Breaking New Ground

Urban Residential Development and the Environment

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Executive Summary

In western Canada, there is strong demand for residential development in and around large urban centres. Two forms of development are taking place: 1) suburban development at the edge of cities and 2) country residential development in rural municipalities around the periphery of cities. Residential development provides many benefits including jobs, increased housing stock, and a broader tax base. However, there are also costs associated with new residential development. These costs are most often associated with traditional infrastructure (roads, water and waste water services), but there are also environmental costs. Environmental costs tend to receive less attention, and when they do, the focus is usually on effects at the individual level (e.g., household water consumption). Although this situation is starting to improve and gain more attention, there are large-scale ecological effects that continue to require greater consideration.

The environmental costs of current development and the potential benefits of alternative, "greener" approaches are not well understood and are not a policy priority in western Canada. *Breaking New Ground* aims to rectify this situation and draw attention to the shortcomings of current public policy and promote the need for change.

Breaking New Ground outlines the environmental costs of current development, highlights the potential economic and environmental benefits of integrating natural features and ecological services into community design, identifies the problems in current public policy, and provides recommendations to enhance residential development policy. The overall intent of this report is to encourage policymakers, the development industry, consumers, residents and other interested parties to work together to enhance the public policy framework and find creative solutions that are economically, socially, and environmentally sustainable in the long-term. To encourage and enhance the debate around urban growth and the environment, *Breaking New Ground* recommends the following public policy actions:

- Government (municipal, provincial and federal) should explicitly recognize the full range of environmental costs associated with residential development and adopt proactive policies designed to address these costs.
- Greater intergovernmental cooperation and large-scale ecological planning should be adopted.
- Governments should explore and adopt the use of creative regulatory and economic incentives to encourage alternative residential development options.
- Governments should explore ways to more fully account for the environmental costs and benefits of various urban forms and residential development options, and integrate full-cost accounting into residential development policy.

I. Introduction

A growing city and new housing construction are signs of prosperity and are sought after by a wide range of interests. Urban growth means more jobs, a larger market, and a bigger tax base. At the same time, growth brings with it a series of challenges, unintended consequences, and hard costs. An expanding tax base, for example, is great but less alluring if it means massive capital outlays in the short-term to build new infrastructure. A growing city is a good thing, but it needs to be managed in order to maximize its benefits and minimize its costs.

Urban residential development is driven by the demand for housing created by existing residents wishing to purchase a home or relocate and by the arrival of new residents. On the positive side, residential development generates revenues for developers, investors, architects, construction companies, and the real estate industry, supports jobs in construction and related industries, produces economic spin-offs, broadens the property tax base, energizes the real estate market, and expands the housing stock available to both new and current residents. On the negative side, residential development can – depending on how it takes place – lead to less compact and, in turn, less efficient cities, increase pressure on municipal infrastructure, and generate both short- and long-term environmental costs. The reduced efficiency (e.g., traffic congestion) and increased infrastructure costs that follow in the wake of certain forms of residential development are relatively well-understood whereas the *environmental side-effects* of residential development are often either unseen, hard to measure, or ignored. As a result, public policy often fails to fully account for the environmental deficit created by some forms of residential development.

Many of the environmental costs of residential development are unavoidable, but others can be minimized or avoided altogether. In either case, the trade-offs need to be explicitly recognized and managed rather than treated as an afterthought or a low priority trumped by other more immediate or more visible concerns.

Much of the debate surrounding urban growth is polarized into two camps – growth and development versus the environment. This report highlights that common ground can be found in this debate. Our aim is to draw attention to the critically important trade-offs and the innovative ways that public policy can proactively minimize the environmental costs of residential development and, by so doing, strike a better balance between urban growth and the environment.

Breaking New Ground is a part of the *Urban Growth and Land Use Initiative* and is a component of the Canada West Foundation's *Western Cities Project*. This initiative aims to draw attention to the environmental costs of current residential development practices and the potential benefits of alternative approaches. The overall goal is to generate greater awareness, advance debate among key interest groups (policymakers, the residential development industry, consumers, residents, and nonprofit sector) and encourage the development of stronger policy tools to minimize the environmental effects of residential development. Specifically, *Breaking New Ground:*

- Identifies key interests in residential development – both urban and country residential;
- Examines how urban and rural residential growth affects the environment in western Canada;
- Assesses the policy capacity of governments to address the environmental effects of residential development; and
- Identifies policy options that have the potential to lessen the environmental effects of current development practices.

Breaking New Ground examines two types of residential development: 1) suburban development occurring along the urban fringe as cities encroach into rural areas; and 2) low-density, country residential development occurring in rural municipalities around the periphery of cities. A city's legal limits mark the dividing line between these categories of development.

II. Methodology

Extensive consultation with key stakeholders and secondary analysis of existing literature were used to collect information about the environmental effects of residential land use and the role of public policy in this area. Focus groups were conducted in April and May 2004 in five major western Canadian urban centres – Calgary, Edmonton, Regina, Saskatoon, and Winnipeg.

During the initial stage of the project, potential participants in each city were identified and a diversity of participants were invited to represent a range of key interests including developers, home builders, municipal government, provincial government, federal government, consultants, real estate industry, academics, and environmental and agricultural groups. Total participant numbers were: Calgary 15, Edmonton 18, Saskatoon 8, Regina 12, and Winnipeg 12.

The intent of the focus groups was to gain an understanding of current residential development trends in each city, discuss environmental issues related to residential development, assess the policy capacity of municipal governments, and debate recommended changes to policy and the current approach to residential design and development.

The feedback gathered at the focus groups forms the inspiration for the arguments made in this report. The focus group findings were supplemented with telephone and in-person interviews with a limited number of key informants and a review of relevant literature.

III. Key Interests in Residential Development

An array of interests are involved in residential land development including the development industry, government (municipal, provincial, and federal), consumers, residents, and nonprofit organizations.

The Development Industry

The residential development industry is complex and involves a variety of groups. From design, approval and construction to financing and marketing, members of the development industry are involved at all stages of residential development. The main players in the development industry include land developers, architects and designers, home builders, construction contractors, consultants (engineers, planners, landscape architects, and environmental specialists), real estate companies, utility companies and financial institutions. Industry members purchase land for future development, conduct market research, develop residential projects from individual homes to large communities, and perform a host of other functions related to the construction of new homes. The development industry also works with municipal governments and city residents to gain approval for proposed projects.

Government*

Municipal governments in Alberta play a central role in residential land development. They are responsible for approving land use changes, subdivision and development. Municipal governments in Alberta are also responsible for creating local land use policies

* Readers should note that, because of significant variations in the role played by municipal and provincial governments among the four western provinces, this section refers to the Alberta case only and is not necessarily generalizable to other jurisdictions. In the absence of a systematic review of provincial and municipal land use policy and process in the four western provinces, this section provides an example of the complex intergovernmental relationships that determine residential land use policy.

such as municipal development plans and land use bylaws, and in some cases are themselves large landowners. These policies and decisions are local in nature and do not apply to other areas. Alberta had regional planning commissions to plan and manage growth on a larger, regional scale until 1995, but they were dismantled when the new *Municipal Government Act* was passed. This change has been accompanied by increased conflict and competition among individual municipalities and a loss of policy coordination and planning on a regional level. The lack of a regional political structure to help plan for and manage residential development is not limited in the West to Alberta, but is also absent in Saskatchewan and Manitoba.

Although the provincial role in residential development has become more "hands-off," the province remains an important player. The provincial government is responsible for developing overarching, standardized policies that direct the decisions of individual municipalities. Ultimately, the province determines the powers and authorities given to municipal governments. The provincial government also provides some financial assistance to municipalities for service and infrastructure projects.

The federal government has an even less direct and somewhat unintentional role in residential development on private land. The federal government influences urban form (development patterns) and indirectly influences residential development through fiscal policies and programs for municipal infrastructure. Such policies include GST rebates on municipal infrastructure and one-time grants for waterfront revitalization or brownfield redevelopment. And recently, federal government departments such as Agriculture and Agri-Food Canada have expressed concern over the rapid expansion of residential development into rural landscapes. Although the fiscal policies of all orders of government affect urban form (including where and how development takes place), there is little coordination between the federal, provincial and municipal governments. This lack of coordination can result in the policies of one government being undermined by those of another.

Consumers

Consumers have a direct role in residential development. Consumers create the demand for developers and home builders to construct new homes. This demand comes from both new residents moving to an urban area and by those who already live there and want to purchase their first home or a different home. Although it is not clear how much influence consumers have on the type of residential development that takes place or if they simply buy what is available, it is likely that strong consumer preferences would lead to a market response.

Residents

Residents affected by a development project also have a role to play. Residents and the public in general can influence the decision-making process through a variety of means including community organizations, public consultations, and media campaigns. Three examples in the Calgary region illustrate this role: 1) a high-density apartment complex proposal has been put on hold because of opposition from local residents; 2) the construction of a new home of unusual design in an established neighbourhood was blocked by local residents; and 3) a proposal to develop a natural area in the nearby Town of Strathmore was rejected after local residents argued against it.

Nonprofit Sector

In recent years there has been growing discussion of the advantages and disadvantages of our current approach to residential community design. Academics have raised concern over quality of life and quality of place, the efficiency of different urban forms, and the environmental costs of outward growth and some forms of residential development. Nonprofit organizations are

interested in this debate as well. Environmental groups are concerned with the sustainability of land and water resources, and emphasize the negative consequences of land consumption and car-oriented suburban design. Agricultural groups are becoming more vocal about the loss of productive land to support new roads and housing projects, and alternative planning and design groups are starting to emerge in Canada. Groups such as Smart Growth BC are promoting alternative residential design patterns that reduce the financial, social, and environmental effects of current practice. Presently, academics and nonprofit organizations are not formally involved in the design of new residential areas. However, their ideas can be put forth in the municipal approval process and may have an effect on consumer demand and public opinion.

