Conscious Cities

International Examples of Urban Land Stewardship

Catherine Cone

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This report is part of the Canada West Foundation's Land Stewardship Initiative—a two-year research and communications endeavour focused on the role of public policy in facilitating land stewardship in western Canada. Land stewardship is the practice of responsible land use to ensure that natural capital is maintained or enhanced for future generations. Land stewardship policies are actions taken by governments that require, enable or encourage land users to manage land in ways that maintain or enhance natural capital for future generations.

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This report was prepared by Canada West Foundation Intern Catherine Cone.

1. Introduction

Cities house large populations that consume considerable quantities of goods and services. These goods and services are often thought of in terms of shopping, healthcare, transportation, education, recreation, safety, entertainment, and so on. What are often overlooked are the goods and services provided by the surrounding environment such as clean water, fresh air, fertile soil, and wildlife. These environmental goods and services are part of the natural capital that cities need to ensure a high quality of life.

Just as urban populations place pressure on healthcare and transportation systems, they can also strain the natural environment (Egger 2006). The demand that cities have for water alone is enormous. For example, the Catskill/Delaware watershed supplies 8.2 million New York City residents with approximately 5 billion litres of water per day (Lloyd and Rush 2006). A smaller centre like Winnipeg still draws 225 million litres of water each day from its watershed to supply its 270,000 households and businesses with water (City of Winnipeg 2007).

Natural capital such as clean water, fresh air, biodiversity, and food does not begin and end in cities as food is grown elsewhere, rivers flow long distances, animals migrate, and air circulates across boundaries. It is for this reason that actions taken *outside* urban centres affect the quantity and quality of natural capital available to cities. As well, actions taken *within* cities affect the quality and quantity of natural capital available for others in adjacent towns and rural communities. There is a complex and dynamic relationship between cities and rural/natural areas.

Given that more than half of the world's population will reside in cities by the end of 2008 (Gutman 2007) and that these urban centres will require a large natural capital base to support them, this report asks the following questions:

- How can cities be stewards of land beyond their boundaries?
- What lessons can western Canada take from the trans-boundary land stewardship experiences of cities around the world?

A literature review and web search were conducted to gather information on examples of cities acting as stewards of land beyond their boundaries. Fifteen case studies were selected and provide an overview of how cities can be land stewards by protecting, enhancing, and managing the natural capital upon which they depend.

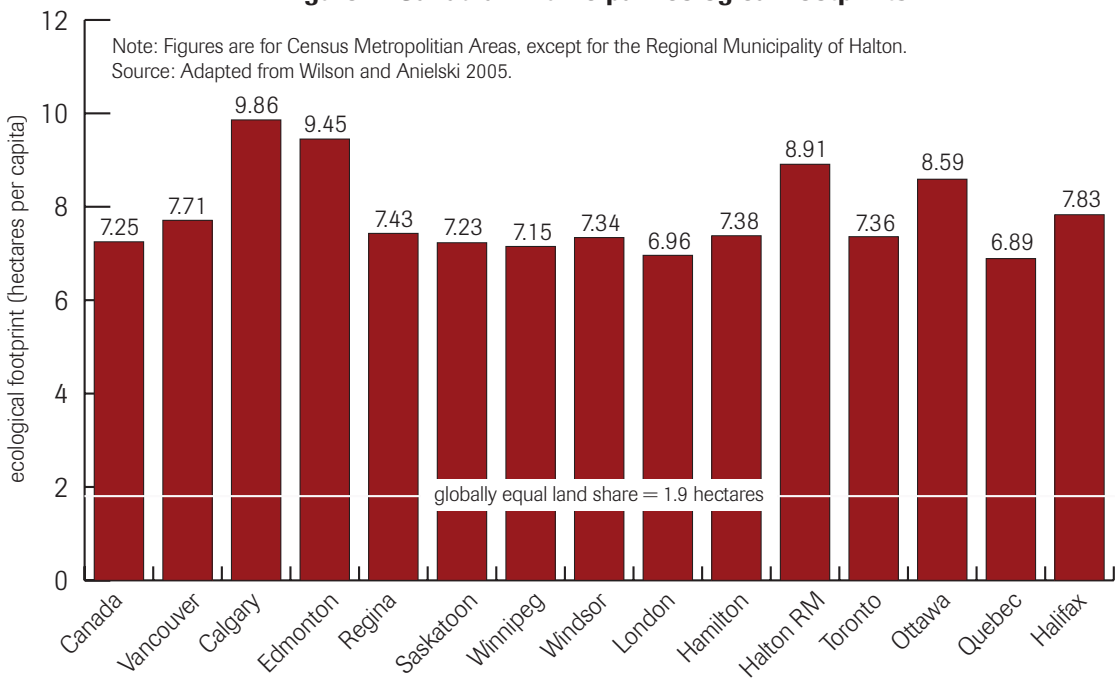
The report begins by looking at why cities should protect, manage and enhance natural capital outside their boundaries. This is followed by an overview of each case, a discussion of lessons learned, and a set of recommendations for policy-makers in western Canada.

