

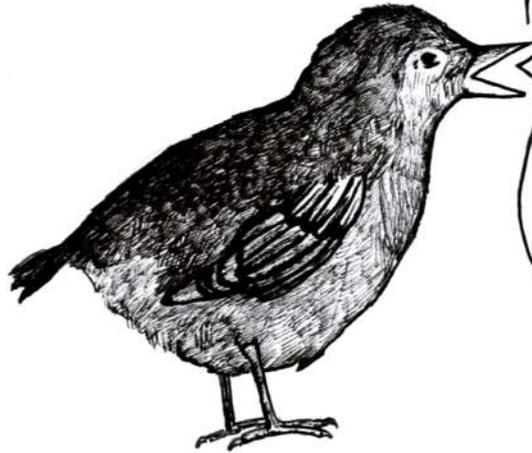
explore ways
to improve
water
quality in
Pullen Creek
through
rain gardens



taiya inlet
watershed council

Why and How to Build Rain Gardens 4 steps for Skagway, AK

Funded by the the
Alaska Department of Environmental Conservation
Alaska Clean Water Actions Program



A rain Garden is a shallow depression that collects rain water and snowmelt. The water runs through soils, which filter out pollutants. Rain Gardens are planted to look pretty and because plant roots help increase soil drainage.

•In this booklet you will learn **WHY** you might consider building a rain garden. See pages 2-9.

•You will also learn **HOW** to build a rain garden with information specific to Skagway. See pages 10-14.

•For **REFERENCES**, see page 15.

Contacts:

Alaska Department of
Environmental Conservation
Division of Water

Alaska Clean Water Actions

https://dec.alaska.gov/water/acwa/acwa_index.htm

907-465-5300

Taiya Inlet
Watershed Council
Skagway, Alaska

www.taiya.org

907-983-2426

Southeast Alaska
Watershed Coalition
Haines, Alaska

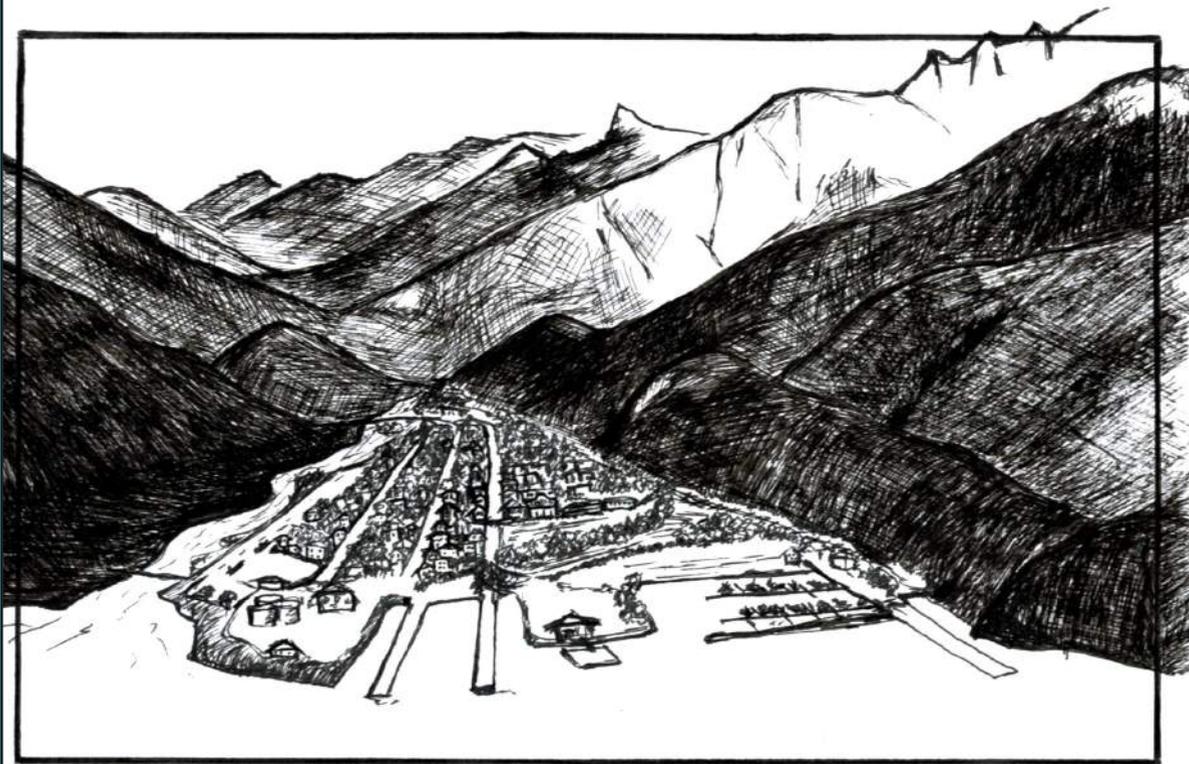
www.alaskawatershedcoalition.org

907-766-3745

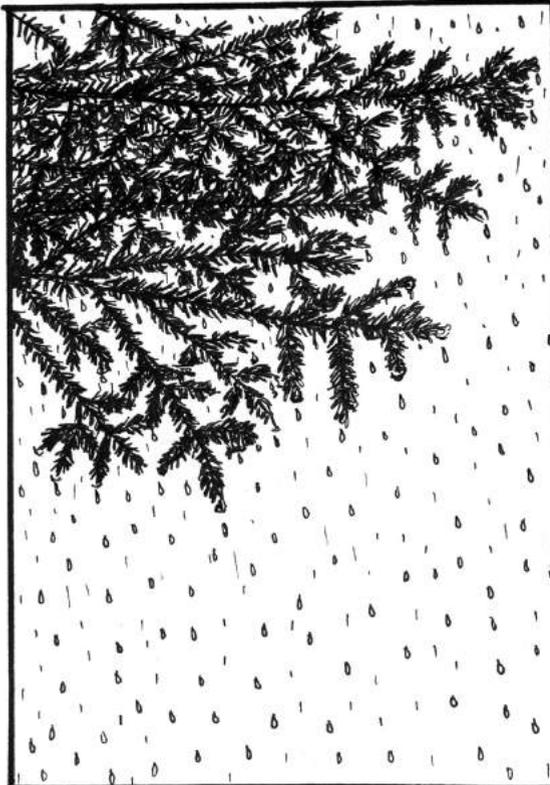
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WHY Build a Rain Garden?

A
story
to
inspire
you



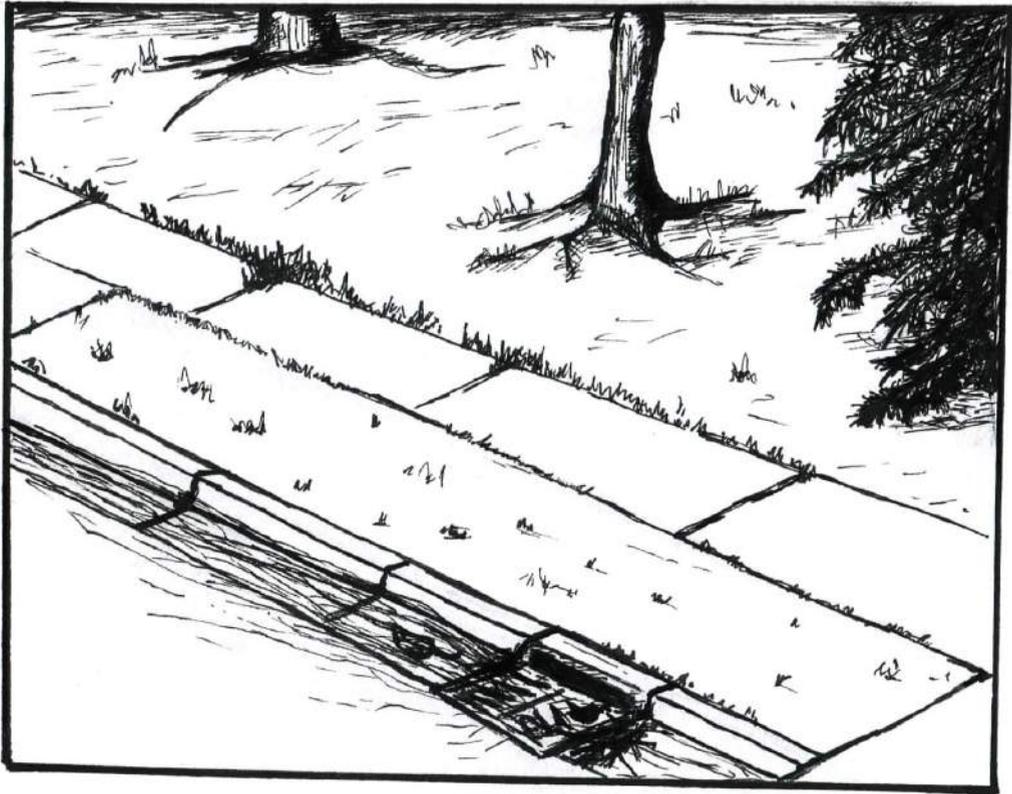
Skagway, Alaska. Coastal town at the top of the Lynn Canal. Year round residents: 800-ish.