Summary

The diversity of these groups, their competing interests and the division of power (who makes the decisions) add to the complexity of residential development in western Canada. Of particular interest in this report is how each key interest can benefit from alternative residential designs. The development industry can save money on infrastructure and could increase the number of lots adjacent to open space, thus increasing their selling price. Municipal governments could improve the quality of their cities and in turn the quality of life for those who live there. This is advantageous in attracting new businesses and residents. Consumers can live in "healthier" communities – healthier in terms of economic, social, and environmental sustainability. Home owners can benefit from faster resale of their homes and at higher prices – especially for homes located in alternatively designed neighbourhoods. Academics and nonprofit organizations can benefit from having their concerns addressed and their research findings and ideas integrated into a new approach to residential development.

IV. Growth and Development in Western Canadian Cities

Put simply, the West is growing (see Figure 1). With the exception of Regina, all western Canadian Census Metropolitan Areas (CMAs) experienced increasing population between 1996 and 2003. During this time period, Calgary recorded the strongest population increase (20.6%), Edmonton experienced the second greatest growth with a population change of 12.2%, and Vancouver ranked third with an 11.9% increase.

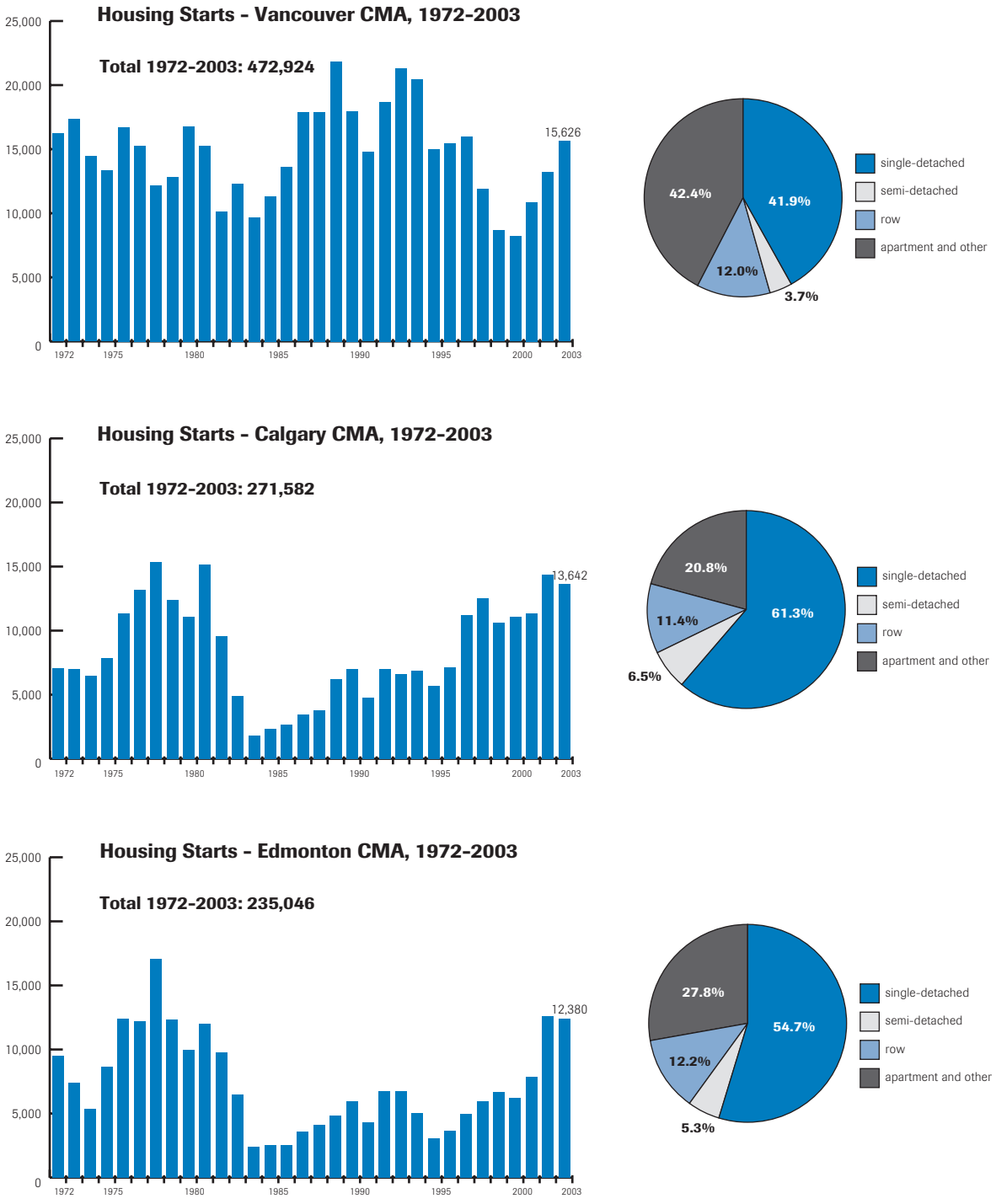
Figure 1: Population Growth in Select Census Metropolitan Areas, 1996-2003

Year	Vancouver	Victoria	Calgary	Edmonton	Regina	Saskatoon	Winnipeg	WEST	Toronto	Montreal	Ottawa
1996	1,906,704	316,358	843,112	883,208	199,146	225,375	678,644	5,052,547	4,392,186	3,379,179	1,020,903
1997	1,958,228	318,468	871,756	896,682	198,408	226,908	678,016	5,148,466	4,481,521	3,395,090	1,030,648
1998	1,985,400	319,009	903,201	915,280	198,296	228,851	679,034	5,229,071	4,565,195	3,411,473	1,043,286
1999	2,012,560	320,380	928,409	931,083	198,618	230,038	682,298	5,303,386	4,645,587	3,437,543	1,058,969
2000	2,040,295	321,828	952,459	946,845	197,966	230,313	686,430	5,376,136	4,746,121	3,471,062	1,080,725
2001	2,076,098	325,400	976,730	961,438	196,817	230,843	690,085	5,457,411	4,882,514	3,507,182	1,105,663
2002	2,110,615	326,760	1,000,165	978,593	196,579	231,917	693,190	5,537,819	5,011,879	3,542,537	1,119,795
2003	2,134,286	326,668	1,016,616	990,525	197,016	233,939	698,210	5,597,260	5,101,610	3,574,516	1,132,181
% change	*11.9*	*3.3*	*20.6*	*12.2*	*-1.1*	*3.8*	*2.9*	*10.8*	*16.2*	*5.8*	*10.9*
raw change	*227,582*	*10,310*	*173,504*	*107,317*	*-2,130*	*8,564*	*19,566*	*544,713*	*709,424*	*195,337*	*111,278*

Source: Derived from Statistics Canada data.

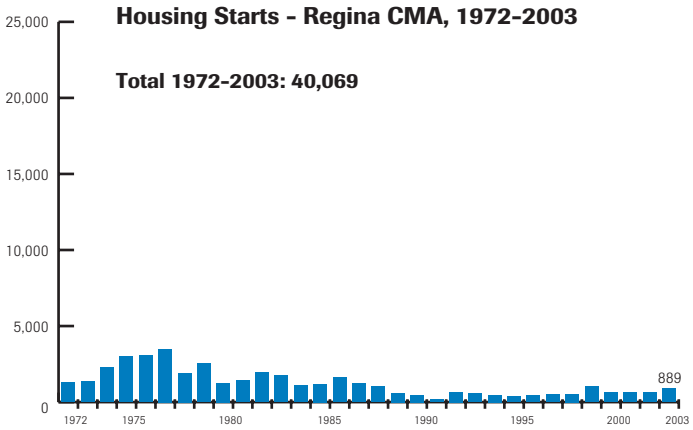
To illustrate the cumulative effect of residential development over time, housing starts data from 1972 to 2003 have been selected to highlight trends in the housing industry in western Canadian cities. The number of housing starts in Vancouver, Calgary, Edmonton, Regina, Saskatoon, and Winnipeg fluctuated between 1972 and 2003 (see Figure 2). Despite an overall population decrease (1996 to 2003), Regina has experienced positive residential growth, and housing starts reached 889 in 2003. Between

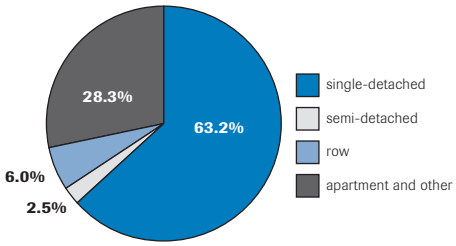
Figure 2: Housing Starts, 1972-2003

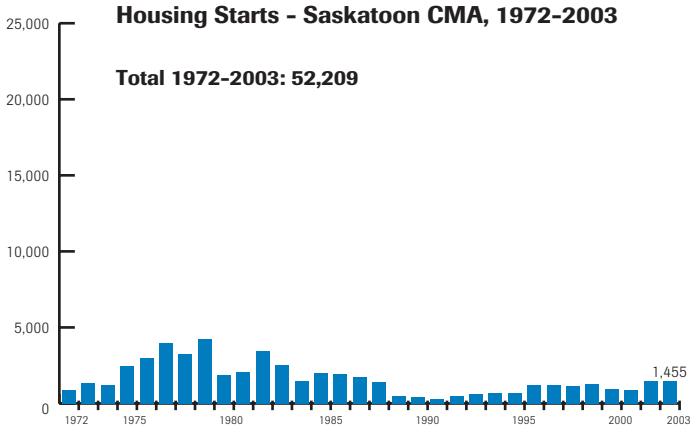


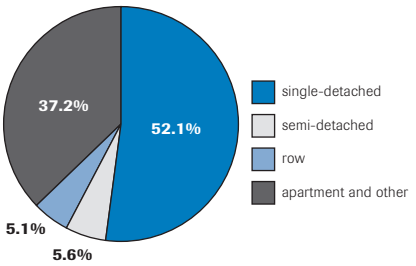
Source: Derived from Statistics Canada data.

