was supplemented with a resident opinion survey to assess the intrinsic values of these greenways to the local population. The results of the assessment and the survey indicate that property values are positively affected by proximity to a greenway and local residents value the greenway above many other features of their neighbourhood. This information should provide a basis for discussions aimed at trying to find the balance between protection of a common property resource (fish and fish habitat) and protection of individual property rights and maintenance of property value.

Corridors of Green & Gold is the eleventh report in the Fraser River Action Plan urban initiative series. Many municipalities in North America are requiring greenways be incorporated into approved developments as a part of the infrastructure of a neighbourhood or community. The recent literature and research in this area indicates that greenways consistently provide desirable community amenities which can protect local environmentally sensitive areas in a manner that does not reduce adjacent land values.

This document is a resource for local governments, private landowners, developers, community groups and resource management agency staff. Readers are encouraged to use the information in this report as well as emerging information from other jurisdictions to encourage new strategies and approaches to sustainable urban development in BC communities.

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Corridors of GREEN GOLD: Impact of Riparian Suburban Greenways on Property Values

Stanley Hamilton and Moura Quayle[1]

The open space system like housing, transportation, education and economic development, like air, water and light Y is a fundamental building block of modern urban life, a physical, social, economic, and human necessity, day in, day out, year after year.

(New York City Open Task Force, 1987).

1 INTRODUCTION

Community builders, land developers, environmentalists, homeowners, and politicians appreciate that land-use planning and management improves with better information and better understanding of the diverse interests involved. Behind concepts of growth management, sustainable development and new urbanism is a growing commitment to better understand ecological, social and economic factors in planning and managing our landscape.

This study is intended to contribute to our understanding of the role of greenways in residential property markets, with particular reference to greenways standards applicable to fisheries management concerns along shorelines, rivers, streams and creeks. The focus of the research is on testing the general hypothesis that proximity to a greenway will have a positive impact on nearby property values. There is a widespread belief, supported by numerous studies, that indicates the positive features associated with a greenway outweigh the negative features, and that on balance, tenants and owners will pay for such proximity. Four different sample areas are selected, all situated in the province of British Columbia, three in the metropolitan Vancouver area and one in the metropolitan Victoria area. The economic focus of the paper is the application of multiple regression analysis to isolate the impact of greenways on property values. A survey of property

[1] Stanley Hamilton and Moura Quayle are, respectively, Professor of Urban Land Economics, Faculty of Commerce & Business Administration, and Professor of Landscape Architecture and Dean, Faculty of Agricultural Sciences. The authors wish to thank Cecilia Achiam, Jorge Alvarado, and Sara Muir for their research assistance. We also wish to credit Brian Tutty with the inspiration for the title of this paper. This study was supported by funding from the Fraser River Action Plan of the Department of Fisheries and Oceans (DFO) and is intended to be another in the urban initiatives series that focusses on research and evaluation of fish habitat/land use conflicts in urban and suburban settings. Thanks to the scientific authority, Melody Farrell of DFO for her support and assistance.

owners in the four study areas was also administered for perceptions of values held by the residential owners and occupants related to their proximity to the greenways.

This study makes two important contributions to our understanding of the pricing dynamics associated with proximity to greenways. First, the empirical analysis relies on a comprehensive database that includes all sales within a sub-market, not just a sample, as is the case in most other studies. As a consequence, issues associated with sample bias are overcome. Second, the database used in the study has a comprehensive set of property characteristics available for use. Finally, current appraisal data from the provincial assessment authority provides a (secondary) database that can be used to augment the often-small number of sales within an area. This is important since residential properties tend to turnover infrequently, resulting in a small number of sales. In British Columbia all residential assessment is market-based and intended to represent current values, hence these assessed values provide an independent second source of values to be used as the dependent variable in the analyses.

Stepping back to define our term of reference, the term "greenway" is a relatively recent concept that may mean different things to different people. Generally, a greenway is characterized as,

(a) a landscape corridor or linear open-space zone which is protected or regulated for,

(b) public interest purposes of balancing and enhancing the needs of natural systems and human experience.

In its more natural form, a greenway could be a protected stream or wildlife corridor; in our cities it could be a carefully designed parkway or even a network of back alleys (cp. Ministry of Environment, Lands and Parks, B.C., et al (1995) and City of Vancouver, B.C. (1995)).

For the purpose of this study, the general concept of a greenway has been further defined by the following characteristics:

(c) the greenways are in or adjacent to suburban, residential neighbourhoods, and

(d) the greenways are effectively conservation zones as represented by leave areas or 'no development/disturbance areas' that are to remain naturally vegetated and provide a buffer between development and sensitive aquatic areas containing important fish habitat.

Hence in this study we use the more specific reference of "riparian greenways".

This is a study of one aspect of economic value, that is based on real estate markets. We recognize that there are many aesthetic, cultural, ecological, health, political and social values, and reasons for open space within an urban framework, as part of the larger public interest. The greenway concept itself developed largely to promote environmental and social benefits: more diverse and sustaining ecological systems of plants, animals and water; social benefits of the calming effect of open space and passive recreation, educational opportunities and expanding awareness; and diversified transportation options which are consistent with the greenways purposes. This study is not to attempt to provide a comprehensive economic valuation of greenways over the long term. Rather, it is to see how a certain sample of communities respond to the presence of riparian greenways, as indicated through community values reflected as real estate values at a given point in time.

Although the greenways concept may have been established for largely non-economic purposes, there is an interesting trend to better understanding the economic value of open space generally, and greenways in particular. Challenges to economic modeling have also started to address the difficulty of defining significant public or long-term values in economic terms, but currently few studies are available for comparable reference. Another aspect of this study is therefore to apply an updated method of economic analysis, and to update and augment the relatively sparse work on the economic impact of greenways in Canada.

This study therefore focuses on one component of the information puzzle: the economic impact of proximity to riparian greenways on suburban residential property values. Section 2 provides a brief summary of related literature. The research methodology is presented in section 3 and the four study areas are described in section 4. The results are presented in section 5 and the survey results are summarized in section 6. Section 7 concludes the report noting that the results of this study support the hypothesis that proximity to riparian greenways has a positive impact on residential property prices for adjacent properties.

2 BACKGROUND: OPEN-SPACE VALUE

2.1 Major research issues

In an economic assessment, some form of cost-benefit study is necessary to determine whether the benefits derived from a project outweigh the costs associated with creating the project. In most private enterprises or use of private property, the provider looks at the costs and the benefits they could capture in either marketplace rents or prices. Public enterprises or the use of public property, on

the other hand, make similar analyses, however the scope of public costs and public benefits frequently raises additional measurement problems. In many cases the economic value of a "public good" is only apparent through long-term analysis with attention to comprehensive costs and benefits, including effects on human health and welfare.

This study seeks to provide better information about decision-making by focusing only on real estate market information as an indicator of value. Economic studies recognize that there are some benefits which are not captured in the rents or prices charged for the project. Similarly there may be some costs associated with the project which are not borne by the project. These benefits and costs are referred to as (positive or negative) externalities. For example, a golf course may provide valuable park-like views, cleaner air for the neighbourhood, and important ground-water recharge areas. The value of these benefits is not captured by the user fees for playing golf and using the clubhouse. A prudent developer may purchase a larger site and create both the golf course and development adjacent to the course. In this case the developer captures (internalizes) the benefits associated with the view of the golf course in addition to the user fees, but the developer does not capture the value of the clearer air associated with the green space for the golf course. Aside from some public tax, it is unlikely the value of the open space could be captured since it is not possible to give exclusive access to the cleaner air.

An example of a negative externality is pollution. The golf course may use dangerous or harmful chemicals in its maintenance operations, or create an eyesore of parking lots and ugly facilities, and these costs are not borne by the golf course. In this case the surrounding neighborhood pays the costs of the pollution, not the manufacturer of the golf course.

Concerns relating to the economic valuation of externalities are not new. The principle seems clear: those who pay should capture the benefit and those who capture the benefit should pay. Governments try to better balance the effect of externalities through regulation. In our golf course example, governments may try such options as positive development incentives or tax concessions, or restrictive regulations such as chemical use and design controls. Good decision-making based on understanding economic implications often starts with problems with the availability and quality of data, including the historical lack of good data on property values, rents, and property characteristics. Given a set of quality data, there remains the problem of specifying a model that properly captures the valuation process for real property.

This study therefore seeks to provide better information for informed decision-making, and to help owners, developers, and others better understand another aspect of the benefits of riparian greenways. While the empirical base for this study is British Columbia, the model and estimates will have wider applicability for similar situations, or for comparison purposes. Economic models are also limited by available resources for data and analysis, with the result of not being able to effectively value public goods, due to a reliance on fairly narrow indicators of private valuation. Would there be National Parks, or New York's Central Park, or Vancouver's Stanley Park, if only based on economic models of the time? However, economic models, like the one used in this study, are developing more sophisticated ways to assess and attribute how prices paid in the market-place can reflect a broader range of values.