2. The Relationship Between Cities and Land Stewardship

Cities have been linked to the decline of global environmental quality and the depletion of resources due to high energy and material consumption rates (McGranahan, Satterthwaite and Tacoli 2004). This does not mean that cities are all bad; rather, cities and residents can play a significant role in the reduction of ecological degradation and help to achieve global sustainability (Rees and Wackernagel 1996). To help understand why cities have a responsibility to be land stewards, the concept of ecological footprint is useful.

Ecological footprint is a measurement that uses land area to depict the quantity of space needed to support a given lifestyle. It takes into account the amount of land needed to produce and then dispose of the waste generated by human populations. As Figure 1 illustrates, the ecological footprint of Canadian cities is much greater than the average amount of land available per human being.

Figure 1: Canadian Municipal Ecological Footprints



Given that urban quality of life depends on the availability and protection of ecological goods and services in surrounding areas (IUCN/WCPA Task Force 2003; Newman 2006), and given that urban ecological footprints can have a negative impact on the health of regional landscapes through excessive consumption and pollution (Egger 2006), it makes sense for cities to look beyond their immediate borders and engage in regional land stewardship. The benefits of doing so include:

- wildlife and biodiversity help maintain functioning ecosystems;
- forest and open space help maintain water systems;
- protection of farmland facilitates a local agricultural economy and increases local food options;
- aesthetically pleasing landscapes and recreation opportunitues draw tourists;
- sprawl can be limited and infrastructure costs decreased; and
- joint land stewardship initiatives allow governments to combine resources and potentially accomplish more.

3. Land Stewardship Case Studies

The following case studies reveal how cities can be stewards of areas beyond their borders by incorporating the protection and enhancement of regional natural capital into city plans. They are emblematic of local authorities understanding that population and consumption rates affect the stability of the surrounding natural environment and that the health of this environment is critical to the well-being of their city.

Open Space and Mountain Parks Program, Boulder, Colorado

Objective
Acquire, preserve, and recreate on land that is inside and outside the city.

Description
The Open Space and Mountain Parks Program (OSMPP) began in 1898 when Boulder purchased its first mountain park. Today Boulder owns approximately 43,000 acres (17,402 hectares) of parks and protected open space around the city. In 1967, the residents of Boulder voted to establish a 0.4 cent sales tax per dollar for acquiring and maintaining open space—making Boulder the first US city to have such a tax. Today there is a 0.88 cent sales tax per dollar to fund the OSMPP. Boulder also uses land and/or development rights acquisition, density transfers, and land donations to further develop the OSMPP.

The OSMPP began because the local government and residents believed that it was important to preserve/restore natural areas; preserve water resources; preserve land for passive recreation; preserve agriculture; limit urban sprawl and discipline growth; and preserve land for aesthetic values.

Successes
- To date, total land acquired is 43,000 acres (17,402 hectares).
- Program protects and preserves natural areas for plants and animals.
- Program is a joint resident/local government initiative that has lasted over 100 years.

Challenges
- The creation of undesignated trails has led to some habitat deterioration.

Source: www.ci.boulder.co.us

Urban Open Space and Open Space Strategies, Brisbane, Australia

Objective

Develop and protect a network of natural areas inside and outside the urban boundary.

Description

The Brisbane Open Space Strategy (BOSS) and the Urban Open Space Strategy (UOSS) define open space as natural habitat areas, ecological corridors, public spaces, landscape assets, and rural areas. The programs acquire open space land. The goal is to have 40% of the Brisbane and surrounding area's land base designated as natural habitat by 2026.

To acquire land, Brisbane residents pay a Bushland Preservation Levy as part of their property tax. Since the Levy's introduction in 1990, $72 million has been used to purchase 4,880 acres (1,975 hectares). Brisbane also uses voluntary conservation agreements and works with participants to set land conservation goals through financial, technical and training assistance. To date, the local government has partnered with over 250 private landowners.

Brisbane—the capital city of the State of Queensland—has the highest level of biodiversity of all other Australian capital cities. For this reason, residents and the city council place importance on maintaining the regional biodiversity.

Successes

- Voluntary conservation has acquired 2,864 acres (1,159 hectares) of land.
- Bushland Preservation Levy has acquired 4,880 acres (1,975 hectares) of land.

Challenges

- The Queensland state government is Brisbane's largest landholder—this limits what Brisbane can accomplish.
- With a population growth rate of 22% between 1986 and 2004, development can interfere with Brisbane's ability to protect land.

Source: www.brisbane.qld.gov.au

Open Spaces Division, Albuquerque, New Mexico

Objective

Preserve the natural features of the area by conserving resources, natural environments, and recreation/educational opportunities inside and outside the urban boundary.

Description

The protection of open space in and around Albuquerque began in the 1970s and has resulted in the acquisition of 29,000 acres (11,736 hectares) of land. This was achieved through taxes, land swaps (with the State of New Mexico's Land Trust and the Bureau of Land Management), general obligation bonds, and federal funding. The Open Space Division is the product of citizen activism and local government visioning.