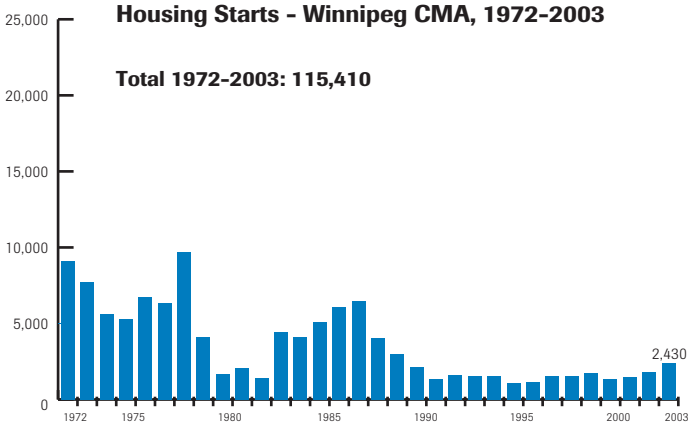
Figure 2: Housing Starts, 1972-2003 continued

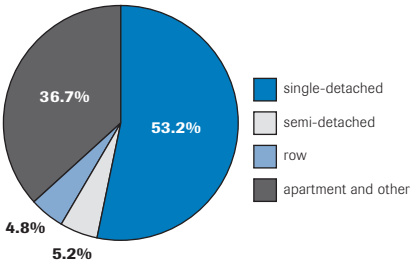












Source: Derived from Statistics Canada data.

1972 and 2003 there were a total of 472,924 housing starts in Vancouver, 271,582 in Calgary, 235,046 in Edmonton, 40,069 in Regina, 52,209 in Saskatoon, and 115,410 in Winnipeg. Comparing the type of housing starts that took place is also interesting. Over 50% of the housing starts in Calgary, Edmonton, Regina, Saskatoon, and Winnipeg were single-detached houses. The highest proportions of single-detached houses were started in Regina (63.2%) and Calgary (61.3%). In contrast, the housing starts in Vancouver were 42.4% apartment style (and other) developments, followed by 41.9% for single-detached houses.

To account for the differences in population and to allow for comparison between CMA housing starts, Figure 3 illustrates the rate of housing starts per 1,000 population. Between 1996 and 2003, the rate of housing starts experienced ups and downs in each CMA. Overall, Calgary experienced the greatest rate and Edmonton the second greatest rate of housing starts compared to Vancouver, Regina, Saskatoon, and Winnipeg. In comparison to the average rate of housing starts recorded by all CMAs in Canada, Calgary, Edmonton, and Vancouver experienced greater rates of housing starts between 1996 and 2003.

Figure 3: Housing Starts Per 1,000 Population

	Vancouver	Calgary	Edmonton	Regina	Saskatoon	Winnipeg	WEST*	Canada CMAs	Canada All Areas
1996	8.1	8.4	4.1	2.2	5.4	1.7	6.1	4.3	4.2
1997	8.1	12.9	5.5	2.6	5.2	2.2	7.3	5.3	4.9
1998	6.0	13.8	6.5	2.7	5.0	2.3	6.8	5.1	4.6
1999	4.3	11.4	7.1	5.1	5.5	2.6	6.0	5.5	4.9
2000	4.0	11.6	6.6	3.1	4.2	1.9	5.6	5.7	4.9
2001	5.2	11.6	8.2	3.2	3.9	2.1	6.4	6.0	5.2
2002	6.3	14.3	12.9	3.3	6.4	2.6	8.5	7.5	6.5
2003	7.3	13.4	12.5	4.5	6.2	3.5	8.8	7.9	6.9
Average	*6.2*	*12.2*	*7.9*	*3.3*	*5.2*	*2.4*	*7.0*	*5.9*	*5.3*

*Vancouver, Calgary, Edmonton, Regina, Saskatoon, Winnipeg
Source: Derived from Statistics Canada data.

V. Environmental Costs

Discussions of housing-related environmental issues and concerns tend to concentrate on individual homes and automobile use – particularly on energy and water consumption. Although these are critical elements in the sustainability equation, there are larger scale ecological effects that result from restructuring and reshaping the landscape to support new residential development. Unlike individual homes, these larger scale effects are difficult to undo. Retrofitting the landscape is difficult if not impossible. Historically there has been a lack of attention paid to the ecological consequences of development. Even as concern for the environment is increasing, cities – the places where most people in Canada live - continue to be bypassed by this movement. This situation is slowly changing and the impacts of residential development are starting to gain attention. The cumulative impacts of both urban/suburban and country residential development need to be understood by all parties and addressed by public policy.

Land

Land is a finite resource. This is difficult for many people to appreciate, especially in the prairie provinces where there seems to be limitless land. The consumption of wild and working (agricultural) lands to support residential development is becoming a concern. There are two forces at work here. One is urban expansion outward and suburban growth at the edge of the city. The second is the increasing popularity of large “dream homes” out in the country. Acreage development or country residential development

is popping up around the periphery of cities. These developments portray a false sense of environmental sustainability. They visually appear more environmentally sound (e.g., because of the presence of trees), but country residential development actually consumes more land than the same number of houses built within a city. Development within cities tends to be denser than development in surrounding rural areas because of the water well and septic tank requirements in unserviced areas.

Once land is slated for development, the structure of the landscape is modified to accommodate housing. This is true for both suburban and country residential development. There are changes to the physical/topographic character of the landscape that can alter ecosystem structure (what is on the landscape – e.g., removal of vegetation). Changes to the landscape can also impact how the land functions ecologically (such as the availability of soil nutrients). The resulting ecological effects are not confined to the immediate development site and can extend well beyond into surrounding undeveloped areas.

Cities are not closed environments. Instead they are connected to larger, surrounding landscapes. Rivers and streams provide natural links between urban habitats and open spaces outside the city. These movement corridors have been found to increase migration and the abundance of wildlife found in the urban environment. However, landscape changes to accommodate new residential development impacts the quantity and quality of habitat found in urban areas and fragments natural linkages. In general, residential development can cause habitat loss, fragmentation, disturbance and generalization, all of which create challenges for the survival of native biodiversity.

Habitat loss to settlement is not new, but the dramatic increase in the rate of loss is new (Terris 1999). The loss of habitat is essentially caused by the removal of grasses, flowers, shrubs, trees, wetlands and watercourses during development. Wildlife species are dependent on these habitats for food, shelter, water and space. Without the presence of habitat, many species are unable to adapt and survive in urban environments. Urban habitat is important for the persistence of biodiversity and also for the ecological services (functions) it provides – services important to humans as well as wildlife. These services include primary productivity, nutrient cycling, and water infiltration, filtering and storage. Ecological services can also help to control erosion, siltation and nutrient inputs into streams and rivers – providing natural water quality and aquatic ecosystem protection. Without habitat areas, these services become limited and often require the construction of human systems to do the same job. For example, habitat areas are able to capture, store and treat storm water runoff. Without habitat, storm water sewers are needed to transport the runoff away from residential areas to nearby rivers and streams to avoid flooding. These constructed systems are not free and can be hefty financial burdens for cities.

Development fragments habitat – cutting it into smaller pieces and disconnecting it from the regional ecosystem. Fragmentation is considered a principal threat to biodiversity (Forman 1995) since it inhibits ecosystem function, including species movement and migration in the landscape. Roads, houses and fences create barriers to movement and often encircle remaining habitat. Wildlife populations contained in smaller habitat areas shrink in number and risk extinction as food supplies and mating opportunities decrease (Gillham 2002). Fragmentation also alters the edge of habitat areas. “Edge conditions” increase as microclimatic conditions change (such as increase in wind and sunlight) and new species are introduced. Generalist species (such as deer, skunks and coyotes) can eventually take over habitat. However, not all species react the same, as certain species are more sensitive to fragmentation than others. Fragmentation results from greenfield suburban development, but also from country residential development.

Continual disturbance in the urban environment creates unstable conditions, which increases the number of non-native and invasive species in the landscape (Hough 2001). Disturbance changes plant species composition and the availability of nutrients in the soil. Native plant communities have an especially hard time adapting to urban conditions (Hough 2001), which undermines biodiversity. Native plants function differently than non-native species; therefore, the ecological services provided by native plants will not be maintained when the species composition changes. However, not all types of disturbance are negative – certain habitats are dependent on natural disturbance regimes, such as fire, to regenerate. When these habitats are incorporated into urban areas, disturbance generally is prohibited, causing changes to species composition and abundance. For example, it may be difficult to gain resident support for annual burns in a habitat area that is surrounded by housing development.

Almost no on-site wildlife can survive the transformation of a wetland to a Wal-Mart. Changes in species composition, in particular the loss of native plant species, causes the decline of native biodiversity and the introduction of non-native species (Zipperer, Wu, Pouyat and Pickett 2000). The end result is habitat generalization – habitat lacking plant and wildlife diversity. The loss of biodiversity drastically alters how the ecosystem functions, creating an imbalance in the system. For example, urban areas are often devoid of top predators, which causes the population of other species to flourish. This is the case in many urban areas that suffer from escalating deer populations.

The variety of species, plant and wildlife, found in the urban environment can also be influenced by resident choice and behaviour. Many residents prefer ornamental landscaping in their front and backyards and manicured park spaces that look "tidy." Often native species are removed to accommodate residents' preferences, adding to the loss of native diversity in the urban environment. In addition, the presence of pets in urban areas also effects the presence and diversity of wildlife. Some native wildlife species, including birds, do not adapt to the continual disturbance caused by cats and dogs in their smaller, fragmented habitat areas.

Cities need ecological diversity. An ecologically diverse city has a higher quality of life. A city with a variety of wetlands, forests and wildflowers is more interesting and offers greater choice to residents. Maintaining ecological diversity in urban areas is key to long-term quality of life for the people who reside there.

Agriculture

Productive agricultural land is a finite and irreplaceable resource. It provides both market and non-market goods (America Farmland Trust 2003). Alberta is the second largest agricultural producer in Canada, contributing 20.5% of the national farm cash receipts from primary agriculture (Agriculture, Food and Rural Development 2004). The agri-food industry contributed 3.1% to the province's Gross Domestic Product in 2002, of which 1.6% was generated by primary agriculture (Agriculture, Food and Rural Development 2004). Agri-food industries employ many Albertans – 94,000 people in 2003, of which 68,200 were employed in primary agriculture (Alberta, Food and Rural Development 2004). In terms of non-market goods, well-managed agricultural land provides food and cover for wildlife, helps to control flooding, protects wetlands and watersheds, provides areas for groundwater recharge and assists in improving air quality (through carbon sequestration). There are also cultural and aesthetic values generated by agricultural land – social heritage, community character, scenic amenities and open space. In other words, it provides ecological and social services that benefit urban and rural areas on top of the money generated by the production of agricultural goods. However, agricultural land is under pressure. Farm and ranch lands are being bought up and subdivided into housing developments. The conversion of agricultural land to residential development is occurring at the suburban fringe as cities encroach into rural areas and country residential development is popping up in rural municipalities. These transformations are permanent and irreversible.