There is a growing body of literature that looks to a variety of property and neighborhood characteristics and estimates the contribution to total value. Examples of studies on the impact of externalities on property values include, (a) the impact of noise from major installations such as an airport (Uyeno and Hamilton, 1993); (b) the impact of a positive or negative view from a given property (Maser et al, 1977); (c) the impact of air or water pollution from major installations (Freeman, 1979); and (d) combinations of perceived nuisances such as traffic or views from specific developments (Li and Brown, 1980). Perhaps the closest type of study to the impact of the greenway is the impact of high voltage transmission lines (Hamilton and Schwann, 1995). There is also a shift to better understand important environmental and social values, and long-term life cycle costs of land development to owners, taxpayers and users. Land-use planning strategies adopted initially for environmental concerns have been found to not only improve the local environment and living conditions, but to also attract business and increase economic value in the area (Brabec, 1992; Boerner-Ein, 1991; Gibbs et al, 1996; Goldstein and Elliott, 1994).

Some costs and benefits of these externalities are reflected in property prices. The next step is to try to isolate what contribution is made by each attribute. This step is always limited by available data and subject to significant resource constraints. Even if data limitations and resource constraints are minimal, there remains the significant problem of designing the "correct" model of pricing which allows one to isolate the contributions of each property or neighborhood attribute. Are the contributions of each attribute linear (for instance, does the second bedroom add the same value as the first bedroom in a house?), or non-linear (the second bedroom adds less

than the first bedroom[2])? Do property attributes interact (is one bedroom plus larger backyard more valuable than two bedrooms and smaller backyard)? A full specification of a property valuation model is beyond the means of most research projects. What one attempts to achieve is to design a simple model that focuses on the attribute in question. What is the value of proximity to greenways?

This study tries to draw credible conclusions from information gathered through on-site observations and a comprehensive set of price and property characteristics. The accompanying survey of the property occupants, both renters and owners, provides supporting evidence for the conclusions reached.

2.2 Greenways: An Economic Edge

Is it reasonable to attribute a component of the value of adjacent properties to their proximity to a greenway? There are an increasing number of studies that indicate that there are many economic benefits associated with open space generally, and greenways in particular, and that such value is reflected in (capitalized into) rents and prices. Even before the recreation boom of the 1990s, studies identified economic benefits as including: (1) direct job creation from construction and management of a greenway, to recreation-oriented businesses including tourism, and indirect job creation from the greenway as an amenity which influences businesses or key personnel in making decisions as to where to locate or live; (2) increasing local tax revenues as an incident of increased property value and business activity associated with greenways (with the added benefit of avoiding increased property tax rates); (3) increasing retail sales, special events, recreation and financial services from the ripple effect of employment and business vigour; (4) frequently mitigating the costs of other public expenditures, through safer transportation options, local climatic and aquifer recharge benefits, and mitigating natural hazards, and supporting important initiatives in the public interest, such as B.C.'s salmon-habitat preservation program, as well as; (5) increasing property values for owners through the above and the market recognizing the intrinsic value of environmental and recreational qualities of open-space for the human mind, spirit and body. (see, e.g. Goldstein and Elliott, (1994); Little, (1990); National Park Service, (1990, updated 1995); Brabec, (1992); and King, (1987)).

A particular benefit of greenways is that, as open-space corridors, they provide a long "economic edge" by touching on a number of smaller adjacent properties. Apart from more intrinsic

[2] It is possible that the second bedroom could add more than the first, but this is not found to be the case in any major study.

environmental or social values, greenways have encouraged successful development strategies for local authorities because of this economic edge effect and the economic opportunities offered. As a result, greenways have become one of the most "rapidly growing conservation initiatives" (Diamond and Noonan, 1996). The economic effects are so strong that in some cases the greenway is specifically initiated as an economic revitalization project: the River Park project in Chattanooga, Tennessee; River Walk in San Antonio, Texas. Even greenways developed without specific economic motivation have been found to have "positive economic effect as an ancillary benefit" (Little, 1990).

2.3 Adjacent values – Greenway Gold

Is it possible to isolate the element of increased value to properties adjacent due to proximity to the greenways? Previous work confirms that positive economic effects have been identified for properties adjacent to, and nearby greenway corridors. Higher real estate value, and in many taxation jurisdictions, higher property values which translate to higher real property tax revenue, are identified (Little, 1990).

For credible results, empirical studies must isolate the difference in the market value (or prices) of properties that are due to their proximity to the greenways, all else held constant. In other words, apart from the proximity to greenways, property, social and other characteristics must be relatively constant or clearly identified and measured in the underlying model. In this study, a cross-sectional database is used, hence changes over time are not a primary issue. Attention is focussed on those property and neighborhood characteristics which will influence property values at a point in time – and which can be measured for the study areas selected.

Clarifying which other (uncontrolled) factors affect valuation will require a second generation of work to more critically examine what may have been over-simplified conclusions in the past. For example, Smith, (1993) cites several other studies and observes:

> *Pollard studied the aesthetic properties of water bodies and their influence on the heights of buildings in Chicago. Pollard concluded that residents of a lakefront apartment were paying 26% of their housing expenditure for consumption of amenities. Diamond found that living within 5 miles of a lake in Michigan increased the value of a house in Chicago by $2,219 (1970 dollars). Grimes indicates that land per square foot falls by and average of about 0.14% for every 1% rise in distance inland form the Lake Michigan shoreline and that the lake-distance variable alone explained 19% of the variation in land price for the sample as a whole.*

Did the three studies referenced by Smith specifically address the implications of political, economic, cultural and land-use characteristics? Was there a way to assess whether such characteristics balance out over the reference area?

Two types of modeling for estimating the economic contribution of property and neighborhood characteristics have been used in the past. The more traditional approach has been to use traditional appraisal or valuation models (generally the "market" or "comparative" method of appraisal) to isolate the contribution of a particular attribute. These traditional valuation models have been characterized as using very small samples. An alternative traditional method is to use simple statistical analyses such as reporting and testing differences in the mean prices for two samples, one with proximity to the greenway and another without proximity. Improved data and modeling permits improved estimates, and most modern studies rely upon more rigorous modeling such as the hedonic model. In this context, the regression analysis generally consists of relating the sales price of the property (the dependent variable) to the characteristics of the house and neighborhood (independent variables), and including as one of the independent variables the specific attribute in question (proximity to the greenway).

Studies using regression analysis tend to be more credible by taking into consideration a more defined set of circumstances. Many statistical studies of this kind performed have concluded that greenways have a positive, or at least neutral, economic effect on property values for properties immediately adjacent to greenways or stream buffers. More recent studies have refuted concerns that proximity to open space encourages vandalism, loss of privacy or increased crime (Conservation Fund (1995)). Increasingly, however, the cause and effect of such concerns is being better understood, and open-space designs offer solutions wherein groups and individuals take responsibility and pride in their communities.

Most examples of earlier studies are of U.S. urban areas, including greenways in Philadelphia: (Hammer, Coughlin and Horn, 1974; Seattle, Little, 1990; Weicher and Zerbst, 1973); and the largely recreational community of Boulder, Co. (Correl, Lillydahl and Singell, 1978). In this last study, in a community built for a closer connection with nature, the average value of properties immediately adjacent to the greenbelt was 32% higher than those located 1000 m. away, with commensurate increases in property tax revenues. On balance it appears that proximity to a greenway is associated with increased property values, but the impact will be affected by local or neighborhood characteristics.

With the increasing body of evidence readily available on urban and suburban properties over the past twenty years, our analysis differs from previous studies in three key respects. First, we were able to identify and use 100% of all sales in the study areas and did not have to rely on small samples of sales. Second, we were able to augment our results by reference to detailed property tax assessment data as a second indicator of values. Third, this study has available an extensive list of property characteristics, although in the summary analysis, described in section 3, more simplified models were used.

3 VALUATION MODEL

3.1 Approach to estimating the contribution of the greenway to property values

A traditional and well-accepted method of measuring the implicit prices paid for housing attributes, including neighborhood characteristics, is the hedonic model. The hedonic model provides estimates of the marginal contribution of each property attribute to the total price. The underlying theory of hedonic models is well established (see, Follain and Jimenez, 1985; Grilches, 1971; and Freeman, 1979a). In the underlying theory of hedonic models, it is expected that the impact of property and neighborhood characteristics will be capitalized into property prices. For example, in the context of taxes: "Property taxes are said to be capitalized into house values if, all else equal, higher tax payments leads to lower house value (and visa versa)" (Yinger, et al (1988)). Paraphrasing Yinger, the positive effects of proximity to a greenway will be reflected in the prices (and rents) paid for properties enjoying the benefits.