A subsection of the Open Space Division is the Open Space Farmlands Program (OSFP). Through the acquisition of farms, the program aims to protect Albuquerque's food; recharge Albuquerque's aquifer; provide habitat for wildlife; and maintain living landscapes. There are both working and protected farms. Working farms produce food for Albuquerque and return a profit to fund the Farmlands Program. Residents can buy into a Community Supported Agriculture program and have fresh local produce delivered to them weekly. Protected farms provide forage for wild animals and educational experiences for residents and tourists. Farms are run by the city or leased to farmers. In both cases, best practices farm management is in place (e.g., milk products are rgBH-free and produce is certified organic).

Successes

- Five farms have been purchased under the OSFP.
- Local produce is available to Albuquerque residents.
- Local heritage and culture is preserved.
- City aquifers are being protected.

Challenges

- Funding for farm infrastructure improvements is limited.
- Commercial irrigation and city water demands can leave the land stewardship project low on the list of priorities.
- Habitat restoration projects must fit into the layout of the farm.

Source: www.cabq.gov

Downland Initiative,
Brighton & Hove, UK

Objective
Conserve the Downlands (Downs) and the residing species and habitat.

Description
Downs are unique calcareous grasslands characterized by diverse grasses and wildflowers and found only where there is chalky/limestone rich soil. Brighton & Hove's (BH) duel City Council owns 11,000 acres (4,000 hectares) of Downs around the cities, the majority of which are under tenancy agreements and located outside urban boundaries.

In 2005—collaborating with Natural England and the South Downs Joint Committee—BH developed the Downland Initiative to meet Biodiversity Action Plan targets and acquire Downs around the cities (for the provision of greater social and environmental benefits). Priorities are landscape restoration, improved public access, and increased wildlife. City farms have Farm Environment Plans that encourage land stewardship such as the protection of existing habitats.

Successes
- Walking trails/countryside provide opportunities for physical activity.
- Acquired land is linked with other trails, contributing to a larger intact landscape and increased biodiversity.
- The program is helping to reverse the decline of grasslands.
- Local crops are available to Brighton & Hove residents.

Challenges
- Agricultural intensification is detrimental to Downland sustainability.
- Declining farm income limits funds available for restorative projects.
- The calcareous nature of the Downs limits farmers to only a few crops that will grow, complicating diversification and biodiversity efforts.

Source: www.brighton-hove.gov.uk

Action for Wildlife and Groundwork Leicester and Leicestershire, Leicester, UK

Objectives

Enhance and improve land for wildlife and increase the awareness of biodiversity while protecting the livelihood of regional farming.

Description

Action for Wildlife is the Biodiversity Action Plan for Leicester, Leicestershire, and Rutland. The program was initiated in response to the Local Action for Biodiversity, a challenge organized by the International Council for Local Environment Initiatives. Leicester aims to ensure that resources are properly allocated to maintain/enhance the region's biodiversity. Habitat and species plans have been developed that describe management strategies for areas of biodiversity concern, including farmland areas.

Groundwork Leicester and Leicestershire is a program working in sync with Action for Wildlife through projects such as Leicestershire Produce. This program enables Leicester to promote the consumption of local produce (labels are placed on all local products for easy identification). By doing this, Leicester is promoting the long-term sustainability of the farming community and preserving land for biodiversity.

Successes

- Grassland and farmland is protected.
- Management plans and strategies are in place for wildlife and habitats.

Challenges

- Fertilizers and pesticides on farmland affect biodiversity.
- Grazing intensity affects habitat sustainability.
- Recreational pressure can degrade wildlife habitat.

Source: www.leicester.gov.uk

Open Space and Parkland Preservation, Ann Arbor, Michigan

Objective

Provide funding for the protection/preservation of farmland, open space, natural habitats, the Huron River, and source water inside and outside city limits.

Description

The Open Space and Parkland Preservation (OSPP) program was adopted by Ann Arbor City Council in 2004. It acts as a framework for the purchase of land within a Greenbelt District around the city.

Ann Arbor is interested in three areas: the purchase of development rights on farmland (the most endangered type of land in the area); the completion of the Huron River Greenway (a countywide conservation effort); and the protection of natural areas (e.g., open spaces that are aesthetically or scientifically important and/or valuable to larger regional conservation efforts). The city is using a $20 million bond to purchase land over three years (beginning in 2005) and has endowment funds in place to maintain the land purchased (through direct purchase or easements) and finance its management.

Successes

- A greenbelt has been identified.
- A framework for land acquisition is in place.
- Funding has been solidified.

Challenges

- Encouraging adjacent cities to participate in the greenbelt and open space and parklands program can be difficult.
- Land speculation affects the quantity of land that the city can purchase by increasing the cost of individual parcels.

Source: www.ci.ann-arbor.mi.us/

Natural Resources Department, San Luis Obispo, California

Objective

To conserve the natural resources and the open space lands of San Luis Obispo (SLO).

Description

The Natural Resources Department of SLO designates a greenbelt system of parks and open space. The Greenbelt Protection Program preserves rural/natural settings and protects areas of important resources and agriculture. Land is acquired through direct purchase or easements, development entitlement grants, and by donation. Conservation guidelines exist for the management of city-owned open space land.