Despite the size of Canada, dependable agricultural land (fertile, high quality land) is a relatively scarce resource. Approximately 7% of Canada's land mass (673,000 square kilometres) is under agricultural production, of which only 5% is considered dependable. Between 1971 and 1996, urban dwellers grew from 16.4 to 22.5 million persons, a 37% increase (Hofmann 2001). During this same period, 12,000 square kilometres of land across Canada was consumed for urban uses. Of this, approximately half (5,900 square kilometres) was dependable agricultural land – forcing agricultural production onto marginal or poorer quality land and increasing the use of chemicals to increase yield. Although the loss of high quality agricultural land to urban expansion is often associated with British Columbia and Ontario, the loss of Class 1 land (the best quality land) is also happening in Alberta, Saskatchewan, and Manitoba. Approximately 6% of Alberta's, 1% of Saskatchewan's and 3% of Manitoba's Class 1 land was consumed for urban purposes between 1971 and 1996 (Hofmann 2001). This may not sound significant until you consider the total amount of Class 1 land available in each province – only 1.2% of Alberta, 1.5% of Saskatchewan and 0.25% of Manitoba is Class 1 land (Hofmann 2001).

Although agricultural land is being lost to urban growth in and around all western Canadian cities, only the Calgary and Edmonton focus groups and interviewees from Vancouver noted this loss as a major issue. This could be attributed to the rapid rate of residential expansion occurring in these cities in comparison to Saskatoon, Regina and Winnipeg.

The permanent and cumulative loss of agricultural land is a major concern, but the fragmentation of agricultural land is also an important issue. Chopping up large tracts of farmland and building "dream homes" in rural areas is resulting in conflicts between farmers and non-farming residents. Conflicts arise over issues such as the noise, dust and odours generated by agricultural operations. Also, it is becoming more difficult for producers to move livestock and machinery between fields. These conflicts affect the productivity of agriculture and the quality of life for both farmers and non-farm residents.

"Agricultural areas are facing increasing pressure for growth because rural municipalities want more revenue. There is this perceived notion that more growth equals more money, but this is not necessarily true. City people move out to the country and demand more services."
– Winnipeg focus group

Water

The development of new residential communities alters how water is collected, moved and filtered by the landscape – creating an altered hydrological environment. Aquifers can be covered by development, wetlands can be drained and watercourses can be channelized. Asphalt and concrete replace soil, buildings replace trees, and pipes and storm sewers replace the natural watershed. Put simply, impervious surfaces replace natural land covers. The amount of impervious surfaces in the urban environment directly affects water quantity, quality and aquatic ecosystems.

Natural land covers encourage the infiltration and horizontal movement of water into wetlands, lakes, streams and aquifers. Impervious surfaces such as roads, houses and parking lots reduce the infiltration of water and can result in flash flooding and erosion. Lacking infiltration areas, the urban environment uses storm sewers to collect and transport runoff away from development and into nearby streams and rivers. As a result, urban environments have increased quantities of runoff entering streams, which can cause erosion, and decreased quantities of groundwater recharge. These changes create imbalances in the system.

Runoff is not just a water *quantity* issue, but it also has negative effects on water *quality.* Runoff can transport sediment, nutrients, pesticides, heavy metal contaminants, fecal material, and various parasites from urban areas and dump them into nearby rivers and streams. The input of these pollutants into surface and groundwater supplies impacts water quality for both humans and aquatic ecosystems.

Surface and groundwater pollution caused by leaky septic tanks was identified as an environmental issue at each focus group. Septic systems are commonly used in low-density, country residential development. As more and more development takes place in rural areas lacking water and waste water services, the number of septic tanks will also increase, heightening the potential for water pollution.

Urbanization of the landscape also impacts the structure and function of aquatic ecosystems. Changing the flow of a river (increase, decrease, diversion, channelization) has ecological consequences – altering the growth, survival and relative abundance of native aquatic and riparian species. Changes that result in different light, temperature, and water conditions can alter species composition, which can lead to a takeover by non-native, invasive species (Strange, Fausch and Covich 1999).

Riparian habitat is an important component of the aquatic ecosystem, providing natural water quantity and quality controls. Riparian areas can absorb and store water, which reduces bank erosion and downstream flooding. Also, riparian vegetation can filter pollutants carried by storm water runoff. Through their root system, plants filter and uptake nutrients providing water quality protection - often non-native species cannot perform these same ecological services (Strange, Fausch and Covich 1999). The importance of riparian areas as habitat, as movement corridors, and as regulators of water quantity and quality is gaining attention in urban areas.

Air

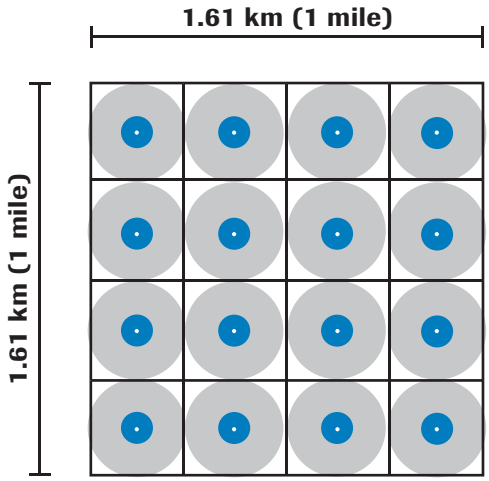
An environmental concern that was raised during each focus group is the relationship between urban form and air quality. The pattern of new communities (proximity of homes to grocery stores, to public transit, to the places where people work) is directly related to automobile use. It is difficult to promote the use of public transit to someone who has to walk more than 10 minutes to the nearest bus stop (Barnett 2003). This design leads to increased traffic congestion, longer commute times and lower air quality. In other words, we can see and feel the negative effects of our current community designs. Air quality is becoming a hot topic and various levels of government are developing programs to address this environmental concern.

Summary

The diversity and magnitude of these environmental costs highlight the need to find a new approach that better integrates the built and natural environments. However, alternative approaches do *not* necessarily mean drastic changes. In other words, we are not suggesting that all residents must live in high-rise towers in the inner city. In fact, *alternative approaches might not actually look that different.* In some cases, even changes to the pattern of development can result in a diversity of benefits and at the same time minimize the environmental cost (see Figure 4). For example, rethinking how we arrange houses in the community can leave more land leftover to be integrated into an open space network that can provide multiple benefits – recreation, aesthetics, environmental, and economic.

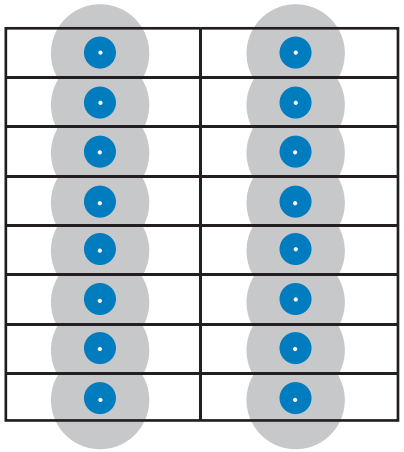
Alternative strategies are not new, but are slow to emerge in public policy. Some strategies that are getting attention include brownfield redevelopments, increasing densities in desired areas, mixed-use designs, and transit-oriented development. These

Figure 4: Alternative Development Patterns



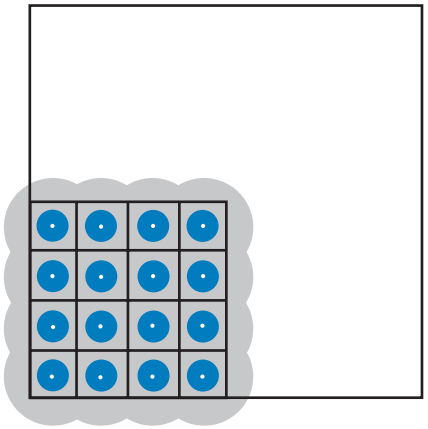
Regular Dispersion: 16 dwelling units on 16 new parcels of 16 hectares (40 acres) each

The long distance disturbance effect of 500 metres (1,640 feet) indicated by the gray circles degrades the habitat of the entire original parcel of 259 hectares (640 acres)



Half-Linear Dispersion: 16 dwelling units on 16 new parcels of 16 hectares (40 acres) each

The long distance disturbance effect of 500 metres (1,640 feet) degrades approximately 62% of the habitat of the original parcel



Clustered Dispersion: 16 dwelling units on 16 new parcels of 4 hectares (10 acres) each

The long distance disturbance effect of 500 metres (1,640 feet) degrades approximately 34% of the habitat of the original parcel

The white dot is the building location. The blue circle is the a 100 metre (328 feet) disturbance zone and the gray circle is the 500 metre (1,640 feet) disturbance zone.

These simplified examples of alternative country residential development patterns illustrate the potential of innovative thinking to have a profound influence on the ecological outcome of residential development. In the clustered dispersion case, you have the same number of single-detached homes as in more typical dispersions, but you end up with a substantial parcel of open space that can be used to maintain habitat, wetlands, and other natural features. This diagram also shows that *patterns* of development are as important as overall *density.*

Adapted from Barton (2002) and from Theobald, Miller and Hobbs (1997).

strategies focus on how to better design the built environment to create more compact and efficient cities. Although they do not have a direct focus on the natural environment, they can have indirect environmental benefits. For example, by increasing the housing available in already developed areas (such as old industrial sites), pressure for the consumption and transformation of land at the edge of cities can be reduced. This is an approach that Edmonton is pursuing. The City of Edmonton has recently developed policies to encourage redevelopment in older neighbourhoods to take advantage of existing infrastructure. One initiative is the Belgravia development featuring a 56 lot residential development on an old commercial site. Also, better designing communities to encourage the use of public transit can reduce car dependency and improve air quality.