The purpose of estimating the value of externalities is twofold: (a) to provide more accurate inputs to determine the economic viability of projects, and (b) to help assess responsibility to attribute costs or benefits accordingly. With proper identification and pricing of such externalities, economic tools can be employed to mitigate or require compensation for costs, or to encourage or compensate for benefits. For example, an option to mitigate wear and tear of using something could be user fees; supporting something more in the general public interest may be through a more general levy, cost-recovery fund-raising, or public incentives.

3.2 Major hypotheses

Three general hypotheses are addressed in this study:

H1: Properties adjacent to a greenway will exhibit positive and significant impacts on their value, all else being equal.

H2: As distance from the greenway to residential sites increases, the contribution to property value due to proximity to the greenway diminishes rapidly, all else being equal.

H3: The views expressed by occupants and resident property owners in surveys will suggest a higher positive contribution to property value due to proximity to greenways than the empirical evidence would support.

Multiple regression analysis, or hedonic modelling, is commonly used to estimate the value of individual property or locational attributes (see Griliches, (1971); and Rosen, (1974)). These studies have been applied to a variety of valuation matters relating to real property, as well as other assets. The studies relating to real property have been generally in the residential markets where data are more readily available and the properties are generally more consistent in characteristics.

The application of regression modelling raises two important and fundamental questions:

(1) "What pricing process or model is best for the particular research question?" and

(2) "What variables (independent variables) are to be included in the model?"

A variety of forms of the regression equation have been employed in the various real property related studies. The linear model is the most simple, and commonly used in the past. The linear model assumes that each property characteristic adds to the overall value in a simple additive fashion: the first bedroom adds the same value as the fifth bedroom. However, previous work by numerous authors has indicated that the linear model, while a good first approximation, is not the best model. Some allowance must be made for interaction between variables and for non-linear contributions of the variables. Hence a log-linear model is used in this study.

$$\ln P = \beta_0 + \beta_i (D) + \beta_i \ln X_i + \beta_g (\text{Green}) + u$$

where

$\ln P$ = the log of property value, P, the dependent variable

β_0 = a constant term

β_i = estimated coefficients for other dummy variables

β_j = estimated coefficients for continuous variables

β_g = estimated coefficients for greenway variable

X_j = jth property characteristic other

u = the error term. (See, e.g. Halvorsen and Palmquist, 1980).

3.3 Data

Four study areas were selected for the empirical analysis (see section 4). A sample zone for data collection was outlined for each area. The selection of the specific sample zones was determined by balancing the size of the sample zone and the time frame of sales or other statistics necessary for the analysis. Larger geographic zones create additional problems in the regression model, as it becomes necessary to measure and control for more neighborhood variables. The preference for using zones which represented small homogeneous neighborhoods would ideally be balanced by studying the context of many different situations along a greenway (time and resources permitting). In addition to variables reflecting the physical context, an adequate sample of sales is required. Taking sales over extended time horizons creates additional problems of measuring and controlling for changing general economic conditions. Individual circumstances in each area determined the trade-off between larger geographic areas and longer time horizons.

In this study, the dependent variable is the sales price (or alternatively, the assessed value of a property or of the land component). The choice of independent variables, which are intended to account for the major differences in property value, is more difficult. While a wide variety of property characteristics were available, previous research by numerous authors has shown that a few important variables account for a significant percentage of the differences in value. As with many previous studies, four or five independent variables captured much of the cross-sectional price variation for samples taken from small areas or well defined neighbourhoods. In this study, four independent variables are used including (1) age of the building, (2) total floor area of the dwelling, (3) lot size (square feet), and (4) the number of bathrooms. It is expected that the coefficient for "age" will be negative and the coefficient for "lot size", "floor area" and "bedrooms" will be positive.

In addition to the analysis reported, alternative regressions were undertaken using several different neighbourhood variables, but in most cases these other neighbourhoods were common to all properties in the sample, hence added nothing to the explanation of differences in values. The effects of two particular neighbourhood variables appeared to be important in two areas only. These included proximity to the golf courses in the Richmond sample and proximity to the schools in the Delta sample.

Sources of data included a review of market value statistics, site characteristics, and residential occupant opinions. The market-value statistics for this study were obtained throughout the British

Columbia Assessment Authority and included all arms-length sales transactions for single detached dwellings in the study areas[3]. The timeframe was 1996, but earlier sales going back to 1989 were used in one study area to increase the sample size. In addition, the assessed values of the properties were used in two study areas (Sturgeon Banks and Colquitz Creek). Site characteristics were assessed using detailed maps and site visits; all properties, which were adjacent to the greenway, were labeled as "ADJACENT" and included in the sample. Next, all properties which were within a band of 150 feet of the greenway, but not adjacent, were labeled as "NEAR". Finally, all the properties located more than 150 feet, but not more than 450 feet away from the greenway were considered classified as the "Control" sample. A survey of residential occupants was also used and the results are discussed in more detail in section 6.

Table 1
Mean Values of Variables used in the Regression Models

Variable	Richmond	Delta	Maple Ridge	Saanich
Age (years)	22.3	20.1	7.0	18.4
Floor area (sq. ft.)	1375	1490	2239	1833
Prior Sale Price	$367,725	$288,578	$345,000	$190,347
Lot Size (sq. ft.)	7455	7807	7845	7834
Full Baths (count)	1.47	1.28	2.7	2.2
Assessed Value	$338,736	$289,970	–	–
Assessed Land	$315,892	$191,784	–	–
Adjacent (Count)	92	151	12	92
Near (Count)	79	99	28	164
Control (Count)	750	160	38	176
Sample size	921	410	78	432

Table 1 summarizes the key regression variables used in the regression models for each area. The sales price represents the actual sales price reported to the Lands Titles Office and includes all arms-length transactions as specified by the British Columbia Assessment Authority. British Columbia uses a Torrens-based land-title registry system, which is a model of effective computerized information management, and we are indebted to the Land Title Registry for this service. Sales for the year 1996 were used, however in some areas it was necessary to go back to 1995 or 1994 to obtain a sufficiently large sample of sales. The property characteristics were

[3] In British Columbia, the Assessment Authority collects sales data for all transactions in the province from the Provincial Land Titles Office. Property owners are required to declare the actual sales price. The Assessment Authority then classify the transactions as "arms-length", implying that the parties were negotiating at arms-length. In addition, annual assessments are prepared at "actual value", which in the majority of cases reflect current market value. The quality of assessment in the province is very reliable.

acquired from the British Columbia Assessment Authority, along with the assessed values for the property and for the land component.

To provide a second opinion of the value of proximity to the greenways, the assessed values of each property were used as the dependent variable. Since real property assessments in British Columbia are at actual value and current, these assessed values provide an important opinion of value developed by professional appraisers. Unfortunately these data were not available for all areas. The assessed value information was not available for Saanich, and was not used for Maple Ridge because of the relatively small sample of sales transactions. In British Columbia, all properties are assessed annually for property tax assessments; and in the properties reviewed, the assessment authority provided highly credible market value assessments with an assessment-to-sales price ratio close to 1.0.

Site inventories were carried out at the beginning and the end of the survey period, to first identify and then clarify or confirm physical site characteristics apparent on a visual inspection.

4 CHARACTERISTICS OF THE FOUR STUDY AREAS

4.1 Study Areas – Provincial context

The larger context of this study is the southwestern corner of British Columbia, Canada. This is a relatively small fraction of the land-base of the province of British Columbia, but an area that includes the largest cities in the province, metropolitan Vancouver and metropolitan Victoria. Three of the four study areas are situated in metropolitan Vancouver, with a population of approximately 1.8 million, while the fourth is in metropolitan Victoria, which has a population of approximately 500,000. All four of the study areas could be described as middle-class, urban, multi-cultural communities with a mix of older and newer dwellings.

The four study areas were selected after consultation with experts in fisheries management and real estate development for examples of riparian greenways which provide a cross-section of different greenway situations. The selection criteria were, (1) there was a reasonable sample of single detached dwellings in the immediate area of the greenway; (2) there was a reasonable volume of sales; and, (3) each study area was different in some respect, such as age of property, price range, or other amenities. Interestingly enough, in British Columbia at the time of initiating this study, the final selection was not difficult since there were few areas that met these criteria.

