

# BIORETENTION:

Bioretention is a technique that uses soil, plants and microbes to treat stormwater runoff. These shallow, landscaped depressions are known as *bioretention cells* or *rain gardens*.

## How are bioretention cells designed to be effective treatment devices?

- 1 Onsite soil is replaced or amended to include a first layer of sandy soil with some compost, topped with a thick layer of non-floating mulch.
- 2 Native plants are recommended due to their ability to cope with the region's environmental stresses and the habitat and food source they provide to native species of birds, insects and other creatures.
- 3 Stormwater enters the cell and is allowed to slowly percolate through the soil to the groundwater table. Root systems of plants increase the infiltration capacity of the cell, while plants also utilize the water and nutrients carried by the runoff. Some temporary ponding may occur.
- 4 An outlet is typical of a bioretention cell so that runoff may be discharged during heavy storms.
- 5 Where rapid removal of water is needed or where soils do not provide the needed percolation rate, an underdrain can be engineered into the system.
- 6 Maintenance includes irrigation upon establishment, weeding, some plant trimming and possible plant removal.

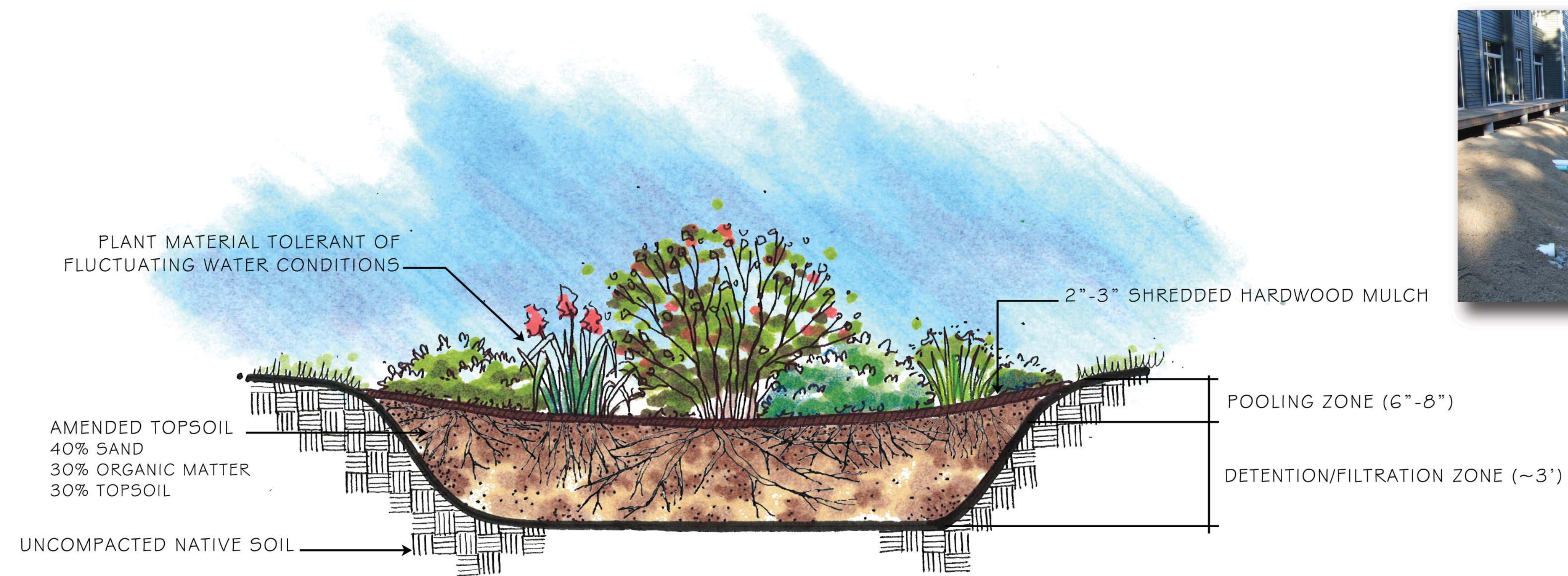


Illustration by Renee Byrd, Clemson University

## What type of treatment can be expected from a well-designed bioretention cell or rain garden?

- Volume of stormwater is removed, resulting in total runoff reduction, reduced peak discharge and increased groundwater recharge.
- Additionally, suspended solids, metals, bacteria and nutrients (total phosphorus, nitrogen) are removed from stormwater.

## Where can bioretention be used?

- This technique can be utilized in a variety of settings and climates, and in development sites both large and small.
- On a small scale, individual residences can utilize bioretention in the form of a "rain garden," treating runoff from the roof and driveway.
- Bioretention can be designed to treat smaller drainage areas within the larger development. Typically, bioretention is applied in parking lot islands, traffic islands, median strips and adjacent to parking lots.

BEFORE



AFTER  
(July 2010)



Trees, shrubs and herbaceous plants can all be used in a bioretention cell. Plants you may find here, and that are suitable for bioretention areas in this region, include Baldcypress (left), Lizard's tail (right) and Threadleaf coreopsis (bottom).



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These bioretention cells are instrumented with real-time monitoring equipment as part of the Intelligent River®.  
Data can be viewed at [www.clemson.edu/baruch/rain\\_gardens](http://www.clemson.edu/baruch/rain_gardens).

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