In addition to these initiatives, alternative community designs with a direct focus on minimizing environmental costs are emerging in western Canada. Like traditional infrastructure, green infrastructure – an integrated network of existing streams, green streets, greenways, parks and riparian areas – can be used as a foundational support system for development. In Surrey, British Columbia's East Clayton Neighbourhood Concept Plan, green infrastructure was a key component of design from the onset of the project. Its purpose is to maintain predevelopment water conditions (infiltration), uphold the quality of stream ecosystems and reduce the upfront and long-term maintenance costs of gray infrastructure (pipes and sewers). When comparing the costs of infrastructure in a conventional versus an "alternative, green" community, the use of green infrastructure can reduce infrastructure costs by approximately 35% (Condon and Isaac 2003). Thus, green infrastructure has the potential to reduce both financial and environmental costs of current development practice.

Other examples of community design that capitalize on existing natural features and the ecological services they provide are setting the stage and providing important case studies for Canada. Calgary, Saskatoon and the Township of Langley (British Columbia) provide good examples of the diversity of opportunities available to reduce environmental costs of traditional development. In Calgary, the community of RockBorough Manor was designed without traditional stormwater infrastructure. Instead, the development integrates vegetated swales and wetlands to capture and filter stormwater. In Saskatoon, new communities developed in the Northeast are incorporating native grassland habitat and corridors to connect the natural areas to the surrounding rural landscape. The Township of Langley wanted to protect and restore a diversity of native wildlife species and habitats, which became a key goal in their comprehensive growth management strategy. In this case, important habitat areas and movement corridors were identified and maintained based on ecological principles and the needs of targeted species. This strategy involved partnership and cooperation from a variety of groups. The Langley Wildlife Habitat Strategy was conducted as a pilot project for a larger Regional Biodiversity Strategy for the Greater Vancouver Regional District and provides a model for other communities across Canada.

"We need to strive for a balance between development and the environment – not everything can be saved."
– Saskatoon focus group

VI. Problems with Residential Development Policy in Western Canadian Cities

Policy Capacity

Feedback from the focus groups indicates that municipalities have limited tools to address the negative effects of residential development and to encourage alternative, environmental development approaches. In general, current public policy does not

address the larger scale ecological effects and has limited application due to weak language, lack of ecological principles, lack of tools for implementation, and a lack of coordination between municipalities to manage growth on a regional scale. As a result, municipalities cannot effectively manage urban growth to minimize its impact on the environment.

The emphasis of the focus group discussions was on the role of public policy in determining how and where development takes place. Changing and enhancing public policy was identified as key to lessening environmental costs. The point to emphasize is that the residential development industry's current approach to community design isn't "going against the rules." The current public policy framework has framed the types of development and urban form present in western Canadian cities. It is public policy that needs to be updated to discourage high-cost development (economic, social, and environmental) and encourage more efficient, compact, and environmental residential developments.

Although each city faces different pressures for growth and development, and has a different policy environment, the comments put forth at the focus groups highlight the similarities among the cities. A number of common themes emerged over the course of the focus group discussions and are discussed below.

Governance

Residential growth and development is a part of a complex political environment. The complexity results from the involvement of, and conflicts among, multiple jurisdictions. Power struggles between the province and municipalities and among municipalities were identified as fundamental problems at each focus group. For example, in Alberta, the changes ushered in by the new *Municipal Government Act* in 1995 created competition between municipalities because of the equal power given to all municipalities – both rural and urban. Rural and urban areas want to attract new development (industrial, commercial, and residential) and generate greater tax revenue. Property taxes are a main source of revenue for municipalities, therefore rural and urban municipalities are competing against each other to attract residents, develop new housing and generate revenue.

Competition between municipalities has resulted in a lack of cooperation between adjacent jurisdictions. As a result, urban growth management is generally not coordinated or planned at the regional level. A regional development plan is necessary to evaluate the landscape and identify the areas best suited for development, and to protect the most sensitive areas. At the focus groups, most participants agreed that regional planning is a good idea but the practical elements of how to organize and implement a regional planning framework are still up for discussion. There were concerns raised by both municipal and provincial governments about the division of power, revenue sharing, and that regional planning may not be a panacea for environmental problems.

"There is no appetite for regional planning in the Regina area. There is fear of amalgamation."
– Regina focus group

The role of provincial governments in urban residential development has evolved and has taken a more "hands-off" approach. Cities agreed that there are benefits to having greater control over the issues within their own jurisdiction. However, some felt that they were given little direction when it comes to the environment. For example, in Alberta, the province delegated environmental responsibilities to municipalities with little direction, which, as one focus group participant put it, "resulted in chaos." Municipalities in Alberta rely on the Provincial Land Use Policies (1996) for guidance. However, these policies have weak language and lack tools for implementation. Without "teeth and direction" it is difficult for municipalities to implement these policies.

Box 1: Environmental Reserve Dedication in Alberta

Alberta's Municipal Government Act Section 664 (1) states that environmental reserves must be given to the municipality, without compensation, during the time of subdivision. Environmental reserves are defined as:

1) swamp, gully, ravine, coulee, or natural drainage course;
2) land that is subject to flooding or is, in the opinion of the subdivision authority, unstable, or;
3) a strip of land, not less than 6 m in width, abutting the bed and shore of any lake, river, stream or other body of water for the purpose of i) preventing pollution, or ii) providing access to and beside the bed and shore.

Areas identified as environmental reserves represent the "natural areas" that will be maintained during the development process. The term environmental reserve is slightly misleading as the areas actually protected during development might be more appropriately defined as "hazard lands." These areas are "saved" during development because they pose a potential risk to residents and human settlement and are not protected based on ecological importance and quality.

More specifically, the environmental reserve definition is limited and does not protect upland habitat such as forests, grasslands or rare habitats. The dedication does recognize certain types of wetlands, but does not include occasional or ephemeral wetlands (seasonal or intermittent) that are important elements in the ecological system. Currently, municipalities have no authority to ask for any more land than what is specified in the MGA, which means that some of the most important ecological areas will continue to be lost or fragmented during development.

At each focus group the lack of political will, within individual municipalities, was identified as a barrier to addressing environmental issues. Without the support of city council, environmental policies will not be successful. Even if one government is in support of environmental policies, they may not withstand a change in government at the next election. However, this situation is improving, albeit at a slow rate and on an issue-by-issue basis.

"The environment is not a burning issue in municipal development planning."
– Edmonton focus group

Dedication of Environmental Areas

In all cities there is a gap between science and policy. Known ecological principles have little application in the policies guiding residential development and the dedication of land during subdivision. For example, the environmental reserve dedication used in Alberta and Saskatchewan is good at saving features in the landscape. Basically these features are circled on a map and saved as "islands of nature." In fact, environmental reserves, as defined in Alberta's *Municipal Government Act* may not be that "environmental" at all (see Box 1). These environmental reserve policies do not address ecological patterns in the landscape and have no ability to save connections between the isolated features, which are essential for the movement of people and animals. Connections between isolated areas support ecological function, which is important for the long-term viability of protected areas in an urban setting. Without ecological function and connections, the quality of environmental reserves may decrease over time.

In general, the policy available to municipalities to "set aside" environmental features are vague, lack definitions, and lack tools for implementation. A Calgary focus group participant suggested, "the weak and subjective language in current policy takes away the

municipality's negotiating power with the development industry to set aside the *most* important areas." However, this is not always the case since developers and home builders are beginning to capitalize on existing natural features and integrate them into new subdivisions. But it is important to highlight that evaluating the landscape to identify and save the most important environmental areas and the connections, functions, that support them is *not a requirement* in western Canadian residential development policy.

Scale and Focus

Ecological systems are not confined to the boundaries of a neighbourhood, a community or even a city. These systems are much larger and often pass through multiple jurisdictions. Current policy focuses on too small of a scale and lacks a watershed or subwatershed approach to planning – the preferred approach to address large scale environmental issues. Even isolated changes in one portion of a watershed system can negatively impact the system as a whole. Overall, residential policy does not have the ability to address ecological systems.

The changes that result from transforming wild and working landscapes to support new residential areas are long-term and permanent. However, current policy has a short-term focus. There is a lack of consideration for the future and how to the maintain the "islands of nature" over time. Environmental stewardship requires long-term approaches; however, environmental priorities can change with political regimes. What is a priority for one government may not be an important issue for the next.

"There are problems with surrounding municipalities that aren't trying to be efficient with the land and water resources we share."
– Regina focus group

Incentives

In general, municipalities lack incentives to encourage innovative, alternative community design. Currently, there are disincentives in place. The approval process acts as a barrier to innovation since "different" designs often take longer to get approved. In the development industry, time is money and why would anyone want to lose money because of a slow process. The current development approval process was created for "cookie-cutter", status quo development.

"Innovation is being led by the development industry. Developers had to ask the City to consider alternative development approaches. This has been a tough fight."
– Winnipeg focus group

At the focus groups, we heard many stories of developers who came up against problems with the development approval process while trying to get approval for alternative, innovation designs. For example, Garrison Woods in Calgary is a community built on an old military base. The design put forth by Canada Lands Company is unique in Calgary and is a good example of mixed-use development that utilizes multiple housing types – not just single family detached houses. Even though this development was a well-designed, compact community, the approval process was stalled because it differed from a more traditional suburban design.

"The approval process encourages developers to build out. It is easier to build in greenfield areas than it is in the inner city."
– Regina focus group

There are also limited economic incentives to encourage brownfield redevelopment. This type of development is more expensive (and can incur costs associated with clean-up, decontamination and liability), and without incentives, land may remain underutilized (undeveloped). Pristine greenfields (flat, large tracts of agricultural land) are easier and less expensive to develop. Although some cities (e.g., City of Regina) are beginning to use economic incentives to encourage development in the inner city, public policy needs to use more economic tools to encourage inner city redevelopment and intensification.

