RAIN GARDENS

General Information

Summary

Rain gardens are also known as recharge gardens. They are small detention and infiltration areas that use native vegetation to achieve an appealing, aesthetic look. They are simple, inexpensive, and easy to install. Rain gardens are an extremely popular form of stormwater mitigation, as they are easy retrofits for existing developments and are well suited for small sites like individual homes, or larger sites such as common areas and schools. They are a small form of bioretention.

A shrub rain garden in Maplewood, Minnesota (Photo: Maplewood Public Works)

Advantages

- È Rain gardens only require the work necessary for any ordinary landscaping project.
- È They can be designed to work in most soil types.
- È Rain gardens also provide an aesthetic value, runoff volume control, and attract wildlife such as birds and butterflies.

Disadvantages

- È If built incorrectly, rain gardens can accumulate standing water or increase erosion. These problems can be avoided by following published design guides.

Conventional Alternatives

Rain gardens take the place of conventional landscaping. Conventional landscaping, such as turf grass, will produce some runoff and may require fertilizers or regular maintenance such as mowing, mulching, etc. Rain gardens do not need fertilizer or pesticides and require only periodic weeding.

Design Information

A rain garden should be kept at least 10 feet downslope from a house, so that any overflow flows away from the structure. A rain garden should be a 2 to 6 inch deep dish shaped depression if standing water is not desired and approximately 18 inches if standing water is desired. A typically sized rain garden is approximately 70 square feet and in a shape or design that follows the drainage system of the landscape. All utilities should be marked before installing a rain garden to avoid digging up or over water mains and electrical lines. Rain gardens should

not be built over or near septic drain fields. They do not need to be (and should not be) fertilized or exposed to pesticides. Additionally, avoid building gardens in right of way areas (e.g. phone lines, adjacent public roads) unless specific permission is received from the utility that owns the right of way.

Uses in combination with other techniques

Rain gardens are small stormwater mitigation areas, and can be used in connection with other individual soft path techniques. Rain barrels work well in conjunction with rain gardens.

Cost

Rain gardens can be very inexpensive or even free if you use plants that you already own. Designs can be found for free online, and the gardens can be dug and planted by homeowners with costs limited to time and the price of the desired vegetation. Costs can rise depending on the size of the project desired. Garden builders and designers can be hired, although costs vary by region, design, and contractor. Soil replacement, new vegetation and gravel drain outlets increase the price. Large rain gardens, with new plants, soil and gravel drain beds can cost as much as $4000.[21]

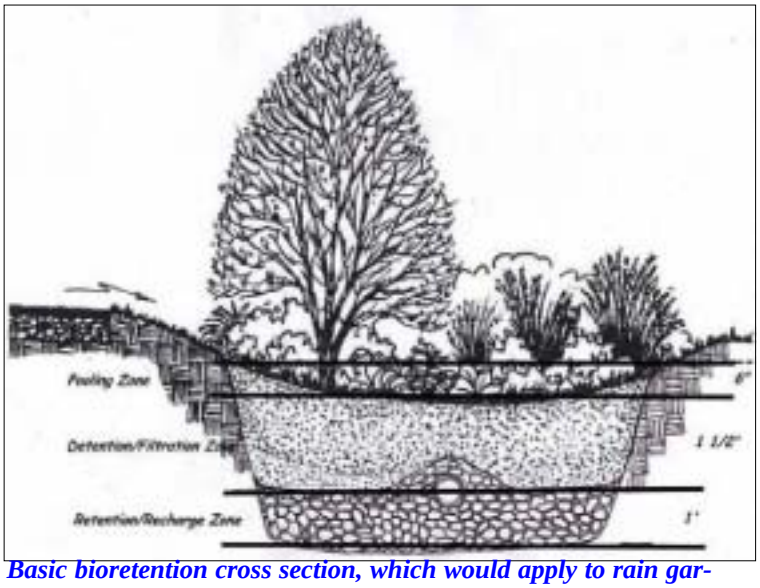
Runoff Reduction

The amount of stormwater and pollutants that rain gardens can absorb depends on the size of the gardens and the plants used. Rain gardens have been found to be successful in reducing bacteria and 80-90% of heavy metals and other common pollutants. They reduce only small amounts of nitrogen, phosphorus, and salt. Designed properly they can substantially reduce stormwater runoff volume.