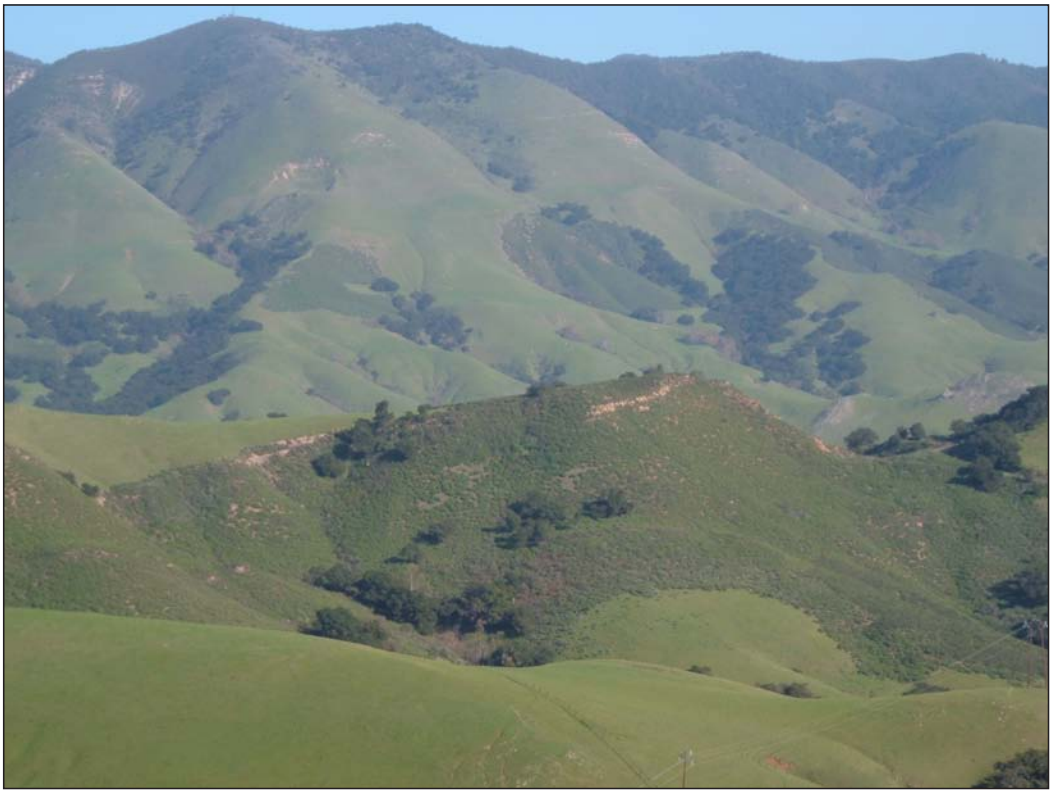
Successes

- Open space lands have been organized into designated land uses (e.g., habitat area, restoration area, and cultural/historic area).
- Best management practices are applied to greenbelt and other open space areas.
- Policies are in place to protect the greenbelt system (e.g., all restoration activities will use indigenous grasses, herbs, shrubs and trees).

Challenges

- Fiscal restraints limit the quantity/rate at which land/easements can be acquired.
- Negative user behaviour in the parks and open space (e.g., vandalism, pollution).
- Erosion due to the influx of people.

Source: www.ci.san-luis-obispo.ca.us



Long-Term Watershed Protection Program, New York, New York

Objective

Protect the Catskill/Delaware watershed to avoid the need for a new water filtration system.

Description

The Surface Water Treatment Rule under the Environmental Protection Agency's (EPA) Safe Drinking Water Act states that all public water supplies in the US must be filtered or meet qualitative/quantitative criteria. New York City (NYC) opted to meet the criteria by protecting the Catskill/Delaware watershed rather than build a new filtration facility. The result was the Long-Term Watershed Protection Program (LTWPP). The NYC Department of Environmental Protection—specifically the Bureau of Water Supply—is the primary authority in charge of protecting the upstate watershed.

The LTWPP is comprised of a variety of protection/remediation programs such as:

- Watershed Agricultural Program—maintains a high level of farmer stewardship;
- Watershed Forestry Program—focus is on forests as water quality tools;
- Stream Management Program—protects and restores stream system stability; and
- Wetlands Protection Program—integrates regulatory/non-regulatory strategies with mapping and research initiatives.

Successes

- 93% of farmers participate in the Watershed Agricultural Program.
- the city, state, EPA, counties, towns, and interest groups signed a Watershed Memorandum of Agreement (MOA) in 1997 outlining the institutional framework required to implement programs.
- Avoidance of filtration system set-up costs and annual operating costs has saved billions of dollars.

Challenges

- A UV disinfection facility is still required and will be in place by 2012.
- Occasional periods of elevated turbidity due to clay-rich soils affect water quality.
- Intense storm run-off events have at times caused stream bank destabilization.

Source: www.nyc.gov

Creek to Coral Program, Townsville, Australia

Objective

Maintain working wetlands and clean waterways (fresh and marine) from Creek to Coral in Townsville and Thuringowa catchments.