Economic Value

Current policy lacks a method to quantify the ecological goods and services provided by natural and agricultural lands. Saving ecological areas may actually save cities money. Unfortunately, current public policy lacks the tools to account for this value. The true value of agricultural land is also not taken into account. Policy does not evaluate the true cost of losing productive agricultural land and what that means over the long-term.

"The environment is undervalued. There is information about its value but it is marginalized."
– Edmonton focus group

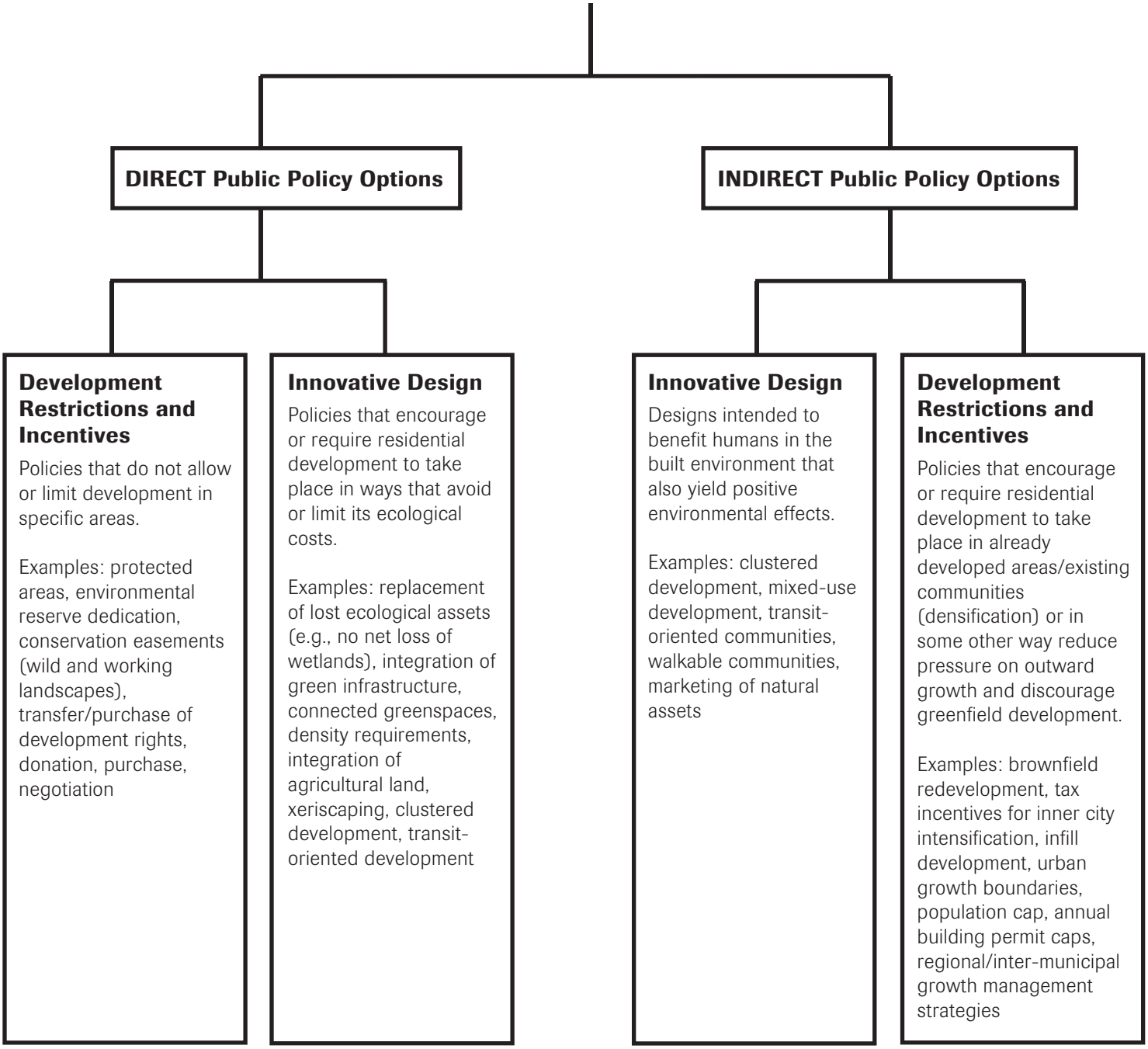
VII. Public Policy Recommendations

Municipal stakeholders of all sorts – residents, homebuyers, developers, community leaders, business people, planners, and politicians – need to carefully consider the environmental effects of residential development and work together to improve public policy in this area. Generally speaking, and notwithstanding a limited number of success stories, public policy is not currently providing the basis for an integrated and proactive approach to managing the environmental opportunities and challenges created by residential development. If we want to ensure the long-term economic competitiveness of our urban centres and ensure that they are able to provide residents with a high quality of life, and the array of ecological, economic and aesthetic services they provide, the environment can no longer take the "back bench" during the planning and construction of residential development.

A first step in this direction involves filling the wide environmental planning gaps in current public policy approaches to residential development by recognizing and accounting for the environmental implications of new housing projects and creatively using policy tools to facilitate ecologically responsible urban growth. Stakeholders need to think beyond short-term goals and envision what they want their communities to look and function like in 20, 50 and 100 years. The environment must be an integral component of this vision or cities risk eroding their quality of life.

In keeping with this, the following public policy recommendations are meant to provide *general* direction to advance debate about urban growth and the environment, enhance the performance of current public policy, and encourage stakeholders to better address the environmental effects of new residential development and to promote the benefits of alternatives to the status quo. The recommendations are not specific to any one jurisdiction and are not intended to suggest that all jurisdictions are the same. Both direct and indirect policy options are discussed and highlight the variety of public policy tools that can be used to help alleviate the environmental costs of residential development (see Figure 5). The recommendations represent the ideas and suggestions put forth at the focus group discussions. The recommendations have not been evaluated to determine their applicability in a western Canadian context or to identify which one is most important. Rather, they are presented to highlight the variety of potential tools available and to encourage debate.

Figure 5:
Urban Residential Land Use and the Environment:
Potential Public Policy Paths



Public policies can directly or indirectly determine the ecological effects of residential development. Direct policies are those that overtly endeavour to improve ecological outcomes whereas indirect policies are not explicitly aimed at the environment but yield positive ecological by-products. As a result, the same policy tool may be direct or indirect depending on whether or not it is being used to enhance environmental outcomes or if this is just an extra benefit. Transit-oriented development, for example, may be pursued because it increases the efficiency of the transportation system and reduces pressure on annual road maintenance and construction costs. Indirectly, this policy may result in less impervious surfaces, less air pollution, and higher density communities that consume less land – all positive ecological benefits. Or, transit-oriented development may be pursued to achieve these ecological benefits and would be an example of a direct policy tool.

The recommendations, designed to encourage bold changes to current public policy rather than piecemeal or small-scale adjustments, fall into four broad categories: 1) full recognition of the importance of the environmental aspects of residential development and comprehensive reform of current policy in this area; 2) greater intergovernmental cooperation and the adoption of large-scale ecological planning; 3) the use of creative regulatory and economic incentives to encourage innovate approaches to residential development; and 4) a move to full-cost accounting of ecological costs and benefits, and integration of this accounting into residential development policy. It is important to stress that there is a need for the environmental side of residential land use to be propelled higher on the political and public agenda, and that this is best served by initiating comprehensive change rather than getting bogged down in or focused on specific details or small changes (e.g., reduced lot size). Each city will have to work out its own approach in concert with an array of stakeholders and tailor its reform efforts to meet its unique needs. With that said, the under-representation of environmental factors in residential development policy points to the general need to move in this area and to do so in as bold a manner as possible.

1. Government (municipal, provincial and federal) should explicitly recognize the full range of environmental costs associated with residential development and adopt proactive policies designed to address these costs.

Extensive consultation with a broad range of stakeholders made it very clear that understanding and acting on the environmental implications of residential development is not a policy priority and, where policy is in place, it is often not adequately addressing the concerns of stakeholders, especially the desire of environmental advocates and developers to pursue alternative approaches. However the current policy gaps cannot be solved with a single solution. Rather, residential development involves multiple orders (municipal, provincial and federal) of government and improvements must occur at each order to ensure municipalities have the tools they need to plan and develop communities that balance the demands for urban growth with the need for long-term environmental quality.

Municipal Governments

At the municipal level, there needs to be better recognition and promotion of the need for alternative, ecologically sound development. Municipal governments need to think beyond planning roads and where to locate new schools. They need to develop a new approach to planning residential areas – one that identifies and evaluates the most important environmental areas first, designs a network (connected system) of environmental areas second, and then designates remaining areas to the built components (roads and houses) last. This type of planning must occur on a larger scale and in cooperation with surrounding municipalities.

"The old regional planning framework had its faults, but it was better than what we have now."
– Edmonton focus group

Municipalities need to explore and adopt a broader range of incentives for alternative forms of development that recognize the needs of the development industry and merge these with concerns regarding long-term efficiency and ecological functioning of the urban area. Focus group participants also stressed the need for municipal governments to remove practical barriers to innovative design rooted in traditional forms of "red tape" that make it difficult for developers to try new things. For the development industry, it is critical that municipal approval processes do not slow down the developers' ability to move forward.

Provincial Governments

Provinces have a large role to play in this area because they have legislative control over land use and the environment. Despite this and notwithstanding provincial variations, provincial legislation tends to be either relatively silent or relatively weak regarding the environmental dimensions of residential development (with the exception of traditional concepts associated with saving key features and hazard lands), has not kept pace with research in this area, does not support large-scale planning, does not adequately recognize the ecological and economic benefits of wild and working landscapes, and often reinforces sub-optimal forms of residential development. In short, a major overhaul of provincial policies is badly needed. This is not to suggest that provinces should take over control of residential land use decisions from municipalities or that everything they are doing is wrong. On the contrary, provinces need to work with municipalities to develop stronger policy tools that will enable municipalities to better address environmental concerns. The point, however, stands: provincial policy is – generally speaking – badly out of date in this area and needs to be reformed based on a comprehensive and consultative reexamination of the costs, benefits, and approaches.