Specialized Information

Cold Climates

Rain gardens planted with native vegetation are not substantially impacted by cold climates, but will have limited effect during the coldest months. Gardens with standing water will freeze over, and infiltration is reduced by frozen ground.



Basic bioretention cross section, which would apply to rain gardens (Prince George's County, MD Bioretention Manual)

Soil Types

Rain gardens can be built on both sandy and clay soils. The proper vegetation should be chosen for the soil type, although in many instances soil replacement or amendment is recommended, particularly in clay soils. Over time, native vegetation adapted to clay soils, such as prairie grass, will become established enough to uptake water and change the soil.

Case Study - Maplewood, Minnesota

The City of Maplewood, Minnesota, in the Twin Cities metropolitan area, has planted rain gardens and established programs that encourage homeowners to build their own gardens.

The idea to install neighborhood rain gardens arose when city officials found that planned street improvements would have required the construction of costly new storm sewers in an older neighborhood. The problem with the addition of new storm sewers was that they would have eventually emptied into Lake Phalen, a popular urban lake where urban water pollution is a concern. After intensive studies and community surveys, landscape solutions, such as rain gardens, were chosen to help mitigate future stormwater problems associated with the city's growth.

In 1996, the City of Maplewood partnered with the University of Minnesota Department of Landscape Architecture and the Ramsey Washington Metro Watershed District to implement the Birmingham Pilot rain garden project. Since then, Maplewood has implemented five other projects. Most recently, in the summer of 2003, the Gladstone South project resulted in the planting of over 100 private gardens and four neighborhood gardens.

A typical rain garden below the soil (Painting by Ruth Zachary, permission to use by Rain Gardens of Western Michigan)

These programs have all been voluntary. They are based around a series of educational efforts sponsored by the city, such as mailings, community meetings and focus groups. City engineers provided easy access to advice, and city staff visited sites to answer questions and give homeowners advice on designing and maintaining gardens. Organized planting days give participating community members access to a variety of garden designs, advice on the types of plants to use, and a chance to speak with master gardeners. All of these programs provide information to homeowners who are unfamiliar with rain gardens, and encourage the city's other communities to implement their own programs.

The program has been very successful in reducing stormwater impacts. When an unusually large storm caused flooding in the area two years ago, no water was observed running from the rain garden project areas. Essentially, the decentralized stormwater project was able to handle the precipitation from an intense storm successfully. In addition to successfully controlling stormwater runoff, the project is cost effective. A conventional street repaving and storm water construction project would cost approximately 30 percent more than the rain garden projects. In addition to lower costs, improvements in surface water quality, neighborhood aesthetics, and citizen involvement were achieved. These would not have been realized with a conventional storm sewer system.

Additional Sources

Rain Gardens of West Michigan - General rain garden information site with design suggestions
www.raingardens.org

The Prince Georges County, Maryland Bioretention Manual (a very good design source).
www.goprincegeorgescounty.com/Government/AgencyIndex/DER/PPD/LID/bioretention.asp?h=20&s=&n=50&n1=160

City of Maplewood Rain Garden Website
http://www.ci.maplewood.mn.us/index.asp?Type=B_BASIC&SEC={F2C03470-D6B5-4572-98F0-F79819643C2A}

City of Maplewood Report on homeowner reactions to rain gardens.
http://www.ci.maplewood.mn.us/vertical/Sites/{EBA07AA7-C8D5-43B1-A708-6F4C7A8CC374}/uploads/{E0CE291E-3C1B-4776-B33A-7C5A4C5F5860}.PDF

Bioretention research at the University of Maryland
http://www.ence.umd.edu/~apdavis/Bioongoing.htm

The Southeastern Oakland County Water Authority - Rain Gardens on the Rouge River
http://www.socwa.org/nature/PDF/Rain%20Gardens.pdf

University of Wisconsin Extension
http://clean-water.uwex.edu/pubs/raingarden/

Wisconsin Department of Natural Resources
http://www.dnr.state.wi.us/org/water/wm/nps/rg/

A typical rain garden (Photo:Maplewood Public Works)