Description

Creek to Coral (C2C) began in 2003 through coordination between the Minister of the Environment, the City of Townsville and the City of Thuringowa. The initiative's Board of Directors consists of the Mayors of both cities, the Executive Director of the Environmental Protection Agency, and a representative from the Great Barrier Reef Marine Park Authority. C2C takes a total systems approach by protecting upland water sources, inner city water, and marine water ecosystems with emphasis on involving scientists, residents, businesses, and local, state, and commonwealth governments.

There are four working groups facilitated by the C2C coordinator: an Integrated Water Quality Monitoring and Research group; a Community Education and Involvement group; an On Ground Action and Infrastructure group; and an Environmental Protection and Emergency Response team.

Successes

- Project complements the Reef Water Quality Protection Plan set by the Australian Government.
- Strong communication between the local government and residents through programs such as Public and School Catchments tours (they highlight the importance of healthy water systems).

Challenges

- The Minister of the Environment has limited the project to four years, 2003-2007.

Source: www.townsville.qld.gov.au/

Forest Management and Watershed Protection Program, Moncton, New Brunswick

Objective

Protect and improve the municipal water supply through forest management.

Description

Moncton owns 15,000 acres (6,070 hectares) of land, 12,000 (4,856 hectares) of which are forested. Priority is on water quality rather than forestry. This is realized through participation in the Fundy Model Forest Program that strategically manages land to encourage the development of old growth forest (that protects water quality). Participation in this program may lead to Moncton being responsible for New Brunswick's first model watershed. Some 10,000 trees are planted annually on abandoned fields to create new forests.

The city plans to draw alternative financial resources from the forest: maple syrup and the growth of medicinal plants/ginseng, both of which are meant to increase the forest's worth for the continued protection of the water supply. Moncton also coordinates the three landowners around the city's watershed—J.D. Irving, City of Moncton, and private woodlot owners—to participate in the Forest Management Strategies initiative that focuses on managing water first by respecting the value of streams within the watershed.

Successes

- Participation in the Fundy Model Forest Program has contributed to the accumulation of information/research on forest ecosystems.
- Water quality is being protected in advance of a new treatment plant.

Challenges

- Moncton owns only 12% of the watershed area and therefore does not have total authority over its management.

Source: www.moncton.org

The Severnside Project, Gloucester, UK

Objective

Conserve, enhance, and manage important habitat between the River Severn and the Sharpness Ship Canal from Gloucester down to Arlingham.

Description

By protecting important habitats, the Severnside Project (SP) hopes to boost biodiversity in the area; maintain and enhance traditional landscapes and floodplains; increase the opportunity for passive countryside recreation; encourage public involvement in preserving the landscape; and enable a portion of the landscape to be farmed in a sustainable fashion while considering biodiversity/wildlife in farm management strategies.

The project area houses a diversity of species and is an important element of the region as its beauty and landform are perfect for recreation/ educational experiences. Gloucester works with local landowners, businesses, volunteers, and schools on environmental enhancement and educational programs to accomplish project goals.

The Water Vole Reestablishment Program (under the SP) is conserving the County's most endangered mammal (the water vole) and the city has received an environmental award for its effort. Gloucester, Severn Trent Water, and a water vole expert, introduced a population of water voles into the River Severn—an ecosystem that is integral for the continuity of water voles in the region.

Successes

- The water vole population is thriving.
- By working with local landowners, the city has been able to access government sponsored agro-environment schemes to enable long-term habitat and public access improvements.

Challenges

- The American mink remains a threat to water vole populations.

Source: www.gloucester.gov.uk

Ranges and Foothills Protection Project, Waitakere, New Zealand

Objective
Protect the ranges and foothills as they are of regional and national significance.

Description
The ranges and foothills cover 27,720 acres (11,218 hectares), 17,000 acres (6,880 hectares) of which are within a Regional Park. This land base is protected and a citizen-driven bill was passed that designates the area as special and of national significance. The bill establishes the Waitakere Ranges Heritage Area as having a distinct statutory identity. The Ranges are recognized for unique landscape, beauty, and aesthetic values; native forests and wildlife; clean water, and as the water catchment and storage area; and tourism.

The Waitakere Ranges and Foothills Protection Project contributes to the City's Green Network Strategy. The goal is to protect and enhance native plants, wildlife and ecosystems, and the great quality of natural landscapes in the region.

Successes
- The community and individual landowners have contributed time and resources.
- Gifts and bequests have added to the Ranges land base.

Challenges
- Urban development pressures (Auckland is the fastest growing urban area in New Zealand and is adjacent to the ranges).
- The existing regulatory framework is unable to guarantee the protection of the ranges and foothills.
- The Resource Management Act does not consider cumulative effects.

Source: www.waitakere.govt.nz

Integrated Waste Management Plan, Walvis Bay, Namibia

Objective
Ensure that new solid waste management practices decrease negative environmental, cultural, social, and economic impacts.

Description
The City of Walvis Bay is adjacent to the world's oldest desert (the Namib Desert) on the south west coast of Africa. The Namib Desert is subject to urban solid waste disposal.