The end result should be the creation of a provincial environmental residential land use policy that specifically addresses the larger ecological issues identified in this report, uses strong language to ensure that it can be implemented while leaving room for consideration of unique local situations and experimentation, and outlines performance standards and benchmarks for local jurisdictions to guide immediate decisions towards long-term goals.

Federal Government

The role of government needs to become more proactive and explicit when it comes to the environmental implications of urban and metro-adjacent residential development. The federal government should ensure that its policies do not inadvertently hinder innovative approaches to residential development and, in addition, use fiscal incentives at its disposal to promote the integration of the environment and residential development. For example, the federal government could provide greater incentives such as higher GST rebates for the use of green infrastructure, look for ways to use its national scope to share success stories, information (federal action in this area should respect provincial and local areas of jurisdiction), seek out ways to partner with provincial and municipal stakeholders, and be flexible enough to account for local circumstances and approaches. The federal government should fund research and demonstration projects that would be of use to communities across the country.

2. Greater cooperative and large-scale ecological planning should be adopted.

A dominant theme at all five focus groups was the need for something to be done to better manage competition between municipalities and to coordinate planning among multiple local governments. Add to this the repeated theme in the literature regarding the need to plan on a large scale (e.g., a watershed level or an ecological system level) and the far reaching environmental effects of residential development decisions, and there is a strong case to be made in favour of reexamining and retooling regional planning. Regardless of which model is chosen, municipalities must find a way to work together and coordinate their residential land use decisions and long-term planning. This planning should identify, evaluate, maintain and connect the most important areas first and then direct growth to other areas to minimize the negative environmental effects of residential development. In other words, a network of ecologically important areas and their connections needs to be established before development planning takes place.

"We need to think bigger and stop carving everything into small units."
– Calgary focus group

At the same time, all residential land use planning should adopt a large-scale perspective that stands back from individual projects and evaluates decisions based on cumulative effects over large ecologically delineated regions such as a watershed. By so doing, planning will be forced to account for the real implications of land use decisions and responsibly manage key ecological services that do not conform to the dimensions of small-scale planning or political boundaries. This type of planning should remain the responsibility of municipal governments, but would require intermunicipal cooperation and working in collaboration with interest groups.

Effective growth management must, moreover, take into account and coordinate the policy actions of others – other levels of government, private industry and nonprofit interest groups. Planning at the watershed level, for example, is an ecological approach to large scale planning that involves multiple government jurisdictions, interest groups, landowners, development interests, and residents. A watershed is the ideal scale at which to integrate land use and water decisions and, in turn, ensure the relationship between where and how land is developed and long-term watershed function and quality is addressed in the planning process. The North Saskatchewan Watershed Alliance (a nonprofit group based in Edmonton) is promoting this approach to planning and managing the Alberta portion of the North Saskatchewan River.

Provinces and municipalities need to develop a decision-making framework that corresponds to a variety of spatial planning scales (house, multi-family development (apartment, townhouse, condominium), neighbourhood, community, municipality, region, and watershed) and ecological considerations need to play a larger role in local land use planning decisions at all scales. Different conservation tools can be applied at each scale, which together can be integrated into an overarching environmental residential land use plan. Planning at all scales needs to be a coordinated effort among ecologists, hydrologists, landscape architects, engineers and land use planners. Stakeholder participation (interested citizens, nonprofit interest groups and the private sector) should also be integrated at all levels to address concerns and integrate different ideas throughout the planning process.

3. Governments should explore and adopt creative regulatory and incentives to encourage alternative development options.

Regulatory

A number of regulatory changes were discussed at the focus groups including those that would encourage the creation of compact, walkable communities and promote higher densities, infill development and brownfield development. For example, environmental or performance zoning was suggested as a regulatory tool to mitigate the negative environmental effects of development at the local level. This type of zoning allows multiple compatible uses in the same area rather than zoning for a specific use (e.g., a large tract of land solely designated for residential development). Using this type of zoning, commercial, residential and even light industrial could be integrated into the same area – as long as the performance criteria were met. Example criteria include maximum traffic noise, maximum daily vehicle traffic, maximum percent land covered by impermeable surfaces or minimum maintenance of ecological function.

In the same vein it was suggested that, municipal and provincial governments explore the use of mandatory, exclusive agricultural zoning. British Columbia and Quebec have used this approach to help keep "working lands working" since the 1970s and have

been successful at reducing the conversion of agricultural land to residential development (Wang 1996). Stronger land use regulations to help maintain agricultural land need to be evaluated to determine their applicability in a local context, but have the potential to arrest the alarming trend toward greater consumption of prime agricultural land and the permanent losses to Canada's agricultural capacity it represents.

Growth control and/or growth phasing regulations were also promoted as possible tools for urban areas to reduce their rate of growth and the physical size of cities. Growth control measures include setting limits to growth and implementing tools such as urban growth boundaries. Growth phasing measures also aim to limit growth, but have different methods such as capping the number of building permits approved each year. These approaches may have practical and legal limitations and may not be appropriate for all municipalities, but they were mentioned at each focus group. There are pros and cons to limiting growth, which should be evaluated for a municipality, region or province before pursuing such measures.

At each focus group, the need to remove the regulatory barriers that limit innovative design was emphasized. This was identified as not just a technical issue, but also a political issue. Local pilot and test projects can be used to evaluate the potential success of alternative designs. It was not too long ago when there was concern over how constructed stormwater wetlands would perform in Alberta's cold climate. There was concern over the technical design and performance, but also potential liability. To overcome this barrier a test project was created and the results illustrated that this alternative technology worked and provided multiple benefits. Now constructed stormwater wetlands are becoming common features in the design of new suburban communities. Proven success and building public support is key to generating political will and eliminating political barriers. Municipal governments do not want to be liable for design flaws and be financially responsible for fixing the problem. Municipalities should also review alternative initiatives undertaken by other jurisdictions to learn from their experiences.

Incentives

At the focus groups economic incentives were identified as having an important role in environmental policy. To encourage "greener" development, a system of financial incentives should be created for the development industry. Market incentives or consumer incentives should also be created to increase demand for alternative developments and reduce pressure for greenfield development.

Incentives can be used to encourage infill and redevelopment in already urbanized areas. Municipalities could reduce or waive development charges, offer tax exemptions or reductions, and provide assistance in the approval of zoning (land use district) changes (Bengston, Fletcher and Nelson 2004). All orders of government need to consider tax policy reform to encourage more efficient use of land (higher density and development in already serviced areas) rather than maintain current policies that encourage low density, greenfield development. Provincial and federal governments also can have a greater role in inner city redevelopment. Grants and/or development loans can be used to encourage and direct development to priority areas, such as brownfield areas. The grants and loans should have specific environmental criteria (performance standards) to increase competition between bidders and to encourage innovative, "green" development.

The purchase and/or transfer of development rights were also promoted as potential tools for protecting quality environmental and agricultural areas. Purchase of development rights discourages development on agricultural land surrounding a city. With this tool, the landowner sells the development rights to the municipal, provincial or federal government or a land trust organization.

The value of the development rights is determined by the difference between the market value (if sold to a developer) and the agricultural value of the land. With this approach, the landowner holds on to the land title (ownership) and a permanent conservation easement is used to restrict future subdivision and development. The landowner often receives a tax benefit for placing a conservation easement on their land. This approach has substantial costs and it is often difficult for municipalities to raise the funds necessary. Currently, provincial and federal funding programs are not available in Canada.

Transfer of development rights is a similar type of approach. This tool allows the sale and transfer of development rights from one property to another. This allows the number of units that would have been accommodated in one area to be transferred to another area that is better suited for development. In this case, a developer buys the development rights and uses them to build a denser subdivision on another piece of land, for example. The original piece of land is placed under a permanent conservation easement and remains the property of the original owner. This approach is less costly to government, but can be plagued by a lack of community support for higher density development.

Consumer oriented incentives should be designed to encourage homebuyers to purchase homes in inner city areas (already serviced by existing infrastructure) or in transit-oriented development. NRTEE (National Round Table on the Environment and Economy) promotes the use of eco-efficient mortgages to reduce pressure for greenfield development and to encourage inner city living, more efficient use of existing infrastructure, energy efficiency and more sustainable modes of transportation. There are two types of eco-efficient mortgages – location-efficient and green mortgages.

Inner city areas in close proximity to downtown office buildings and amenities are often more expensive than outlying suburbs. Yet central locations offer greater opportunities to reduce monthly household expenditures that often quickly add up for those who live in new suburban communities at the urban fringe. Costs often include car ownership, maintenance and insurance, gas and parking fees. Owning fewer cars or no cars at all can significantly reduce additional monthly expenditures. Conventional practices to determine principal mortgage amount do not consider these costs, and thus moderate-income earners often cannot afford inner city housing and have little choice other than suburban, greenfield areas. However, location-efficient mortgages do take these additional costs into consideration and provide higher principal amounts for homebuyers choosing to locate in areas where there are lower levels of car ownership, travel and overall transportation costs (NRTEE 2003). With this mortgage, applicants can be approved for larger principals since the mortgage amount is tied to the "efficiency of location."

Green mortgages are similar to location-efficient mortgages. This type of mortgage takes into consideration the reduced monthly costs for homeowners who live in energy efficient homes. Thus, consumers looking to purchase homes equipped with energy efficient heating systems and appliances can qualify for larger principal mortgage amounts.

Both types of eco-efficient mortgages can influence the type and location of houses desired by potential homebuyers. By providing consumers with incentives to purchase inner city housing and discouraging greenfield, suburban purchases, greater demand can be created for a compact city form that offers environmental alternatives to conventional development practice. Currently these types of mortgages are not available in Canada. As NRTEE has recommended, the federal government through Canada Mortgage and Housing Corporation needs to further explore this type of incentive based program to determine its applicability in Canada.

4. Governments should explore ways to more fully account for the ecological costs and benefits of various urban forms and residential development options. Once this information is available, governments should use it to better evaluate the tradeoffs.