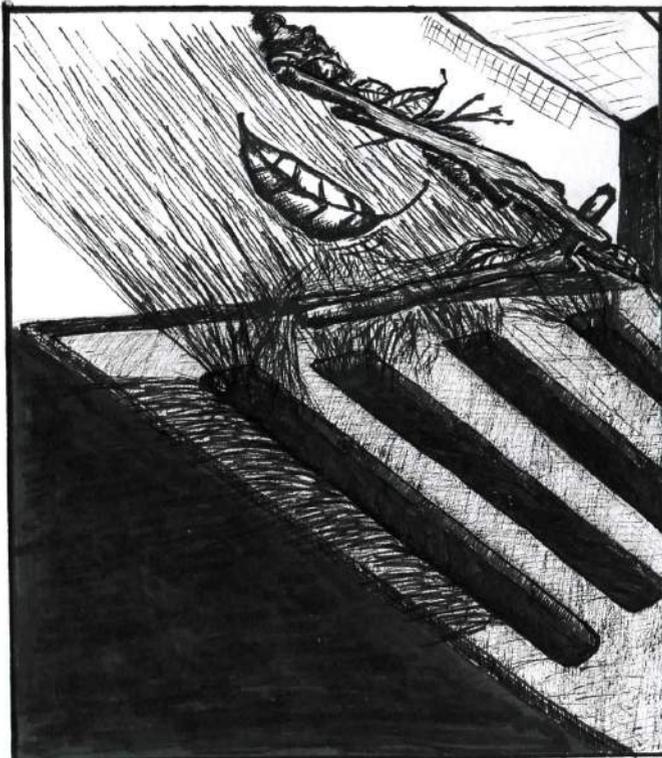
Though the driest part of Southeast Alaska, Skagway is technically part of a Coastal Temperate Rainforest.



When it rains in Skagway, the Urban Salmon Stream Pullen Creek runs gray.



Why would Pullen Creek run gray?



Like most cities, rain fall in skagway flows along streets, picking up pollutants that have collected since the previous rain.



These oils, greases, heavy metals, and sediments flow into stormdrains, which end in a pipe that dumps into Pullen Creek.

Roof tops



Roads and sidewalks



Even alleys and lawns are so compact that they shed rather than absorb water.



The grass roots in this lawn are too shallow to create pores in the soil to allow water to seep down to the gravelly layer below.



These are all examples of impermeable surfaces found in Skagway.

Urban areas like Skagway have these stormwater pollution problems because of the high proportion of impermeable surfaces within their limits. Rather than absorb water, impermeable surfaces shed water, allowing it to pick up pollutants on its way to the storm drain.

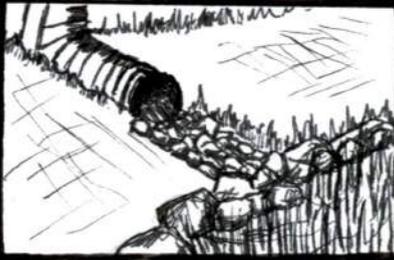
How Can We
Protect Pullen Creek
from
Stormwater Pollution?