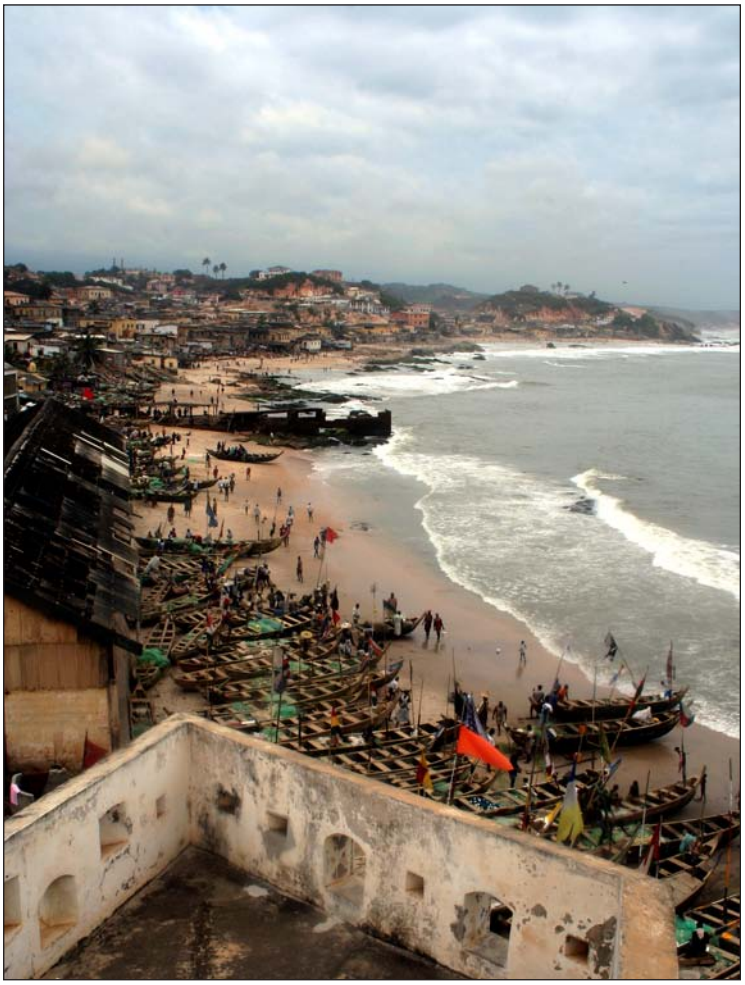
In response to concern over the degradation of the unique desert ecosystem—and the fact that the desert is a large tourist attraction—Walvis Bay drafted an Integrated Waste Management Plan. The plan includes a Recycling and Re-use Activities Program and a program encouraging the direct removal of solid waste from the desert: approximately 100 people derive a living out of scavenging and recycling activities in the desert landfill. This project helps the city's dune conservation efforts by removing over 1,000 tons of solid waste each year.

Successes
- A plan has been drafted to minimize waste entering the desert.
- A plan is in place that removes large quantities of waste each year from the desert.
- City residents have gained employment.

Challenges
- Irresponsible recreational activities disturb the desert ecosystem.
- Urban infrastructure expansion resulting from population growth is negatively effecting the environment by fragmenting landscapes.

Source: www.unep.org/urban_environment/PDFs/biodiversity-brochure.pdf

Wetlands Protection, Accra, Ghana



Objective

Protect the three major regional wetland systems around the city.

Description

Accra City (population 1.7 million) is surrounded by three major wetlands. Accra officials recognize that wetlands provide a variety of services that can benefit cities by contributing to wellbeing and the alleviation of poverty. Services include coastal erosion prevention; flood control; clean water; bird watching tourism, and aesthetics.

The city's poor are dependent on the resources obtained from the regional wetlands. Fishing, crabbing, farming, and the access to medicinal herbs are integral to their survival. To protect the wetlands, Accra is taking the following steps: RAMSAR site designation; collaborative management systems; development of environmental sensitivity mapping; greenbelt delineation; and Site Management Committees that work to attract resident participation.

Successes

- Two of the three major wetlands are now designated as RAMSAR sites.

Challenges

- The complexity of wetland dynamics means that further research is required to fully comprehend the systems/processes associated with wetland ecosystems and urban development.
- City expansion is encroaching on wetlands and causing habitat loss.
- Over-exploitation of wetland resources can place strain on wetland integrity.

Source: www.unep.org/urban_environment/PDFs/biodiversity-brochure.pdf

The Living City Initiative, Toronto, Ontario

Objective

Restore the region's streams/shorelines; protect and restore a network of natural areas; communicate area sustainability; and develop partnerships with businesses to aid in the delivery of the initiative.

Description

The Living City Initiative (LCI) is a partnership-based framework that lays the basis for social, environmental, and economic sustainability through its establishment of success indicators. The main belief of the LCI is that functioning ecosystems are essential for the region's continued prosperity. Functioning ecosystems include the physical, chemical and biological features, functions and interactions that comprise the landscape.

The LCI contains many programs including the Terrestrial Natural Heritage Program. This program is based on collaboration among the City of Toronto, the Toronto and Region Conservation Authority (TRCA), and various other cities/towns and districts. Its goal is to describe, understand, and manage the landscapes of the Toronto region.