4.2 Study areas – Overview

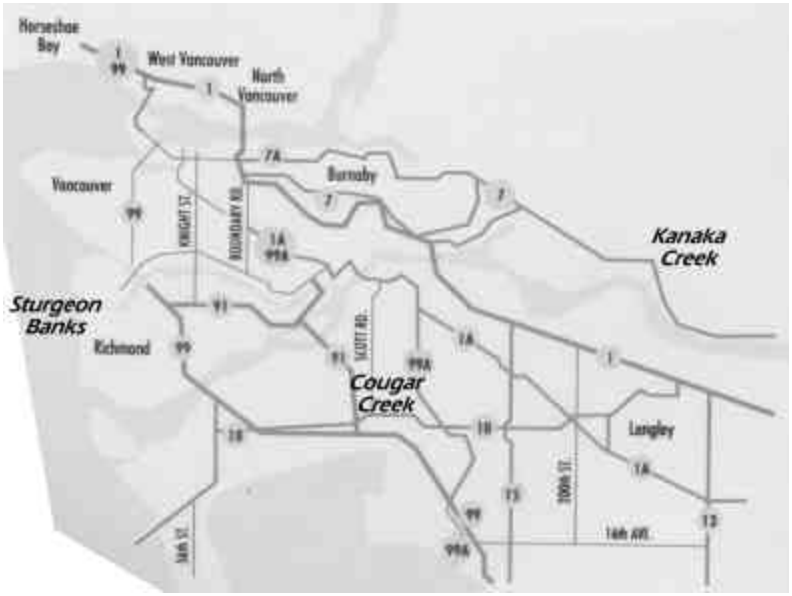
The four study areas are identified in this study as follows:

(1) Sturgeon Banks, a mix of established, twenty-five year old and older streets with pockets of new construction, on a regional waterfront green corridor which serves as a buffer between developed areas and the natural foreshore of the Fraser River estuary – an area of important and critical fish habitat. Richmond, B.C. is one of the larger municipalities experiencing rapid growth in metropolitan Vancouver (current population of Richmond is 150,000 and is expected to reach 220,000 by the year 2021), and;

(2) Cougar Creek, an established, twenty-year old community which includes a greenway along the creek as part of a regional watershed and nature reserve network, is located in Delta, B.C., a suburban community in metropolitan Vancouver;

(3) Kanaka Creek, a newer subdivision (seven years old) at the mouth of a meandering watercourse which is protected as a 15 km, narrow regional park in Maple Ridge, B.C., a municipality of metropolitan Vancouver;

(4) Colquitz Creek, a more traditional municipal park setting as part of a municipal greenway surrounded by fifteen to twenty-year old neighbourhoods in Saanich, B.C., a suburban community in metropolitan Victoria.



The first three areas are suburban areas in the greater metropolitan region of Vancouver, the largest city in the province of British

Columbia. Regional concerns are addressed by the provincially established Greater Vancouver Regional District (the "GVRD"). The fourth, Saanich, is a community on Vancouver Island, located between Vancouver on the mainland and the provincial capital of Victoria on the island.

An overview description of the four study sites follows, including (a) landscape characteristics, (b) urban (building) characteristics, (c) demographics including income characteristics, and (d) visible or notable special characteristics, including specialized land uses and influences. Table 1 provides a brief statistical summary of the key variables relating to the four study areas.

Study Site 1:
STURGEON BANKS, Richmond, BC

Typical streetscape in Terra Nova.

Cyclist on West yke.

The Sturgeon Banks greenway borders the Strait of Georgia along the western limit of the city of Richmond, B.C. The greenway is a belt roughly 100 m. (300 feet) wide, adjacent to three residential neighbourhoods (West Thompson, Terra Nova, and West Seafair). The fourth neighbourhood feels separate due to proximity to Steveston, an older, mixed-use development.

Sturgeon Banks is located on the delta of the Fraser River. The Banks themselves are estuarine landscapes dominated by marsh and intertidal marine vegetation. The series of dykes constructed across the foreshore has alienated foreshore habitats behind them and has created an abrupt break in terrain and in the natural vegetative continuum. The area behind the dyke now represents a highly modified urban landscape with little natural vegetation remaining. The dykes, in addition to providing a floodproofing function for reclaimed foreshore, also support a network of trails and recreational corridors.

The native landscape is that of a major river delta – low lying, flat areas with natural vegetation of sweeping grasses and wetland plant material. Few large trees remain, if indeed the natural forces of the river ever permitted such vegetation. The greenway provides a valuable flood-control buffer, and is the route of several trails to specialized landfill dykes. Natural views to the north are of coastal mountains 10 km (6 miles) away; views to the west are of the Strait of Georgia, a body of salt water roughly 40km across (22 miles) to Vancouver Island and associated smaller islands. To the east lies a

ne of West yke Trail s entrances.


Terra Nova Wildlife Reserve (wetland set aside).

largely urban area, merging with a rich agricultural river valley; to the south is a bay separating Canada from the USA.

The municipality of Richmond faces challenging growth management problems. It has grown from an almost rural suburb of Vancouver over the past twenty-five years to a vibrant, affluent urban centre on its own. The Vancouver International Airport sits on the border between Richmond and Vancouver to the north, and the urban centres are roughly 8 km (5 miles) apart.

The four neighbourhoods adjacent to the Sturgeon Banks greenway reflect the relatively recent and vigorous growth of the area. The greenway edge includes two "old" neighborhoods: Thompson in the north is a low-density, single-family residential neighborhood of relatively small homes (<150 sq. m), which is further buffered by an arm of the Fraser River and a golf course (an "old" neighbourhood here is thirty to forty years old). Steveston in the south is a mixed-use older community that was absorbed by Richmond. Steveston's buildings include a diverse mixture of housing types, and commercial and industrial operations associated with its location on the bank of the main channel of the Fraser River, including fishing, lumber and boating businesses. Steveston's historical roots and native landscape amenities are the subject of discussions for the future of the community, and have already resulted in a revitalized town centre with tourist amenities.

The other two neighborhoods are newer, mixed medium-density townhouse and single-family residential buildings. Somewhat larger homes are more prevalent (200-sq. m). The housing prices rival those of Vancouver ($365,000.00), and town-home design includes more common green-space. Interestingly however, these two newest neighborhoods, in some cases with construction activity ongoing, appear to be experiencing public and private access

problems to the greenway, particularly among users of different ages, and hours of use. Whether such problems are significant, or ought to be addressed in some other way is unclear, however the newest neighbourhood has seriously limited direct access to the greenway.

Greenway Study Site – Sturgeon Banks

NORTH →

Study Site 2:
COUGAR CREEK, Delta, BC

View towards Sunshine Hills from canyon.

Cougar Creek Canyon.

The Cougar Creek greenway is in Delta, a municipality to the south and east of Richmond. Much of Delta is land preserved for agricultural or wetlands purposes due to its location in the Fraser River delta and floodplain. The greenway is located in a series of single-family neighborhoods in the now highly developed eastern part of the municipality.

Cougar Canyon supports Cougar Creek which originates at Strawberry Hill west of Newton in Surrey and drains northwest from Surrey through the neighborhoods of Strawberry and Sunshine Hills in Delta. The lower reaches of Cougar Canyon Creek flow through modified wetland foreshore (now industrial lands) before discharging into the Fraser River at City Reach, under the Alex Fraser Bridge. The stream is eroding the banks and valley walls of the ravine through which it flows. The landscape throughout the greenway changes from steep ravine with some natural mature coniferous and deciduous vegetation in the headwaters to highly modified and developed river foreshore in the lower reaches. Portions of the greenway are protected as part of the Delta Nature Reserve and Cougar Canyon Park.

The adjacent "older" neighborhoods around the Cougar Canyon have managed to preserve, or regenerate, some larger trees. Twenty to thirty-year-old single family mid-sized (150-200 sq. m) homes predominate adjacent properties; some townhouse and commercial developments line arterial roads which are within a block or two of the north side of the greenway.

Typical house in Sunshine Hill.

Typical streetscape in Sunshine Hill.

In the past thirty years Delta's population has tripled to its current level of 93,000. Due to large areas for agricultural and wetland preservation, Delta has a more rural feel although it also supports some heavy industry and large transportation facilities. Vancouver is 15 km (8 miles) away. Current growth is modest; average prices for single-family detached homes is more in the $250-300,000 range. A large mall and several schools are in the immediate vicinity of Cougar Creek.

Much of Delta remains automobile oriented. There are few access routes through the Cougar Canyon, and this sample area has the highest incidence of abuse through dumping, and concerns of vandalism of the four study areas.

Greenway Study Site – Cougar Creek, Delta

Study Site 3:
KANAKA CREEK, Maple Ridge, BC

anaka Creek.

Kanaka Creek is situated on the north side of the Fraser River in the Municipality of Maple Ridge. The Creek originates in the Blue Mountain Forest north of Maple Ridge and flows through a narrow valley at its source, then through a canyon and finally through a low lying plain becoming slough-like in its lower reaches. Several tributaries including Horseshoe, Spencer, Seagull, Rainbow, Magee, Salamander and Cottonwood have been impacted by urban development. A large urban development (Albion) will directly affect a portion of the Kanaka Creek watershed.