One Solution is to build
Rain Gardens:
planted depressions in the
land that collect runoff

Rain Garden built into a lawn ↘



water from a roof or downspout moves
along a rock-lined ditch to a rain garden ↘



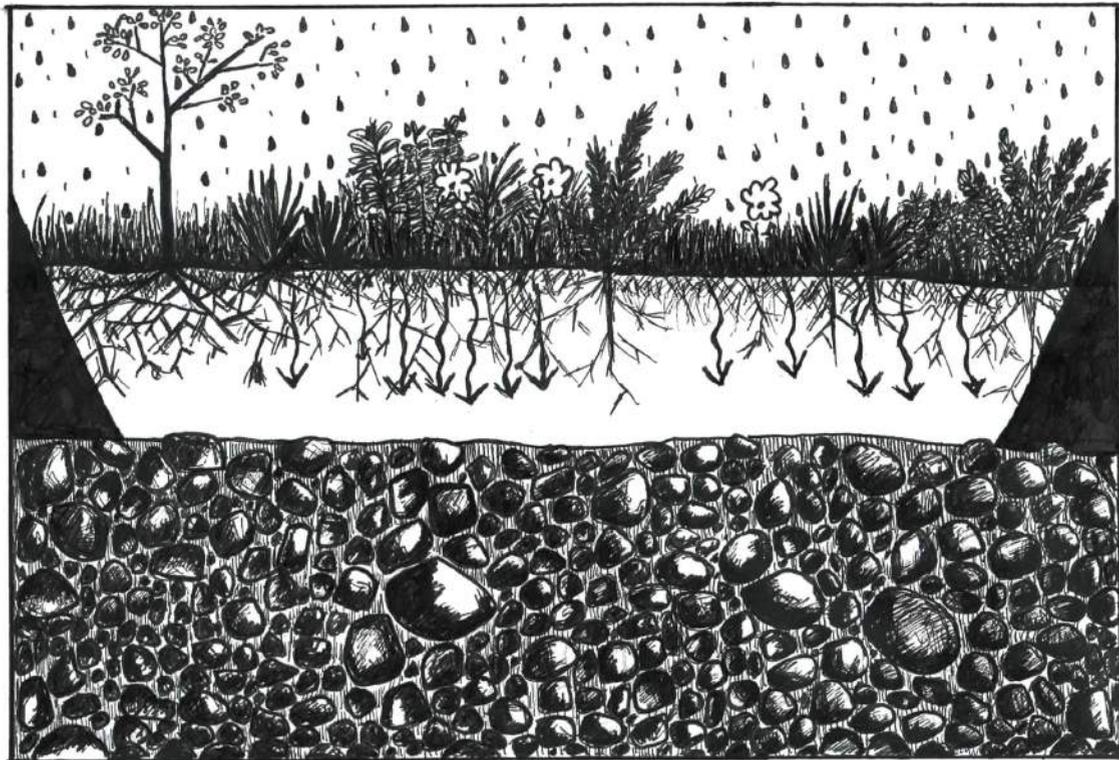
Notches in a curb allow water to
drain off a sidewalk and into
a rain garden



This Rain Garden collects runoff ↘
from a parking lot

Rain Gardens
collect
storm water
(rain & snowmelt in urban areas)
to keep pollutants
out of streams

A black and white illustration of a fish and a small plant. The fish is swimming in a stream, and the plant is growing on the bank. This illustration is part of the text block.



The roots of plants in this rain garden keep the soil porous, allowing water to infiltrate into the ground.

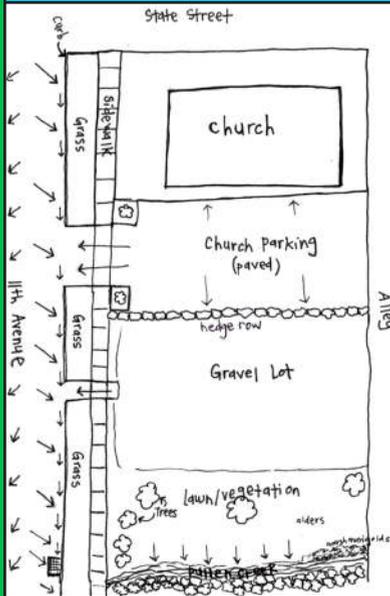


Build Rain Gardens for healthy streams!

Step One

evaluate

Place your rain garden the foot of sloping areas or downspouts. One of the best ways to understand how water flows on your site is to map the directions of flow. Draw a rough sketch of the area and how water flows through it. Draw existing vegetation, buildings, and water features like streams, ponds, or areas where water pools after rain.



The drawing to the left is of the demonstration rain garden site on 11th Ave. and Broadway. The arrows show the direction of water flow in the area. Slopes are all very moderate (between 2 and 15 degrees). For rain gardens built on steep slopes, see Uncapher and Woelfle-Erskine referenced on page 15. Take care not to dig around mature tree roots or buried utility lines. You will also need to keep a distance of at least 10 feet between your rain garden and building foundations to prevent water damage to buildings. Do not build in low areas that already collect water. These will have poorly draining soil.