Accounting

At present, the economic costs of lost or compromised ecological systems caused by residential development are not well understood and are at best a small consideration in public policy decisions, and the value of ecological services is not accounted for in our current market system. However, these services provide residents with value that would otherwise cost money to replace. Natural drainage courses and wetlands can collect and treat stormwater, reducing the need for traditional pipe infrastructure. Forests filter the air, improving air quality, and parks provide recreational opportunities for people who live nearby. However, there is no monetary value attached to these benefits. In other words, the true costs of clearing the landscape of natural areas is not integrated into the costs of development. A recommendation that came out of the focus groups was the need for municipal, provincial, and federal governments to work together with researchers, nonprofit interest groups and the development industry to consider a valuation system that addresses the true value of land and water – including ecosystem structure and function.

The future costs of obtaining and treating water, lost agricultural productivity, missed tourism opportunities, the full value of ecological services such as nutrient cycling, and other economic benefits of working and wild landscape assets are difficult to measure but should nonetheless be accounted for by policymakers in some way. To help determine the value of ecological services, policymakers need greater ecological data and evaluation methods to identify the most important ecological structures and functions. Once they are identified, policymakers and other stakeholders can work together on evaluating tradeoffs and determining the design option that will minimize costs and maximum benefits.

Tradeoffs

It is important that all stakeholders recognize that tradeoffs must be part of a growth management plan. In other words, not everything can be saved, so efforts should be made to save the best of what is there and to link these decisions rather than create unconnected ecological islands. Similarly, not everything should be developed, so development should be directed toward the most suitable areas based on a variety of considerations including ecological factors, and should take the most efficient forms available. This does not mean that traditional single-detached communities should not be built, but it does mean that this option should be weighed against other approaches so that policymakers, developers, homebuyers, and the public can make informed decisions about what is being gained and what is being lost. Increased awareness, information, and incentives will facilitate the adoption of innovative approaches that meet the needs of all stakeholders and maintain a broad range of consumer options including single-detached homes. Residential growth will continue; the point to stress is that it can and should take place within a more informed and proactive public policy context that is able to accurately assess the full range of costs and benefits and not just the short-term benefits of growth.

Summary of Recommendations

Public policy that guides future urban growth and development, and integrates the environmental issues associated with residential development, cannot rely solely on one single policy tool. Rather, multiple tools need to be deployed, interlinked and coordinated into an overall environmental strategy. To ensure the policies are effective and not undermined by others, all orders of government need to work together to develop an urban strategy that explicitly addresses ecosystem structure and function, and

promotes alternative, environmental forms of community development.

Overall, big policy changes are needed at the macro-level that will lead to new approaches to residential development that work for all stakeholders. At present, the environmental side of the equation and the long-term implications of this on urban competitiveness and quality of life are not being given the attention they deserve.

Municipalities need better tools, need to work together and set goals, improve the sources of information available to them to make informed decisions, and plan for large open space networks that maintain ecosystem structure and function. These networks cannot be just set aside and "preserved" as islands; they need to be managed to ensure ecological quality is maintained over the long-term. All orders of government need to look at creating economic incentives and reducing barriers to alternative development practices.

VIII. Moving the Debate Forward

Governments have an important role to play in creating new, and enhancing existing, public policy that will minimize the ecological costs of residential development. But this activity should not be left solely in the hands of government. Other key interests in residential development have important roles to play in advancing this debate and influencing change.

The Development Industry

The residential development industry needs to continue to provide quality housing options for consumers. The industry should continue to push the status quo and integrate innovative designs and urban forms that minimize ecological effects. There is opportunity to capitalize on the environmental aspects of design as there is growing demand and willingness to pay more for environmentally-sound development. The development industry needs to work with the nonprofit sector, municipalities, consumers and residents to continue to advance the quality of residential areas and incorporate innovative ideas and address concerns.

Consumers

Consumers can play a powerful role and can become a catalyst of change. Consumers create demand and if there is increased demand for more compact, efficient, and ecologically sound development, the market will respond. The key is to create this demand. Consumers need to take into account the total costs and benefits of purchasing a particular house in a certain neighbourhood. Not just the costs and benefits that would affect them personally such as mortgage payments, but the total costs and benefits, including large-scale ecological costs.

Residents

During the planning of new residential developments, residents in adjacent communities need to have a stronger role and voice. But this voice needs to go beyond self-interest and needs to see the "big picture." Residents, the development industry, and the municipality should work together from the onset of the project to help avoid delays during the final stages of the development approval process and to integrate residents' ideas and concerns throughout the project. However, the structure for resident involvement needs to be carefully thought through to ensure that the process is not made more cumbersome and, in turn, a barrier to innovation.

Nonprofit Sector

Environmental and agricultural groups need to maintain a strong voice. Nonprofit organizations have a key role to play in educating governments, the development industry, consumers, and residents about the true costs of current practice and the benefits of alternative, "less costly" development options. Environmental and agricultural groups should work together and collaborate with academics, governments, or other interest groups on research, education programs, marketing, and pilot projects.

Information and education is critical in advancing this debate. These are powerful tools that can bring about change. Change is necessary, but it does not have to come only in the form of strict government regulation. It can also come from the "bottom-up" through individual choice and education.

IX. Conclusion

There are a lot of reasons to care about the way urban areas grow and the form they assume. There are infrastructure costs to consider, transportation issues to wrestle with, aesthetic goals to pursue, the interplay between community design and health to take into account, and the ecological tradeoffs to contemplate. Choices regarding urban form directly affect both the efficiency and the livability of an urban area over time. Decisions made today last for generations. If a city gets it right, the benefits accrue for years to come, but if it gets it wrong, the negative side-effects can linger, or worse, fester over the entire life of a city.

Nowhere is this more true than in the specific area of the ecological effects of urban residential development. Once a wetland or sensitive piece of habitat or a track of prime farmland is converted into the single-detached homes of a new suburban neighbourhood, the changes are permanent and their negative side-effects accumulate over time like a bad debt. Despite this, the large-scale ecological effects of residential development are not a priority issue for municipal and provincial governments, are poorly understood, inadequately addressed by current public policy, and trumped by more immediate economic and visible benefits of growth.

The intent of this report is to draw attention to the larger scale ecological effects of current development practice, increase awareness about the issues and potential benefits of alternative approaches, highlight the key role of public policy in addressing environmental issues, illustrate the trade-offs, and point to the common ground in what is often a polarized debate (between the argument for continued, unchecked status quo development and the opposing argument for strict limits to growth).

Our findings suggest that there is reason for optimism. Momentum is building as developers, home buyers and governments become more aware of the value of natural assets, the viability and benefits of green infrastructure and alternative community design, and the need for a comprehensive reexamination of public policy in this area.

Rethinking the policies that determine how cities grow and how they affect the environment is not, moreover, a zero-sum game. For example, better management of the ecological costs inherent in residential development does not spell the end of the single-detached home; “Soviet style” high rise apartments are not the only other option. Neighbourhoods can be designed to limit their negative ecological effects, maximize their integration with existing natural capital, and still incorporate a large number of single-detached housing options. There are positive, practical alternatives out there that make sense to a range of stakeholders and better serve the public interest over the long-term. If it is done right, the development of better public policy in this area does not mean less growth, less consumer choice, or less profits. Cities can continue to grow, the difference being that cities can grow and take on a different form – one that is more efficient, ecologically responsible, offers more choices to home buyers, and has the potential to increase economic returns for investors.

Cities are the places where most people live, work, shop and recreate. This is the environment that 80% of Canadians interact with on a daily basis. The land, water and air quality of urban areas has a direct effect on quality of life and the long-term competitiveness and viability of cities. When you consider the importance of the environment to the future of Canadian cities, the urgency to update and enhance current public policy becomes evident. The effects of land use, urban form, and current development practice can no longer be ignored and pushed aside. These issues need to come to the forefront and need to be addressed by public policy. All governments need to work in collaboration with each other, the development industry, consumers, residents, and nonprofit interest groups to advance the debate and break new ground in the thinking and approach to residential development before we physically break new ground to support inefficient, unsustainable – economically, socially, and environmentally – forms of development. CWF

Definitions

Biodiversity – the variety of plant and animal species and the ecosystems that support them.

Brownfield Development – an abandoned, vacant, derelict or underutilized property. Brownfields can be residential, commercial or industrial areas. These sights may have a perceived or actual contamination and require cleanup prior to redevelopment (typical of old industrial sites).

Conservation Easement – a voluntary legal agreement that permanently restricts the type and amount of development that can occur on a property, which is commonly administered by a land trust organization.

Cumulative Effects – effects on the environment that result from actions that are individually minor but that add up to a greater total effect as they take place over a period of time.

Ecosystem Function – the performance of an ecosystem. Also described as ecosystem processes. For example, water infiltration, movement, and filtering are functions of the ecosystem.

Ecosystem Structure – living and non-living elements of an ecosystem and their spatial arrangement. Shrubs and trees are examples of living elements and soil is an example of a non-living element.

Green Infrastructure – a natural life support system for both humans and nature. It is comprised of a strategically planned and managed network of natural areas such as parks, greenways, streams, rivers and riparian areas that maintain ecosystem function, sustain air and water resources and contribute to public health and community quality of life.

Greenfield Development – an undeveloped, unserviced parcel of land at the urban fringe – usually occupied by agricultural production prior to development.

Habitat – a specific area or environment where a particular plant or animal lives.

Impermeable Surface – an area covered by hard surfaces such as asphalt and concrete that is unable to absorb water.

Infill Development – housing occurring in already developed areas of a city – can take place on vacant or underutilized lands or could replace an existing structure.

Mixed-Use Development – a development that integrates different types of land use into the same area. Homes and shops can be located together with the hopes of reducing car dependency.

Riparian – land areas adjacent to streams, rivers, lakes and wetlands where the vegetation and soils are strongly influenced by the presence of water.

Transit-Oriented Development – a walkable, mixed-use form of residential development that is focused around a transit station.

Walkable Community – a form of community design that focuses on creating enjoyable places to walk and desirable destinations within close proximities. The goal is to create communities where people do not have to rely on their automobiles to get around.

Watershed – an area of land that catches precipitation and drains it into the same water system. For example, the North Saskatchewan watershed includes more than just the river, it consists of the entire land base that drains into this river system.

Xeriscaping – landscaping techniques designed to minimize the need for watering.

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