The native landscape around Kanaka Creek is rugged and steeply sloped, where mountains meet the Fraser River. The north shore of the River at this point frequently cuts into the mountains with little flood plain. The Creek drains a more gently sloping valley in the mountains; the area is still largely forested, with mature second-growth fir trees except where the topography allows agricultural uses and farms.

Kanaka Creek is a regional park for watershed and environmental protection purposes. 56% of Kanaka Creek flows through Kanaka Creek Regional Park and the GVRD continues to acquire land along Kanaka Creek opportunistically with the goal of establishing a linear greenway from the headwaters to the mouth. This area was largely undeveloped except for the study area consisting of a large, single family, detached residential subdivision near the mouth of the creek, and one other smaller subdivision just under development. The area also has a number of very old houses on large sites.

The width of the perceived greenway varies from a band of vacant land 100 m (approximately 300 feet) or wider in some locations, to other situations where backyards are immediately adjacent to the Creek. This latter situation could not occur under current environmental regulations.

Maple Ridge has a reputation of being a bedroom community with more affordable housing, and the amenities of urban centres to the

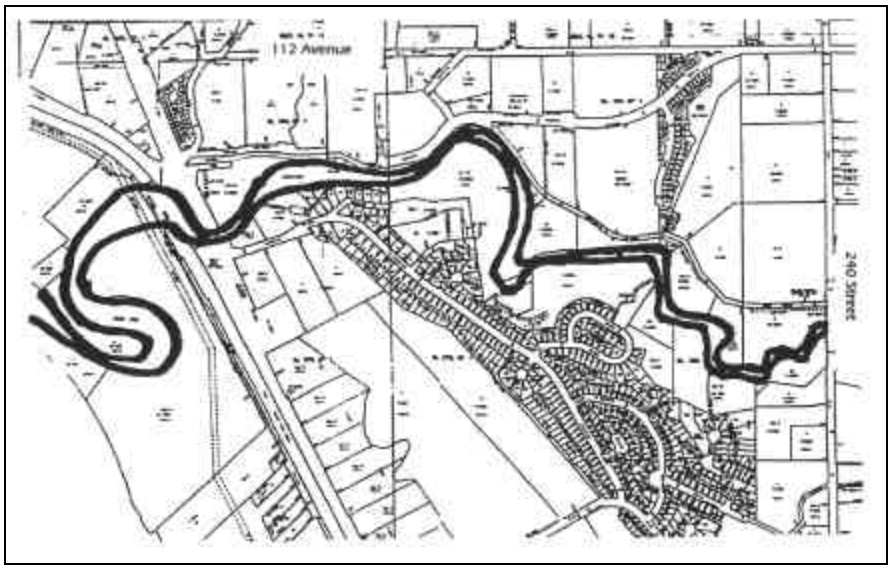
anaka Creek subdivision.

west, and rural and natural countryside to the north, south and east. With increasing access to other urban centres in the GVRD, through mass transit and better roads, Maple Ridge is expected to see continued growth in the future, albeit largely automobile dependent.

The average family residence in Maple Ridge is in the $200,000-$250,000 price range. There are more newer houses, which are generally larger than the other study areas (200-250 sq. m).

Access to, and trails through the greenway appear to be informal but not restricted. As a rural community Maple Ridge has many equestrians who have traditionally established and maintained numerous horse trails through the area.

Greenway Study Site – Kanaka Creek, Maple Ridge



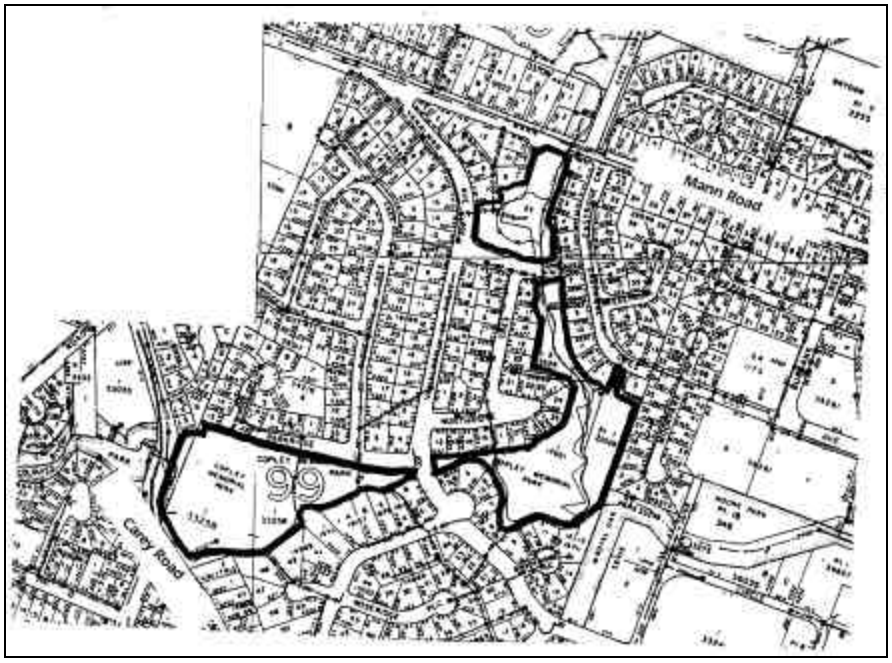
Study Site 4:
COLQUITZ CREEK, Saanich, BC

The fourth greenway area studied is across the Strait of Georgia, in the community of Saanich on Vancouver Island. Colquitz Creek is part of a larger regional creek system; the study site was limited to a roughly five-block long portion that includes a municipal park.

The native landscape is rolling terrain with mature, second-growth trees and related vegetation. The study area is now in an urban landscape of primarily single-family, detached dwellings varying in age from houses built in the 1960s to relatively new houses.

Saanich is thirty minutes by car from the provincial capital of Victoria; and two hours by ferry and car from downtown Vancouver.

Greenway Study Site –
Colquitz Creek
from Carey Road to Mann Avenue



5 RIPARIAN GREENWAYS STUDY: VALUATION BY STUDY AREA

5.1 Valuation analysis: Sturgeon Bank, Richmond

The property characteristics for the proximity to the greenway variables in the Richmond study area are summarized in Table 2. For the Sturgeon Bank greenway (Richmond), both property sales prices and property-assessed values were available to be used as dependent variables for separate valuations.

The first model (Table 3) uses the log of the sales price as the dependent variable. The independent variables had the expected impact on sale prices: age has a negative impact; lot size, house size, proximity to the golf course, and number of bathrooms all have positive impacts. All coefficients are statistically accurate at the 1% level. The base year was 1996. Sale prices from 1995 and 1994 were used to increase the sample size while keeping the geographic area small and contained. The coefficients for 1994 and 1995 were positive, suggesting that prices in 1994 and 1995 were somewhat higher than for 1996, a finding which is consistent with comparable price information from a real estate multiple listing service for Richmond. The overall explanatory power of the model is 0.66 that is within the range for many cross-sectional studies of this type.

The variables of interest are **Adjacent, Near** and **Control**. The coefficient for **Adjacent** is 0.145 and is statistically significant at the 1% level. The coefficient for **Near** is 0.024, but this is not significantly different from zero. This implies that properties adjacent to the greenway have prices that are 15.6% higher than otherwise similar properties in the control area[4]. Properties in the **Near** zone were not significantly different in price than those in the **Control** area. Although this price differential is less than that estimated by respondents to the questionnaire stated (22.4% for Richmond, see section 6), it is still a materially significant increase for adjacent properties, which is attributable to the greenway.

The second model (Table 4) for Richmond used the log of the total assessed value of the property as the dependent variable. The results using the log of the total assessed values produces results that are very similar to those using the log of the sales price. Assuming assessors are reasonably accurate with their estimates of value, the total assessed values should be equal to the sales prices, hence producing similar results. What the results indicate is that the

[4] In a log model, the interpretation of the coefficient for a dummy variable, such as Adjacent, must be modified in the following manner: percent change = 100 * ($e^{0.145}$ -1).

assessors also believe that proximity to this particular greenway contributes to value.

As a final model (not reported), the log of the assessed value of the land component was used as the dependent variable. The lot size and proximity to the golf course, and to the greenway are the only variables included since, presumably, the assessors have removed the value of the improvements. The results relating to the proximity to the greenway remains the same. The coefficient for **Adjacent** is 0.14 (indicating proximity to the greenway contributes 15% to the price).