The catchment area of the demonstration garden is 4,885 ft². The three rain garden beds have a total area of 365 ft². This is about 7.5% of the catchment area, which is smaller than ideal. They have a depth of about 8 in.

How much water will flow into your rain garden?

One important piece of information you should gather is the size of the catchment area that will contribute water to your rain garden.

Now that you know all the areas that will drain into your site, you can measure them to figure out catchment area. For the demonstration garden, we wanted to intercept all water running off 11th and into the storm drain. So our catchment area includes half of 11th street, the driveway of the church parking lot, and the sidewalk from the gravel lot.

$$\text{Area} = \text{length} \times \text{width}$$

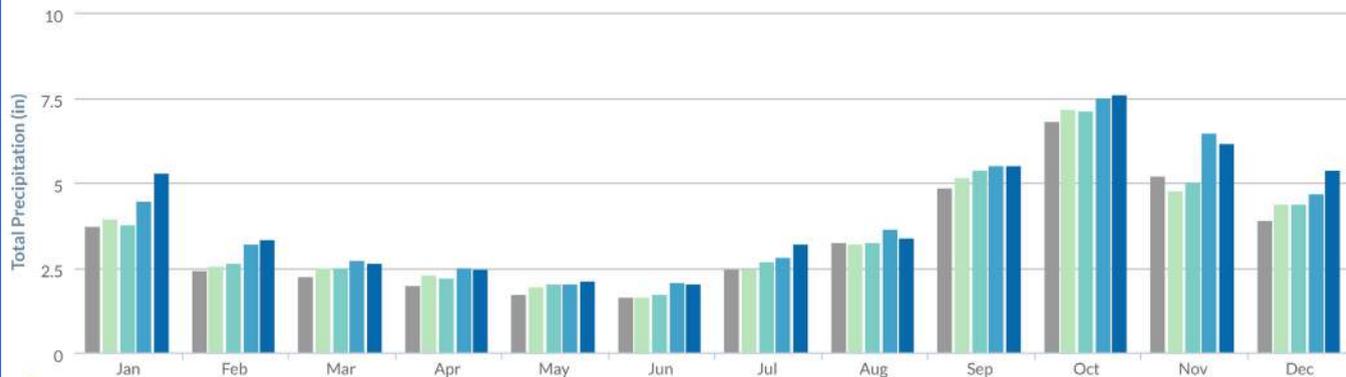
Measure both length and width of each contributing area. Multiply each length and width and add together to get total catchment area.

How big should your rain garden be?

Good news! Skagway has very gravelly soils that water will pass through quickly. Your rain garden, then, only needs to be about **10% of your catchment area**. The depth of your rain garden should be 6 to 12 inches to allow for pooling water.

Average Monthly Precipitation for Skagway, Alaska

Historical PRISM and 5-Model Projected Average, Mid-Range Emissions (A1B)



Due to variability among climate models and among years in a natural climate system, these graphs are useful for examining trends over time, rather than for precisely predicting monthly or yearly values. For more information on derivation, reliability, and variability among these projections, please visit www.snap.uaf.edu.

What about climate change? According to a model put together by *Scenarios Network for Alaska + Arctic Planning* or SNAP, annual precipitation will increase over the very long-term (see above graph). Should our rain gardens account for this? Our demonstration rain garden has failed to completely fill up in the 8 months since it was built. Should we find that, over time, our rain garden can no longer hold the flow from the catchment area, we will build an outlet (discussed in the next section), which will allow water to pass through the rain garden and back out to the storm drain.

Step Two

build

Now that you know how large your rain garden should be, choose a shape. Make your garden square, round, rectangular! It just takes a little math. Make sure the area of your rain garden is **10% of your catchment area**. Use the following examples and formulas.

Skagway soils are rocky! Dig out your rain garden with shovels or consider using a backhoe.

- Dig out a pooling area at least 6 in deep and up to 12 in deep.

- Level the bottom of your rain garden.

- If you are building on a slant, build up a wall on the lower end called a berm.

- The garden needs to be lower than the inflow area.

- Add a layer of organic soil material.

Examples using
Geometry.
Find a high school
student to help!