Successes

- 38,824 acres (15,712 hectares) of land has been acquired by the TRCA/City of Toronto partnership and more than 5 million trees have been planted.
- Field studies have compiled information on biodiversity and resulted in the discovery of threatened species in the area.
- Watershed research led to a better understanding of watershed responses to urbanization and watershed plans have been completed.

Challenges

- Urban expansion has caused the loss of habitat/fragmentation.
- Traditional approaches to conservation (setting aside representative ecosystems, protecting individual endangered species, and the protection of specific landscape features) have failed to maintain ecosystem health. The new approach is more holistic in nature.

Source: www.toronto.ca

4. Lessons Learned

A variety of lessons can be drawn from the case studies. These will be explained by categorizing them into positive and negative influences. Positive influences—reflecting lessons learned that contributed to project success—are split into resident involvement, partnerships, long-term investments, and research. Negative influences—reflecting lessons learned that contributed to project difficulties—are split into institutional capacity, development and growth, and user behaviour and compliance.

4.1 Positive Influences

Resident Involvement

Lesson learned: never underestimate the value of the public

The Boulder, Waitakere, Albuquerque, and Leicester programs show that by involving the public, project outcomes can be successful over the long-term. Support for additional taxes, demand from residents for locally-grown food, and grassroots initiatives such as that in Waitakere (residents pushed to have a bill passed that designates the ranges as having a distinct statutory identity) have all significantly facilitated the development of urban land stewardship programs.

Partnerships

Lesson learned: use partnerships to achieve land stewardship goals

New York, Brisbane, Brighton & Hove, and Townsville have all profited from having project partners. This is critical for projects that operate outside city boundaries. These partnerships took one of two forms. The first is form is between the local government and local landowners. For example, the New York City Watershed Agricultural Program relies on voluntary partnerships between the city and upstate farmers (without the farmer-city partnership the whole watershed protection initiative would be at risk). The second form is between cities and other local/provincial/national/international governments or organizations. By partnering with national and regional organizations, Brighton & Hove and Townsville tapped into larger resource banks and their projects have flourished because of it. By partnering with residents and/or outside governments or organizations, city projects can become a part of a larger entity that has more weight as a whole than it does standing alone.

Long-term Investments

Lesson learned: investing in natural capital today, through land stewardship projects, can save money and generate multiple sources of wealth in the future

Ann Arbor and New York have contributed significant upfront costs to gain greater benefits over the long-run. The use of a $20 million bond by Ann Arbor to purchase land over the next three years means that property can be purchased now at current costs rather than later at higher costs. New York City has invested millions of dollars into watershed management, and by doing so, has saved billions by avoiding the construction of a new filtration system. The gains that result from the short-term pain of large upfront investments are diverse and are often overlooked. For example, the physical and mental health of city residents are bettered with access to open space/natural areas resulting in decreased pressure on health services and tourism industries grow from access to natural open space. Cities that take the initiative to protect/manage/enhance natural capital now can save money down the road and contribute to the overall quality of life for both current and future city residents.

Research

Lesson learned: scientific research (including social science) helps project development and plays a significant role in monitoring during the lifespan of a project

Moncton, Gloucester, Accra, and Toronto have conducted and continue to conduct scientific research to inform program design. To ensure that the focus is on the correct variables and that efforts are aimed in the right direction, these cities have taken the time to research program topics (e.g., ecological integrity) prior to program implementation so that they are guided by correct and current information. Additionally, these programs continue to monitor and conduct research on, for example, watersheds so that they can adapt projects as new information is gathered. Continuous monitoring, field research, and adaptive management are very important as the natural environment is ever changing. Projects that have had success in protecting the natural environment have resulted from continuous scientific research and monitoring.

4.2 Negative Influences

Institutional Capacity

Lesson learned: institutional capacity must be maintained over the life of a project

Institutional capacity refers to the resources (financial, human, statistical, material, etc.), policies, regulations, and resident/provincial/national support that are available to an organization or government for the development and implementation of specific actions, in this case, land stewardship projects. While the case studies in this report were successful in generating sufficient institutional capacity to implement their projects, this does not mean that it was an easy task nor does it guarantee the continued existence of sufficient institutional capacity. For example, the Creek to Coral program in Townsville Australia resulted from an agreement between national and local authorities. However, the national authority has a four-year limit on the project, leaving the city's institutional capacity to continue the project in question. New policies and regulations come into play and resident/provincial/national support comes and goes. When the institutional capacity directed at stewardship projects is reduced, this is likely to have a negative influence on project success.

Development and Growth

Lesson learned: outside development and growth influences project success

Cumulative impacts of population growth and development have had negative effects on the stability and success of land stewardship projects. For example, San Luis Obispo in California notes a difficulty in being able to acquire land for their greenbelt system of parks and open space (a fact explained by fiscal restraints but also because of development projects that acquire land before the city can). Toronto also notes a difficulty in being able to keep up with city expansion and, because of this, otherwise intact habitats and ecosystems have been fragmented or lost. To confront this problem, some of the case study cities have designated or zoned greenbelt systems in advance, therefore limiting development within that area. Other cities, such as Waitakere, have gone as far as having specific regulations created that are unique to the protected area.