Table 2
Mean Values of Variables by Zones in Richmond

Richmond	Adjacent	Near	Control
Age	19.7	13.3	23.7
Floor area	1560	1625	1325
Price	$473,644	$455,184	$354,904
Lot Size	9031	7539	7301
Baths	1.7	1.97	1.38
Assessed Value Total	$460,065	$430,199	$375,054
Assessed Value Land	$356,427	$289,767	$313,447

Table 3
Model 1: Sturgeon Bank, Richmond – Log of price as the dependent variable

	β	Standard Error	t Statistic
Ln (Age5)	-.034	0.004	-8.68
Ln (Floor area5)	0.183	0.032	5.782
Ln ((Baths5)	0.141	0.019	7.22
Ln ((Lot5)	0.159	0.010	15.6
Year 94	0.036	0.014	2.67
Year 95	0.021	0.014	1.48
Golf	0.178	0.037	4.87
Adjacent	0.145	0.038	3.85
Near	0.04	0.020	1.19
Constant	8.758	0.212	41.263
Adjusted R5	0.6602		
SEE	0.1289		
F	103.234		

Table 4
Model 2: Sturgeon Bank, Richmond – Log of total assessed value as the dependent variable

	β	Standard Error	t Statistic
Ln (Age5)	-.038	0.004	-8.59
Ln (Floor area5)	0.195	0.035	5.54
Ln ((Baths5)	0.145	0.021	7.05
Ln ((Lot5)	0.178	0.011	16.07
Year 94	-.016	0.015	-1.08
Year 95	0.0061	0.015	0.397
Golf	0.134	0.040	3.34
Adjacent	0.127	0.038	3.31
Near	0.0081	0.022	0.37
Constant	8.31	0.234	35.59
Adjusted R5	0.613		
SEE	0.136		
F	103.4		

5.2 Valuation analysis: Cougar Creek, Delta

Similar sets of regression models were used for the Delta study area. Table 5 summarizes the statistics for the study area. The only difference between the Richmond model and the Delta model is the inclusion of proximity to a school. The results of the first model using the log of price as the dependent variable are included in Table 6. The adjusted R^2 is 0.61, again within the range of similar studies.

As was the case with the Richmond study area, the signs on the coefficients are as expected, and all coefficients are statistically significant at the 5% level except for the coefficient for the **Near** zone. The coefficient for **Adjacent** is 0.112 that implied being adjacent to the greenway added 11.9% to the property values.

Using the log of total assessed values (Table 7) as the dependent variable, results were generally consistent with the first model. However, the coefficient for **Adjacent** is not statistically significant, even at the 10% level. Hence, it appears the assessors in the area have not ascribed any additional value to otherwise similar properties adjacent to the greenways, when in fact, the market evidence suggests some adjustment in the order of 12% is justified.

As in the case of the Richmond study area, a third model using the assessed value of land only was used. The results (not reported here) were inconclusive. This was not surprising given that the model using the total assessed value was also inconclusive.

Table 5
Summary Statistics for Cougar Creek, Delta

elta	Adjacent	Near	Control
Age	15.9	18.9	21.6
Floor area	1566	1450	1495
Price	$322,518	$260,960	$295,257
Lot Size	8229	6319	8504
Baths	1.53	1.31	1.21
Assessed Value Total	$308,664	$275,428	$280,505
Assessed Value Land	$198,480	$178,189	$193,171

Table 6
Model 1: Cougar Creek, Delta – Log of sale price as the dependent variable

Dependant	**Ln (Price)**		
	β	**Standard Error**	**t Statistic**
Ln (Age5)	-.021	0.009	-2.22
Ln (Floor area5)	0.246	0.032	7.64
Ln ((Baths5)	0.063	0.021	2.97
Ln ((Lot5)	0.102	0.024	4.23
Year 95	-0.31	0.022	-1.49
School	0.062	0.028	2.21
Adjacent	0.112	0.047	2.41
Near	-.044	0.027	-1.61
Constant	7.24	0.483	14.99
Adjusted R5	0.611		
SEE	0.1437		
F	36.34		

Table 7
Model 2: Cougar Creek, Delta – Log of total assessed value as the dependent variable

Dependant	**Ln (Assessed Value)**		
	β	**Standard Error**	**t Statistic**
Ln (Age5)	-.017	0.01	-1.63
Ln (Floor area5)	0.264	0.035	7.65
Ln ((Baths5)	0.037	0.023	1.59
Ln ((Lot5)	0.104	0.026	4.05
Year 95	0.0095	0.024	0.397
School	0.029	0.031	0.93
Adjacent	0.051	0.049	1.03
Near	-.011	0.030	-.378
Constant	6.86	.529	12.98
Adjusted R5	0.524		
SEE	0.1579		
F	26.248		

5.3 Valuation analysis: Kanaka Creek, Maple Ridge

Due to the limited sample size (of recent sales prices), only Model 1 (using the log of the sales price) was used for Maple Ridge. The sample is small because this area is mainly undeveloped larger parcels of land with few detached residential sales in recent years. There is an additional problem that the properties are reasonably homogeneous in terms of age, and the coefficients for both **Age** and **Baths** are insignificant and have the wrong sign; that is, the sign on the coefficient is not what theory suggests to be the case. The variable of interest, **Adjacent**, has a positive coefficient which is statistically significant at the 5% level. The results imply that proximity to the greenway adds 14.45% to the property value for properties in this study area.

Table 8
Model 1: Kanaka Creek, Maple Ridge – Log of sale price as the dependent variable

Dependant	Ln (Price) β	Standard Error	t Statistic
Ln (Age5)	0.0066	0.018	0.037
Ln (Floor area5)	0.381	0.061	6.211
Ln ((Baths5)	-0.0072	0.079	-0.921
Ln ((Lot5)	0.102	0.024	4.23
Year 95	0.043	0.053	0.807
Adjacent	0.135	0.065	2.06
Near	0.085	0.070	1.20
Constant	6.54	0.848	7.724
Adjusted R5	0.744		
SEE	0.161		
F	16.50		

5.4 Valuation analysis: Colquitz Creek, Saanich

The summary statistics for the Colquitz Creek case study are presented in Table 9 and the results for Model 1 are presented in Table 10. As with Maple Ridge, only one model is reported, a model using the log of sales price as the dependent variable. In order to capture an adequate sample of sales within the **Adjacent** and **Near** categories, it was necessary to include sales from the period 1989-1996. The results were very disappointing in that we were unable to structure a model which was stable and which produced reasonable results. These results reflect the sampling problems encountered in this study area. Having to use sales from previous years created additional problems in the regression model. Attempts to improve the sample by using larger study zones were not successful. In the final analysis, we were simply unable to identify a quality sample of properties in this one study area.

Table 9
Summary Statistics for the Colquitz Creek Study Area

Saanich	Adjacent	Near	Control
Age	13.9	19.3	20.0
Floor area	1888	1819	1816
Price	$194,133	$186,051	$192,375
Lot Size	7388	7885	8013
Baths	2.3	2.2	2.1
Assessed Value	–	–	–
Assessed Land	–	–	–

Table 10
Model 1: Colquitz Creek, Saanich – Log of sales price as the dependent variable

Dependant	Ln (Price) β	Standard Error	t Statistic
Ln (Age5)	-.011	0.001	-9.49
Ln (Floor area5)	0.013	0.001	8.89
Ln ((Baths5)	0.099	0.018	5.51
Ln ((Lot5)	0.0058	0.001	4.89
Year 89	-.459	0.021	-22.1
Year 90	-.332	0.017	-19.4
Year 91	-.257	0.016	-16.18
Year 92	-0.05	0.016	-3.08
Year 93	0.027	0.018	1.51
Year 94	0.074	0.019	3.94
Year 95	-.0019	0.018	-.108
Adjacent	0.0063	0.012	0.593
Near	0.0011	0.010	0.287
Constant	11.08	0.104	106.78
Adjusted R5	.858		
SEE	.0824		
F	166.4		

6 SURVEY OF RESIDENTIAL OCCUPANTS

A questionnaire to residential occupants was administered to identify residents' perceptions about the value of the greenway and the impact on property values.

The questionnaire was developed and distributed to 500 residential occupants (owner-occupants and tenants) in each of the four study areas. The response rate was high for this type of questionnaire: 32.6% overall, from a low of 27.6% to high of 40% in a given area.

Each questionnaire included a schematic of the study area and the greenway under investigation. The questionnaires, [**a copy of which is included in Appendix 1**] included several questions concerning the occupants: number of members in the household,

age and gender for each member, whether they were renters or owners, and when they moved to the property. Key questions were designed to address the occupant's use of the greenway and their perceptions of the value the greenways contributed to their enjoyment, and potentially to the value of their property.

Survey questions started with the broader issues and general decisions about what municipality to live in, and then sought to clarify the effect of the greenway on their decision to buy, their enjoyment of the property during occupancy, and finally as an advantage in the time or value on selling.