If your catchment size is 100ft^2 , then your rain garden should be 10ft^2

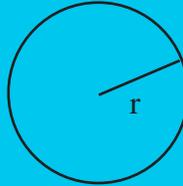
Circle: $3.14 \times r^2$

$$10\text{ft}^2 = 3.14 \times r^2$$

$$3.18\text{ft}^2 = r^2$$

$$1.78\text{ft} = r$$

Your circle will have a radius (r) of 1.78 ft

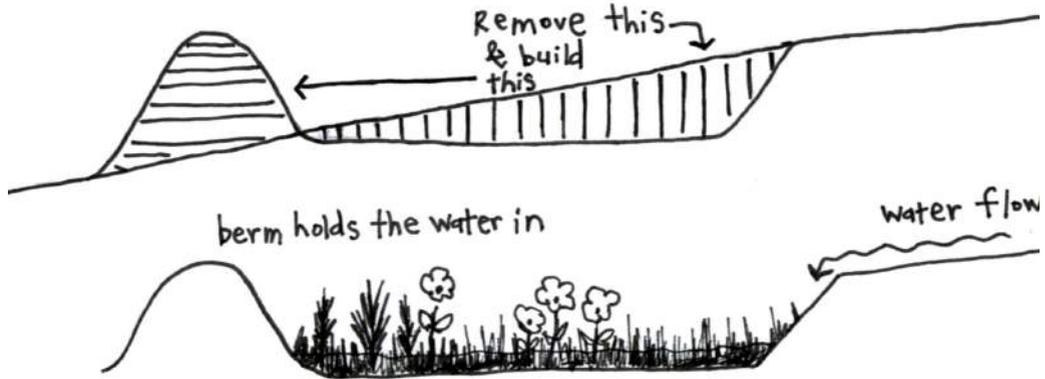
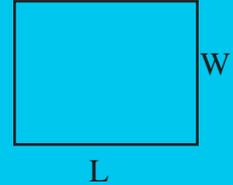


Rectangle or Square: Length x Width

$$10\text{ft}^2 = L \times W$$

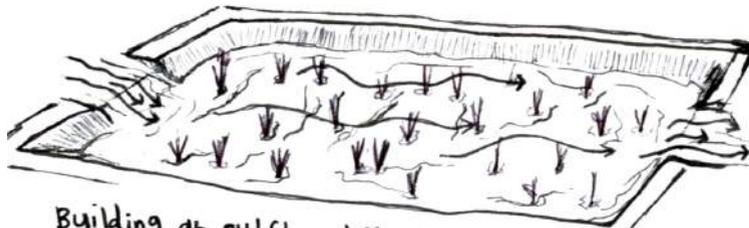
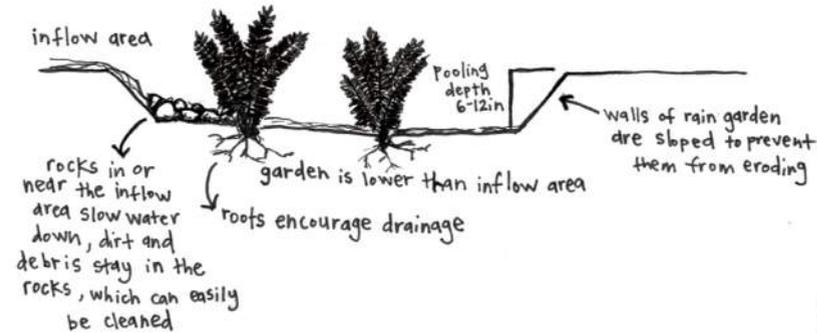
square: $L=3.16\text{ft}$, $W=3.16\text{ft}$

rectangle: $L=2\text{ft}$, $W=5\text{ft}$ or
 $L=6\text{ft}$, $W=1.6\text{ft}$ or many other combinations



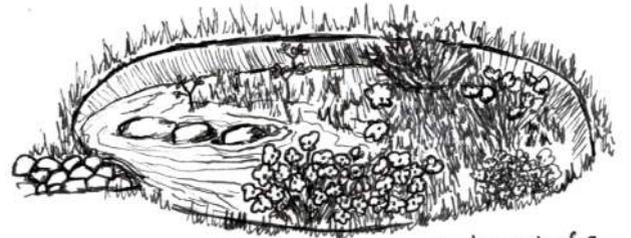
drawing adapted from Uncapher & Woelfle-Erskine, 2012

important features of a rain garden



Building an outflow helps in case the water level in the garden gets too high. Rather than flooding or backflowing, the water is directed out of the garden and into another garden or a storm drain.