User Behaviour and Compliance

Lesson learned: for projects to be long lasting cities must continue to involve the community

Many of the large parkland, farmland and open space case studies, including Accra, noted unsustainable user behaviour. Users have created undesignated trails that affect the quality of habitat; they have caused erosion in places due to heavy influx; and

they have vandalized and polluted areas of the environment. This illustrates the necessity of continued community involvement with the project as this can deter misuse and non-compliance to open space/protected area rules. A great example of this is Walvis Bay's Integrated Waste Management Plan that incorporates the public through both city wide educational programs and by hiring residents to work at the desert remediation site. Brisbane Australia encourages voluntary compliance and participation in conservation programs by offering financial, technical, and training assistance.

5. Recommendations

Three broad recommendations are drawn from the case studies in this report:

5.1 In Canada, land stewardship is necessary at the local level.

The Government of Canada has attempted to address land stewardship through national programs such as the Stewardship Action Plan for Canada (Roach *et al.* 2006), and provincial governments have instigated land stewardship programs such as BC's Five Great Goals (Rae and Beale 2007). However, national and provincial land stewardship strategies should not stand alone. While they are critically important to local governments in terms of generating sufficient institutional capacity to approach land stewardship by acting as a framework for city-led initiatives, they should not be taken as an excuse to avoid building local land stewardship programs. City authorities are closer to the local community, have a better understanding of local circumstances, and can therefore direct efforts more efficiently and appropriately.

5.2 Canada's municipal governments need to think beyond their own boundaries to achieve successful land stewardship projects.

Local governments should be cautious when considering projects that may interfere with another government's jurisdiction. Despite this, the case studies in this report illustrate that cities can take positive steps to protect the environmental goods and services that they depend on while accepting responsibility for the environmental impacts that they cause and that collaboration between cities and other governments/organizations can be very—if not more—successful than solo ventures.

5.3 The relationship between urban and rural landscapes requires further assessment in Canada.

The dynamics (interconnecting systems and processes) that exist between cities and metro-adjacent landscapes require more examination. One thing that is apparent is that the relationship is interdependent: cities require the natural capital that is more plentiful in the surrounding region and smaller communities and towns require the services and employment that large central cities provide. Up to this point, what little research has been conducted has focused on human systems and processes (social and economic) that occur between cities and rural areas. There is less information on the effects that city environments have on surrounding natural environments and vice versa. This represents an information gap, as it is important for the sustainability of a region to understand the natural science behind the human impact.

Many of the case studies in this report have initiated strategies to collect information on the impact of cities on adjacent landscapes for the purpose of effective land stewardship programs. For land stewardship to be fully functional in western Canada, cities will have to contribute more time and effort into better understanding the complexity of urban/rural relationships.

6. Conclusion

This report has provided an overview of city-led land stewardship initiatives from around the world. Actions taken by cities to protect the natural capital upon which they depend are rooted in the recognition that: 1) there is a complex and dynamic relationship between urban and rural areas; and 2) that large populations and high consumption rates can negatively impact the environment outside urban boundaries.

Both positive and negative lessons have been drawn from the case studies with the intent to provide local governments in Canada with a better understanding of how to ensure project success and longevity. Overall, maintaining an interdisciplinary approach (e.g., involving the public, scientists, and other governments and organizations), stabilizing institutional capacity, and having clear goals and guidelines are critical aspects affecting the successful execution of urban land stewardship projects that extend beyond city limits. Indeed, it takes a combination and balance of public involvement, science, institutional capacity, clear guidelines and other winning conditions for urban land stewardship projects to be successful.

If cities do not begin to place priority on land stewardship projects, key metro-adjacent landscapes (such as open space and farmland) will continue to degrade until the damage is irreversible. As is the trend across Canada, western Canadian cities have reached such high levels of ecological impact that they cannot afford to neglect setting priorities for the protection, enhancement and management of the surrounding natural environment. They should, therefore, follow the example set by the case studies outlined in this report and expand their efforts to proactively steward the natural capital that surrounds and sustains them.

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In 1970, the One Prairie Province Conference was held in Lethbridge, Alberta. Sponsored by the University of Lethbridge and the Lethbridge Herald, the conference received considerable attention from concerned citizens and community leaders. The consensus at the time was that research on the West (including BC and the Canadian North) should be expanded by a new organization. To fill this need, the Canada West Foundation was created under letters patent on December 31, 1970. Since that time, the Canada West Foundation has established itself as one of Canada's premier research institutes. Non-partisan, accessible research and active citizen engagement are hallmarks of the Foundation's past, present and future endeavours. These efforts are rooted in the belief that a strong West makes for a strong Canada.

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Head Office:
#900, 1202 Centre Street SE
Calgary, Alberta, Canada T2G 5A5
Telephone: 403.264.9535

BC Office:
#810, 1050 West Pender Street
Vancouver, BC V6E 3S7
Telephone: 604.646.4625

www.cwf.ca