

Rooftop Gardens

Urban communities face many challenges related to the health and well being of citizens. Many of these challenges arise as the direct consequence of dense urban environments. Industry, automobiles, and impermeable concrete and asphalt surfaces combine to negatively impact upon the air and water quality, while climate change serves to exacerbate the urban heat island effect through global warming. Intense competition for land decreases green space, and there is a subsequent spiritual disconnect from agricultural roots and the natural world.

The Benefits of Rooftop Gardens

To help alleviate the environmental problems encountered with dense urban habitation and to encourage sustainable development, governments and non-profit agencies worldwide are working toward creating laws, establishing standards, and funding incentives to promote best practices in green development. Rooftop gardens are an excellent example of incorporating passive, eco-friendly technology into new or existing development. Rooftop gardens help mitigate the negative impacts of cities on the environment by: conserving energy and water, improving air and water quality, assisting in storm water management, absorbing solar radiation, becoming a source of local food production, providing habitat restoration, and creating natural retreats.

Rooftop gardens are most effective when constructed on the flat roof styles common to many city commercial, institutional, or industrial buildings. Depending on the load bearing capability, city buildings can either be retrofitted, or rooftop gardens can be incorporated into the original design. The basic components of a green roof include: a waterproof membrane, a root barrier, a drainage system, filtering cloth, growing medium, and plants. Green roofs can double the longevity of a roof when compared with traditional roofing materials, and some components incorporate recycled materials.



Part of the original building design, the Trent University rooftop vegetable garden utilizes the flat roof surface over the biology wing of the Environmental Science Building. Surrounded by plants, ventilation stacks exhaust air from the rooms located below.

Urban Agriculture and Rooftop Gardens

In an accessible rooftop garden, space becomes available for localized small-scale urban agriculture, a source of local food production. An urban garden can supplement the diets of the community it feeds with fresh produce and provide a tangible tie to food production. Rooftop agriculture allows for the retention of traditional or cultural gardening practices while local choice of plants can preserve heritage species and maintain diversity in diet.



Ancient grains such as Quinoa (pronounce keen-wa) and Amaranth grow behind the onions in the Trent University rooftop garden.



The three sisters - corn, beans, and squash - grow together in the Trent rooftop garden. This combined planting is an example of traditional indigenous gardening knowledge whereby the beans provide nitrogen to the corn, the squash leaves provide shade and reduce soil evaporation, and all three vegetables are nutritional dietary staples.

The Trent University garden is an exemplary example of urban agriculture. The food produced on the roof of the Environmental Science Building provides organic produce to The Seasoned Spoon, a student run, fair trade, vegetarian campus café, as well as providing food security to local citizens through the Peterborough chapter of Food Not Bombs. Part of the original building design, the Trent rooftop garden is situated over the biology wing of the Environmental Science Building. Through the efforts of Dr. Tom Hutchinson, Professor Emeritus, this intensive rooftop garden also provides ongoing research into the deleterious affects of ground level ozone on crop production and an opportunity to study the potential of plants to filter out air pollutants.



A corn leaf from a plant in the Trent rooftop garden bears purple striations that indicate damage from ground level ozone.

Promoting Rooftop Gardens Through Education and Incentives

So, if rooftop gardens offer a multi-faceted solution to improve the health of cities, why do we not see more evidence of their use? This is where promotion enters the picture. Rooftop gardens require marketing strategies just like any other product. Developers, policy makers, architects, and the public require performance information on the technology, benefits, and costs involved. Even when a city recognizes the benefits of rooftop gardens, there is still the need to encourage the construction of green roofs by making them a financially viable option.

The initial construction cost of a green roof can be double the cost of a conventional roof, elevated even more with specialized design or plant materials, and then there is the uncertainty of maintenance costs once the roof is established. Green roofs have been proven to increase roof durability, longevity, and save on energy costs, but are these cost benefits enough to assure developers that there will be a reasonable return on their investment? Alternative technologies - when first introduced to the marketplace - are often slow to develop due to higher front-end capital outlay and performance uncertainties. Therefore, policy makers must utilize economic incentives to stimulate green roof development in order to create a local product

market where eventually, economies of scale will help decrease initial costs. Initial projects can then be used to establish financial and environmental performance records.

Standards and Incentives

Once a municipality decides that rooftop gardens can play an important role in their urban planning goals, they need to set standards to ensure specific objectives are met. Based on meeting the standards set by the municipality, developers can be offered incentives such as expedited permits for green projects and density bonusing. Combined with monetary assistance in the form of tax incentives, fee rebates, or grants, investment in green roofs can become more attractive. Partnerships between non-profit organizations, private companies, and government can improve the financial viability of a project while meeting the individual goals of each partner.

Using Peterborough as an example, rooftop gardens have the potential to be used as a strategy to relieve storm water peaks and prevent flooding during intense rain events. In this case, for a developer to qualify for an incentive or rebate, the municipality may require that the rooftop garden be sized to cover a specified percentage of the roof, have a minimum depth of planting medium, and be located in an area of concern. Cities also need to establish a method of ensuring that once constructed, rooftop gardens are maintained to a set standard.

Introducing the Concept of Rooftop Gardens to Cities and Urban Planners

The promotion of technological innovation within the auspices of urban planning can originate from a variety of sources. Champions of new ideas come from all walks of life. Rooftop gardens have been introduced to municipalities and stakeholders by non-profit organizations, civil servants, students and educators, business and community leaders, and ecologically minded citizens. For more information on rooftop gardens and associated policy, please visit Green Roofs for Healthy Cities at www.greenroofs.org or check out the following links and resources.



“It was the architect’s vision to blend the rooftop garden into the natural surroundings of the Trent campus,” states Aimee Blyth. Aimee is currently responsible for maintenance of the garden while completing her Masters in Canadian Studies, focusing on local markets and small-scale agriculture.

[Links](#)

Centre for the Advancement of Green Roof Technology: <http://commons.bcit.ca/greenroof/>

City of Toronto: www.toronto.ca/greenroofs/

[Research Papers:](#)

Comparative environmental life cycle assessment of green roofs.

Lisa Kosareo and Robert Ries.

Building and Environment **42** (2007) 2606-2613. Available online at: get it! Trent.

Evaluating Rooftop and Vertical Gardens as an Adaptation Strategy for Urban Areas.

Brad Bass; Bas Baskaran

NRC-IRC-46737 (October 14, 2003) <http://irc.nrc-cnrc.gc.ca/ircpubs>

Green Roof Policy Development Workshop: Participants' Manual

Available as a resource item in the Kawartha World Issues Centre located at Trent University (East Bank) in the Environmental Sciences Building, Room B101

[Volunteer Opportunities or Tours of the Trent University Rooftop Garden:](#)

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