- Not all rain gardens need berms. Create a berm only when the garden does not naturally hold water in.
- If your garden is not large enough for its catchment area, create an outflow area. Excess water can be sent to another garden or a storm drain.



This rain garden is dug out of a lawn and doesn't need a berm to keep water in.

- Line inflow areas with rocks to trap sediments and debris that can reduce drainage rates in your rain garden soil. You can clean these rock areas more easily than cleaning debris out of the soil.
- Slope the walls of your rain garden to prevent them from eroding away.

Step Three

plant

Choose native plants or non-invasive plants. See AKEPIC for a list of invasive plants (see page 15).

Be sure your garden gets plenty of water in its first year of life.

Ferns

Go on a hike and look for fiddleheads (spring) or full grown ferns (summer). Dig out the mass and plant directly into your garden.

Cuttings

Head to your favorite stream in the early spring and look at the shrubby plants. Do you notice buds starting? Then it is time to make and plant cuttings. Find willow, dogwood, and high bush cranberry. Clip off branches where they are 1/2 in in diameter and 12 to 18 in long. Pull off all the buds except for 1 or 2. Plant in your garden so that 1/3 of the cutting is above the ground. Water regularly while roots establish.

The plants in the demonstration garden were gathered from the wilderness. If you do this for your garden, get **landowner permission** on any private property. Do not collect within National Park boundaries. Do collect in the Tongass National Forest! **Don't remove too many plants from one site.**

Irises

In the fall, when the irises have died back, dig up a couple of bulbs and plant directly into your garden.

Grasses

Grasses go to seed in Skagway in June and July. Be careful not to collect invasive grass seed (Reed Canary Grass). Toss the seeds around your garden.

Other Plants

Check out the Anchorage Rain Garden Manual for a list of other rain garden plants.

Step Four

maintain

After the first year, maintenance will be minimal.

Year One: •Watch your garden during large rain events. Are the inflow and outflow areas working? Is the water draining into the soil? If the water starts to flow back out the inflow or flood over berms, build an outflow or lower the existing outflow. If not enough water is flowing in, lower your inflow. You can also change the size of your garden if needed •If the soil is not infiltrating water, you may need to add some sandy soil •Water your plants until they are established and can handle dry conditions •Weed your garden.

Year One and Beyond: •Clean out the inflow areas, which will collect sediments, debris, and trash. Properly dispose of it (remember, if your runoff is coming off the street, it likely contains pollutants) •If you have a berm, check to make sure it is intact. Add rocks or soil if it has eroded •Water plants as needed •Prune and weed •Clean up leaves, pinecones, and needles that drop in; or leave them for a natural look •In the winter, do nothing! Let the snow pile up. If you've used native plants, they'll survive •If you need more moisture in your soil, add mulch.

If your plants reproduce, dig some up and donate to a friend who is building a rain garden!

References

This is a fiddlehead

Data

For more information on invasive species in the area visit the Alaska Exotic Plants Information Clearing House (AKEPIC) at <http://aknhp.uaa.alaska.edu/botany/akepic/>

For more on Skagway's soils: websoilsurvey.nrcs.usda.gov/

For more on climate change models: <https://www.snap.uaf.edu/>



Online Manuals

Rain Garden Handbook for Western Washington: A Guide for Design, Maintenance, and Installation. June 2013. Department of Ecology State of Washington, Washington State University. <http://www.raingarden.wsu.edu/> (under “build your own” click on “Read Our Rain Garden Manual”).

Rain Gardens: A How-To Manual for Homeowners in the Municipality of Anchorage. 2012. Municipality of Anchorage. <http://www.anchorageraingardens.com/> (under “Downloads” click on “Manual”).

Books you can borrow from Taiya Inlet Watershed Council

Creating Rain Gardens: Capturing the Rain for Your Own Water-Efficient Garden. April 2012. Uncapher and Woelfle-Erskine. Timber Press: Portland, London.

Rain Gardens: Managing Water Sustainably in the Garden and Designed Landscape. April 2007. Clayden and Dunnett. Timber Press: Portland.