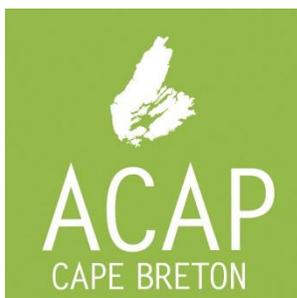


*Stemming Stormwater:
ACAP Cape Breton's Rain Garden Initiative*

Project Final Report 2014-15



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Glossary of keywords

Rain garden: A landscaped plant bed designed to capture and infiltrate rain water.

Low impact development: a type of development that either enhances or does not significantly diminish environmental quality.

Aquifer: An underground layer of water-bearing permeable rock, gravel, sand, or silt from which groundwater can be extracted using a well.

Acknowledgements

ACAP Cape Breton sincerely thanks the RBC BlueWater Project for the financial support that made this project possible.

We would also like to thank all the volunteers who helped us at all stages of the project by providing advice, caring for plants, and toiling in the dirt with us. Special thanks to the Cape Breton Federation of Agriculture, Sydney Downtown Development Association, and Coxheath Elementary School.

Project Overview

The goal of this project was to improve stormwater treatment and management within the Cape Breton Regional Municipality (CBRM) while also educating the public about urban water issues. To this end, ACAP CB planted rain gardens throughout the city, held rain garden workshops, and developed educational materials about rain gardens which can be utilized long after project completion.

Over the course of this project, ACAP CB planted 15 rain gardens throughout urban areas of the CBRM. Twelve of these were on residential properties, and the remaining three were planted in public areas. In addition, three hands-on rain garden workshops were held to help give homeowners the information needed to build their own rain gardens.

Background

What is a rain garden?

Rain gardens are landscaped plant beds designed to capture and absorb rainwater. Rain that lands on impervious surfaces such as roofs, driveways, roads, and sidewalks turns into stormwater runoff. The water picks up pollutants such as sediment, oil, and salt as it flows into storm drains which ultimately empty into the ocean. Rain gardens capture this runoff, filter out the pollutants, and allow the water to infiltrate into soil instead.

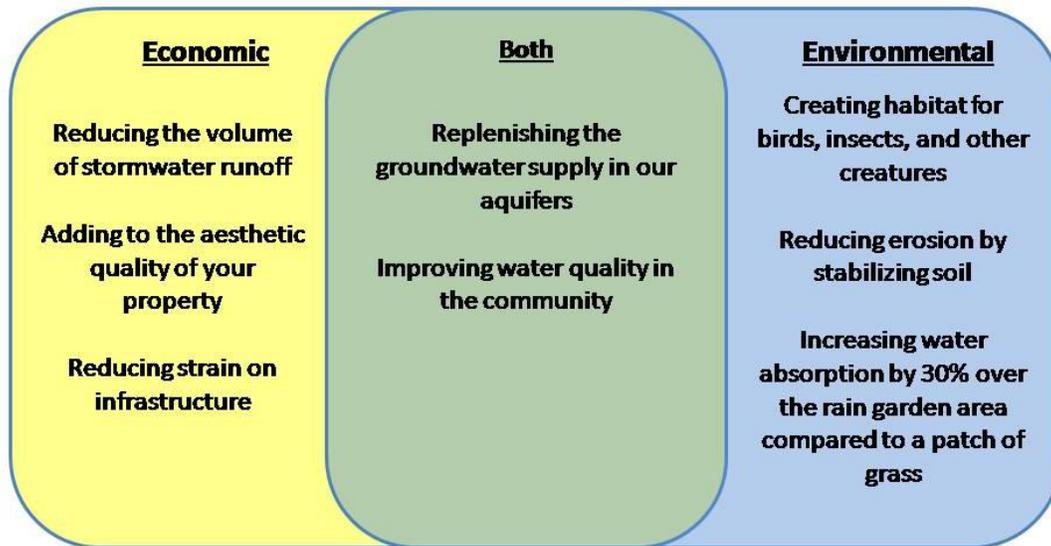
Rain gardens are planted in slight depressions in the landscape so that water which flows into them is retained. This gives the water a chance to slowly sink into the soil. Rocks are often utilized to slow the flow of water where it enters the garden to prevent erosion and damage to the plants. Swales (small channels lined with rocks and grass) can be used to direct water into and out the garden in areas with especially heavy flows. The plants help to increase absorption of the rain water and filter pollutants—and they look great!

Why build rain gardens?

Cities are full of pavement, rooftops, and other impervious surfaces that produce a huge amount of runoff. For example, a single house measuring 10m by 5m can produce 500L of runoff in a 10mm rain event. All the buildings and driveways and parking lots in a city together can produce an overwhelming amount of water with no ground to sink into—this is called stormwater.

Although there is infrastructure present to collect, transport, and manage stormwater, stormwater is not treated in the CBRM, Cape Breton's biggest urban centre. This means that our community is in need of greater stormwater treatment measures. Rain gardens are an excellent start, as they collect, infiltrate, and treat stormwater at its source so it never enters the stormwater system.

Rain gardens are a popular, low-impact development technique for managing stormwater, and for good reason. They have a wide variety of positive impacts on both the environment and infrastructure. The benefits of rain gardens include:



Project Implementation

Program Details

Several preliminary steps were required before any rain gardens could be made. The first step was a visit to the potential site to determine whether it was suitable. Rain gardens are not effective in areas with excessive slope, in soil with high clay content, or areas where the water table lies close to the surface, so ensuring that these factors are not present is vital. On sites that were suitable, we collected measurements needed to determine optimal placement for the garden. Garden placement took into account where the garden would collect the most runoff, where it would work aesthetically on the property, and input from the homeowner.