6.1 Where to Live

Table 11
Which of these factors were significant in prompting you to decide to live in this city or municipality?

Factors	Richmond	Delta	M. Ridge	Saanich	Total
Proximity to work	49.7%	43.4%	26.1%	47.9%	42.3%
Proximity to family	30.6%	20.7%	19.6%	21.9%	23.0%
Affordability	49.7%	54.0%	55.8%	61.5%	55.5%
Access to greenway	n/avail.	51.3%	54.3%	49.1%	51.2%

Table 11 summarizes the responses: affordability was the most commonly cited factor in the selection of the city or municipality in which to live. Note, however, that access to the greenway was second in the three study areas where this factor was included. Interestingly, for all respondents the greenways existed before the respondents moved into their dwelling. There appears to be no significant differences in the responses across the study areas in terms of the quality of access to the greenways, whether a more formal municipal park-like quality in Saanich, or a largely unimproved, natural condition in Delta and Maple Ridge.

6.2 Where to Live within the Community?

Table 12
Which of the following factors played a role in choosing this particular dwelling? (First choice)

Factors	Richmond	Delta	M. Ridge	Saanich	Total
Proximity to greenways	42.8%	28.1%	37.0%	32.0%	30.9%
Proximity to parks and play areas	9.5%	7.5%	15.2%	15.4%	11.6%
Proximity to schools	9.5%	42.2%	15.2%	21.9%	24.3%
Proximity to shopping	11.6%	6.5%	5.8%	8.8%	8.1%
None of the above	9.5%	4.0%	12.3%	13.0%	9.4%

Respondents were asked to rank the above factors by first, second and third priority, as influencing their choice of their home. Proximity to the greenway received the most first priority votes, as noted in Table 12; proximity to schools ranked second overall. In total, using a 3-2-1 weighting of first, second and third choices respectively, proximity to the greenways ranked significantly higher than any other factor.

6.3 Willing to Pay

Table 13
Do you think the proximity to the greenways has affected your property value?

Factors	Richmond	Delta	M. Ridge	Saanich	Total
Yes	80.9%	81.9%	78.3%	61.5%	75.0%
No	17.0%	13.6%	19.6%	38.5%	21.1%
If yes, positive?	98.4%	99.4%	94.4%	98.1%	98.6%
If yes, negative?	1.6%	0.6%	5.6%	1.9%	1.4%

Respondents were next asked whether proximity to the greenways affected their property values: overall 75% said yes, of which 98.6% felt it was a positive effect. Across the four areas, the more positive response rates proved later to be consistent with this study's statistical research on increased property values.

Focusing on those who indicated a positive effect, when asked to quantify this effect the average impact of the greenway on property value was estimated at 20.6%, consistent across the four study areas. Interestingly, statistical research indicates these estimates of positive price impacts appear to be higher than the sales data suggest. In two of the study areas this study's statistical research indicated no

evidence of positive price impacts due to proximity to the greenways. The survey results did indicate that more recent occupants felt that the price impact would be lower, perhaps because they were better informed about market rents and prices in the area.

6.4 Time to Sale

Table 14
How do you think the proximity to the greenway will affect the time necessary to sell dwellings in your neighborhood?

Factors	Richmond	Delta	M. Ridge	Saanich	Total
No impact on time to self	31.3%	23.1%	22.5%	45.6%	30.6%
Properties sell more quickly	63.9%	72.4%	70.3%	46.1%	63.2%
Properties sell more slowly	3.4%	1.0%	4.3%	3.0%	2.7%

How do you think that the proximity to the greenway will affect the turnover rate for dwellings in your neighborhood?

Response	Richmond	Delta	M. Ridge	Saanich	Total
No impact on turnover	45.6%	42.7%	36.9%	53.8%	45.0%
Higher turnover rate	11.7%	14.1%	14.5%	9.5%	13.8%
Lower turnover rate	34.7%	38.2%	42.0%	30.8%	36.3%

Note that approximately one-third of the respondents felt there would be no effect on time to sell due to proximity to a greenway, but two-thirds felt that properties would sell more quickly if they were close to a greenway.

As to building a stable neighborhood, respondents were next asked whether proximity to the greenway would affect the turnover rate of dwellings in the area. The average across the four study areas indicated that 45% felt the turnover rate would not be affected, 13.8% felt the turnover rate would be higher and 36.3% felt that greenways would reduce turnover. Subsequent comparisons with statistical data in this study indicated that turnover as a reference criteria is more affected by property characteristics and age, than proximity to greenways.

6.5 Do You Use the Greenway?

Table 15
What use do you normally make of the greenway?

Response	Richmond	Delta	M. Ridge	Saanich	Total
Walking, jogging, bicycle	90.5%	58.3%	70.3%	80.5%	73.0%
Use as a view	42.9%	55.8%	59.4%	50.9%	53.1%
Use to protect fish, wildlife, water	0%	33.2%	33.3%	22.3%	22.9%
Place to dump refuse	0%	11.0%	3.6%	5.3%	5.5%

Do you find access to the greenway easy?

Response	Richmond	Delta	M. Ridge	Saanich	Total
Yes	95.2%	72.9%	84.8%	91.1%	84.8%
No	4.8%	24.1%	11.6%	4.7%	12.1%
No opinion given	0%	3.0%	3.6%	4.2%	3.1%

Respondents were asked what use they normally made of the greenways. There was considerable variation in the responses across the four study areas, reflecting in part differences in accessibility to the greenways. At Cougar Creek in Delta, where respondents found the least access to the greenway, they also assessed it the highest in abuse. Interestingly, in Richmond, only a fraction of the respondents could actually see the greenway from their homes compared with other study areas, but it has the highest "constructive" use based on the responses in this study.

6.6 Do You Value the Greenway (non-economic)

Table 16
Do you believe the greenways contribute to any of the following?

Response	Richmond	Delta	M. Ridge	Saanich	Total
Vandalism	9.5%	22.6%	9.4%	17.8%	15.6%
Criminal activity	6.1%	15.0%	4.3%	13.6%	10.4%
Extra traffic in the area	54.4%	19.1%	16.7%	23.1%	27.6%
Walking	N/A	79.9%	90.6%	90.5%	66.9%
Nature viewing	N/A	84.4%	86.2%	85.2%	66.0%
Educational activities	N/A	67.3%	24.6%	71.0%	54.7%

Again, interestingly respondents from Kanaka Creek in Maple Ridge, who were the largest number of respondents concerned with a negative economic effect of the greenway on their property,

did not translate this through to concerns with vandalism or criminal activity. On the other hand, the restricted access in Delta's Cougar Creek seems to co-relate to increased concerns with such abuses.

When respondents later ranked the three most important benefits of greenways in their neighborhoods, general recreation was always in the top two benefits, control of flooding ranked higher in Richmond (30.6%), and preservation of wildlife ranked higher in Maple Ridge (42%), reflecting some local differences in the study areas.

Finally, respondents were asked whether they felt any "ownership" of the greenway. The intent was to explore situations where individuals have moved from a sense of private to public responsibility, or the reasons why some greenways are better managed and used than others. The responses were positive and consistent across all four study areas: roughly two-thirds said they did feel some collective ownership, one-third did not. On the other hand, given the differences in access to and care of the greenways among the four study areas, this sense of "ownership" may not be translating through to an individual sense of responsibility for management. A much more detailed survey could be useful to explore this type of relationship further.

7 CONCLUSIONS

Our general conclusions support both the perception of increased economic value on the part of those living in the study areas, and a statistical increase of increased real property prices to residential suburban properties due to proximity to a greenway. The statistical results indicated an order of magnitude of a 10% to 15% increase in value, after controlling for other factors such as age, location, and other adjacent amenities.

Of note are the further indications of increased value which are more difficult to quantify. For example:

1. Two-thirds of the respondents believed proximity would result in quicker sales, and eighty-percent indicated a sense of either neutral or lower turnover. Quicker sales have both an indirect economic benefit, but also a very real personal benefit to the well-being and options of owners. Lower turnover means more stable neighborhoods, with all of the intrinsic and indirect benefits of a greater sense of common ownership, comfort and security (which we otherwise end up paying for). Interestingly, Kanaka Creek elicited the highest negative impact effect on value (3.4%), yet respondents for

this area also indicated the highest assessment of the greenway's positive impact on turnover rate of property resale.

2. Although being able to see the greenway from a home did not seem to be essential, comments on other factors of value to respondents often seem to indirectly describe greenways. Indicative of several responses to "other reasons [for deciding where to live]" is the following: "*quiet area, family area, lots of park area around home*". At Sturgeon Bank in Richmond, only a fraction of the respondents could actually see the greenway from their homes compared with other areas, but this greenway has the highest use based on the responses in this study.