After the assessment was completed, we drafted a scale drawing of the garden design. The sketch showed the size of the garden, its position on the property, and the layout of the plants. Once the garden concept was approved by the property owner, we proceeded with building the garden.

Rain gardens are typically sized to collect all the runoff produced over a given impermeable area (e.g. driveway, part of a roof). When designed this way, the size requirements for a garden can be quite large—too large for most of the urban lots selected during our project. In order to ensure that our rain gardens helped to manage stormwater while still being a positive addition to the homeowner's property, we chose to limit the size of our gardens. Most residential gardens were between 4-6m², which is a manageable size for maintenance that doesn't overwhelm the property and still has the potential to capture 400-600L of runoff.

The goal of this project was to do the hardest part of garden construction (i.e. digging and hauling dirt and rock) and to overcome the initial monetary investment required. With those challenges out of the way, maintaining the garden is easily accessible to homeowners.

Gardens planted in public areas were larger than the residential gardens because more space was available. In addition, public gardens also contain a sign explaining what the rain garden is and how it is beneficial.

How to Build a Rain Garden

Building a rain garden is quite simple, and there are an abundance of guides available to help homeowners plan and construct a rain garden (see the resources section of this report). The basic steps are very similar to planting any garden.

One thing to keep in mind when planning a rain garden rather than a regular flower garden is how water will enter, move through, and exit the garden. Water can enter from a point source (e.g. a downspout), or as a sheet from a slope. Both of these methods work fine, but the point(s) where water enters should be reinforced with rock to slow down water as it enters; this protects the plants and prevents erosion. Once water is in the garden, it is important to consider whether it will spread out evenly (if the garden bed is level within) or if it will pool in the centre (as in a bowl design). This will determine plant placement (more water tolerant plants must go where the garden will be wettest). How water is kept in the garden is affected by the slope around it. If the garden is planted on a slight slope, a berm should be built on the downhill side to increase its water retention capacity; this is not necessary if the garden is on level ground. Finally, rain gardens should all have a place for overflow to exit; this can be as simple as a notch cut in the berm or as fancy as a small swale. As with the entry point, this area should be reinforced with rock to prevent erosion.

Draw your bed



Dig it out



Add soil, compost, and plants



Finish with rock



The Rain Gardens

A total of 15 rain gardens were built. Three of these were in public locations and 12 on residential properties. All of the gardens were built in the CBRM; most were in Sydney, with a few planted in North Sydney, New Waterford, Dominion, South Bar, and Coxheath. In total, the gardens cover almost 80m² and can infiltrate just over 11,000L of water in a rain event.



The Workshops

Three rain garden workshops were held which corresponded with construction of the three public rain gardens. The workshops included an instructional component and some hands-on work. The instructional portion covered what rain gardens are and how they work, what their benefits are, and how to plan and build them. Participants then helped to build the garden by filling the bed with soil and compost and planting flowers, shrubs, and trees. This was a particularly enjoyable activity for kids at Coxheath Elementary where one of the gardens is planted. Involving them in building the garden on their school ground helped to foster a sense of ownership and appreciation for the garden.

Public Education

The goal of this project was both to take a step toward better stormwater management by building rain gardens as well as to raise awareness about stormwater in the community. Although the effects of stormwater become very obvious during a heavy rain event, when streets are wet and storm sewers overflow, stormwater is not often something that is on people's minds. This project was also an attempt to bring attention to stormwater issues. The rain gardens brought attention to stormwater as an issue and as something produced on everyone's property and also provided a solution that anyone can be a part of. To continue education about stormwater after the end of this project, we developed a rain garden brochure describing what rain gardens are, how to maintain them, and other home stormwater management practices.

Garden Building Tips

Constructing a rain garden is a physically demanding process. It's a good idea to recruit lots of friends to help you! Additionally, renting a motorized tool for cutting sod or loosening soil can ease the process significantly.

If you can't build a rain garden big enough to capture all the runoff on your property, don't give up! It is better to capture some runoff than none at all. Build a garden of a size that works for you and your property.

It is important to start gardening projects early in the season when there are a wide variety of plants available. Planting early also gives the plants more time to establish in their new home.

About ACAP Cape Breton

The Atlantic Coastal Action Program (ACAP) Cape Breton is a non-profit charitable community organization. ACAP Cape Breton has a vision for a community in which local people are actively engaged, working and learning together to build a healthy and sustainable Island. Established in 1992, the original mission was to develop a comprehensive ecosystem management plan for the watershed area of industrial Cape Breton. ACAP Cape Breton has grown into a dynamic group that integrates environmental, social and economic factors into projects focusing on action, education and ecosystem planning.

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ACAP Cape Breton



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ACAP Cape Breton has a community vision: "Local people are actively engaged; working, and learning together to build a healthy and sustainable island."

Appendix I: Resources

Rain Garden Guides

Vermont Rain Garden Manual

<http://www.uvm.edu/seagrant/sites/uvm.edu.seagrant/files/vtraingardenmanual.pdf>

Rain Gardens: A How-to Manual for Homeowners

<http://learningstore.uwex.edu/assets/pdfs/GWQ037.pdf>

Rain garden Design and Construction

<http://www.fairfaxcounty.gov/nvswcd/raingardenbk.pdf>

Websites

Atlantic Coastal Action Program Cape Breton – <http://www.acapcb.ns.ca>

Stormwater Central (Ecology Action Centre) - <http://managingstormwater.blogspot.ca/>

Rain Garden Network - www.raingardennetwork.com

Clean Annapolis River Project - http://www.annapolisriver.ca/projects_raingardens.php

Ecology Action Center - <https://www.ecologyaction.ca/blog/rain-garden-plants>