3. Access can also mean greater access for security and better management. At Cougar Creek in Delta, where respondents found the least access to the greenway, they also assessed it highest in abuse and lowest in constructive use. On the other hand, although Sturgeon Creek in Richmond has some of the best developed and maintained greenway access, the newest subdivision appears to have limited direct access to the greenway. On the other hand, in this study area the proximity to the greenway did not seem to be a negative for those homes immediately adjacent.

These conclusions must also be weighed in the context of several general conditions that applied to all four study areas:

(a) all four study areas are in middle-class urban communities and the timing of the study (1994-1996) coincided with the softening of a generally robust period of growth in the province;

(b) each of the communities has a relatively balanced job base; Maple Ridge has perhaps the largest commuter population;

(c) each of the communities remains fixated on automobile use transportation, and greenway corridors remain the exception, not the norm (survey respondents and the real estate market at the time of the study would not generally be aware of the increasing trend in the lower mainland of British Columbia to develop transportation alternatives, and looking to greenways to fulfill a wider range of public policy objectives. For instance under a Regional Greenway Vision, an interconnected system of greenways could be expected to increase the awareness of, and the value of greenways, throughout the lower mainland of British Columbia); and

(d) proximity to water tends to have a positive effect on market property values independently of a public greenway.

While studies such as this are useful in estimating the impact of greenways on property values, it is also important to bear in mind that,

(a) price effects for immediately adjacent properties are not the only economic effect of greenways, and

(b) focussing on economic effects or values is in itself limiting as economic models in many cases currently do not assess the broader range of personal, social and environmental values.

In the case of open space, its economic effect cannot be assessed entirely from the point of private market since the benefits of the greenway are not restricted to the owners/occupants of the properties adjacent to them. Indeed, greenways offer benefits to communities in addition to increasing nearby property values. Unlike purely private land uses where the benefits can be internalized by limiting them to the owners, the benefits of open space may not be so completely internalized. Greenways produce externalities which may not be included in the price or market value that the owner-occupant is willing to pay: fresh air, bird songs, recharged water systems; recreational opportunities; opportunities to learn and to see people, and community image.

This study also confirms that greenways appear to be valued by people of all ages, and across a variety of cultures. Statistics demonstrate a clear economic value demonstrated by increased residential property prices. There also appears to be an indication that both the economic and the intrinsic value of greenways increase as people have the time and resources to understand and better manage this important element of residential suburban landscapes.

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APPENDIX

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CONSIDERING GREENWAYS

changes in land values along riparian greenways

April, 1997

HOUSEHOLDER:

We are conducting a study to determine the influence of greenways with water access, streams or creeks on the surrounding property values. As a householder who lives near such a greenway, we are interested in your views on the significance of such greenways on property values. This study is part of our academic work, but we hope the results will help make the general public more aware of the impact that these types of green spaces have on property and community livability.

This survey is being funded, in part, by the Department of Fisheries and Oceans, and in part from our own research funds. Your assistance is vital if we are to obtain a representative sample. This survey is being distributed to over 500 residents in five different communities throughout BC. All individual responses will be kept strictly confidential. In order to maintain confidentiality, we ask that you do not include a return address when you mail your response in the enclosed prepaid return envelope provided with the questionnaire.

We ask that you take the very few minutes necessary to complete the questionnaire.

We thank you in advance for your assistance.

Yours sincerely,

Moura Quayle, Professor and Director, UBC Landscape Architecture Program
Stanley Hamilton, Faculty of Commerce and Business Administration, UBC

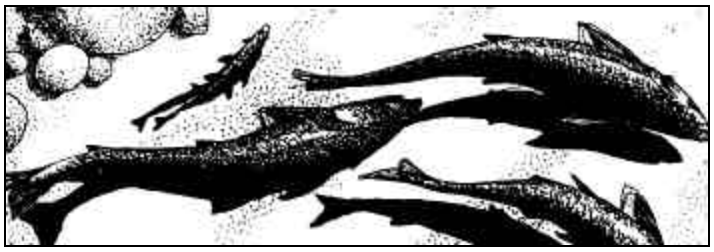

Illustration: Derek Lee

CONSIDERING GREENWAYS

changes in land values along riparian greenways

TO THE HOUSEHOLDER:

We are conducting a study to determine the influence of greenways with water access, streams or creeks on the surrounding property values. As a householder who lives near such a greenway, we are interested in your views on the significance of such greenways on property values. This study is part of our academic work, but we hope the results will help make the general public more aware of the impact that these types of green spaces have on property rents and values.

This survey is completely voluntary, but your cooperation is vital if we are to retain a representative sample. All individual responses will be kept strictly confidential. To ensure confidentiality, we ask that you do not include a return address when you mail your response in the enclosed prepaid return envelope provided with the questionnaire. The questionnaire should take approximately 20 minutes to complete.

Moura Quayle, *Professor and Director, UBC Landscape Architecture Program*
Stanley Hamilton, *Faculty of Commerce and Business Administration, UBC*

❖ GENERAL HOUSEHOLD INFORMATION

1. Please indicate how many people live in this dwelling.

   ❑ persons

2. Please list the age and the gender of each person who normally lives in this dwelling.

person	age	gender
1		
2		
3		
4		
5		
6		
7		
8		

3. Do you rent or own this dwelling?

   ❑ owner-occupier

   ❑ renter

4. When did you first move into this dwelling?

   year 19____

5. Which of the factors were significant in prompting you to decide to live in this city or municipality?

   ❑ proximity to work

   ❑ proximity to family

   ❑ affordability

   ❑ access to recreation/greenways

   ❑ other reasons (please specify) _____

   _____

6. Which of the factors played a role in choosing this particular dwelling? (Please rank 1, 2, 3 for the first, second and third most important reason: 1 is the most important)

   ❑ proximity to greenway?

   ❑ proximity to parks and play areas?

   ❑ proximity to schools?

   ❑ proximity to shopping?

   ❑ none of above

   ❑ other (please specify) _____

   _____

   _____

❖ EFFECTS OF GREENWAY

7. Do you think that the proximity of the greenway has affected your property value?

   ❑ yes ❑ no

8. **IF** your answer to question 7 is **YES**, has the affect been *positive* ❑ or *negative* ❑?

9. **IF** the answer to question 7 is **YES**, what percent impact do you think the greenway has had on your property value?

   ❑ Percent impact

10. How do you think the proximity to the greenway will affect the time necessary to sell dwellings in your neighbourhood?

    ❑ no impact on time to sell

    ❑ properties near the greenway sell *more quickly* than others in neighbourhood

    ❑ properties near the greenways sell *more slowly* than others in neighbourhood

11. How do you think that the proximity to the greenway has affected the turnover rate for dwellings in your neighbourhood?

    ❑ no impact on the turnover rate

    ❑ higher turnover rate than other neighbourhoods

    ❑ lower turnover rate than other neighbourhoods

12. Is it your impression that your neighbours think that the proximity to the greenway has a positive or negative impact on prices?

    ❑ positive impact ❑ negative impact

❖ USE AND MAINTENANCE OF THE GREENWAY

13. What use do you normally make of the greenway?

    ❑ use as walking, jogging, bicycle trail

    ❑ use as a view

    ❑ use to protect fish, wildlife and water quality

    ❑ place to dump organic refuse

14. Do you find that access to the greenway is easy?

    ❑ yes ❑ no

15. Do you believe that the greenway contributes to any of the following activities in your neighbourhood?

	yes	no
vandalism		
criminal activity		
extra traffic in the area		
walking		
nature viewing		
educational		

16. What do you think are the most important benefits of greenways in your neighbourhood? (Please rank the first, second, and the third most important – 1 most important).

    ❑ control of flooding

    ❑ preservation of the fish habitat

    ❑ recreational amenity – trails

    ❑ increase in total neighbourhood greenspace

    ❑ place for children to play

    ❑ increase in biodiversity

17. Do you feel any ownership or responsibility for the greenway?

    ❑ yes ❑ no

18. Who maintains the greenway in your neighbourhood?

    ❑ Municipal Parks Department

    ❑ Regional District

    ❑ Department of Fisheries and Oceans

    ❑ Ministry of Lands, Parks and Housing

    ❑ Local streamkeepers group

19. Is the greenway visible from your house or condominium?

    ❑ yes ❑ no

Thank you very much for your assistance.

If you would like a copy of our research, please call 604-822-4481, fax 604-822-1660, email larc@unixg.ubc.ca or mail us a request. We will be pleased to send you a summary of our findings.

Moura Quayle,
Professor and Director, UBC Landscape Architecture Program
Stanley Hamilton,
Faculty of Commerce and Business Administration, UBC

Map of appropriate case study included here