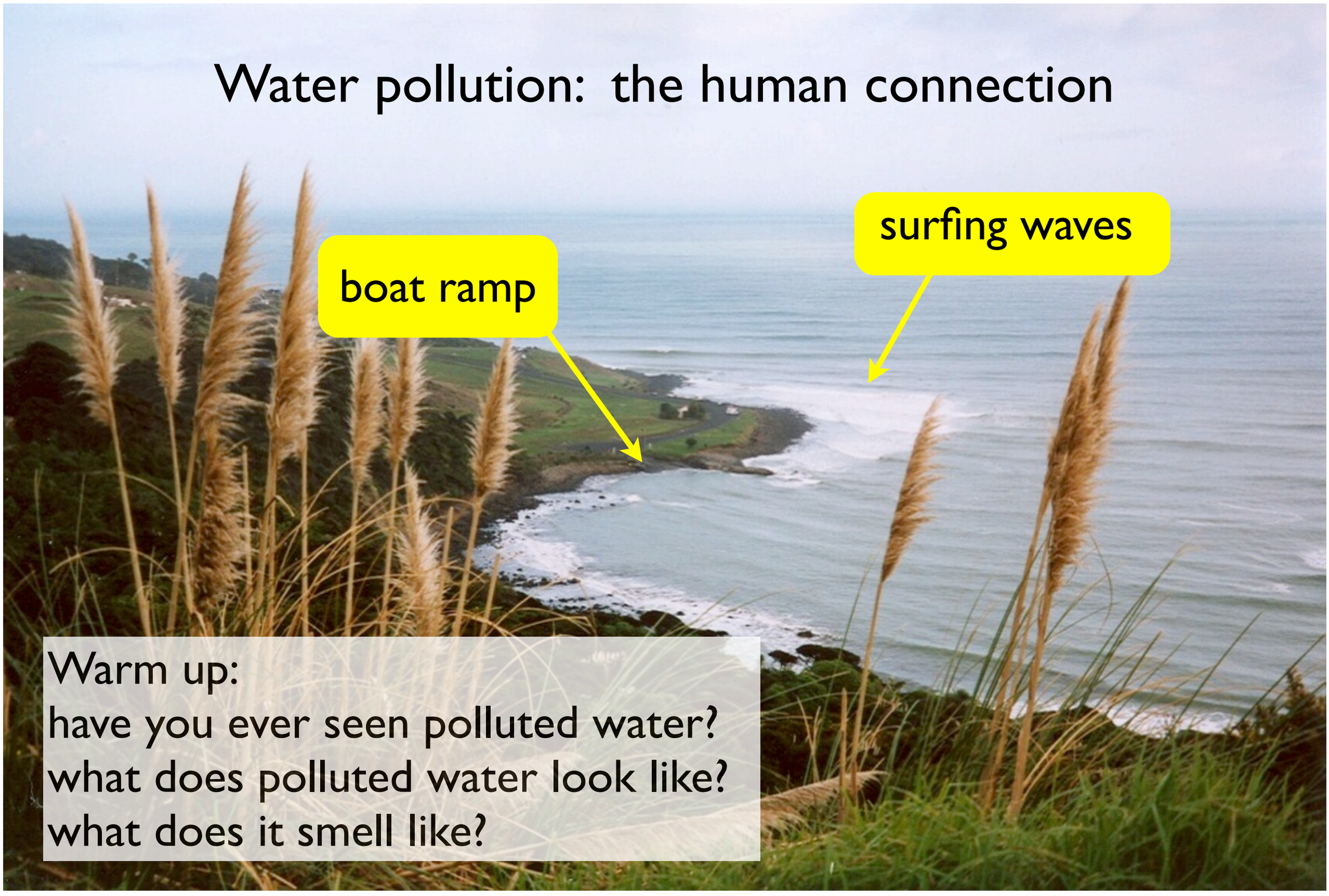


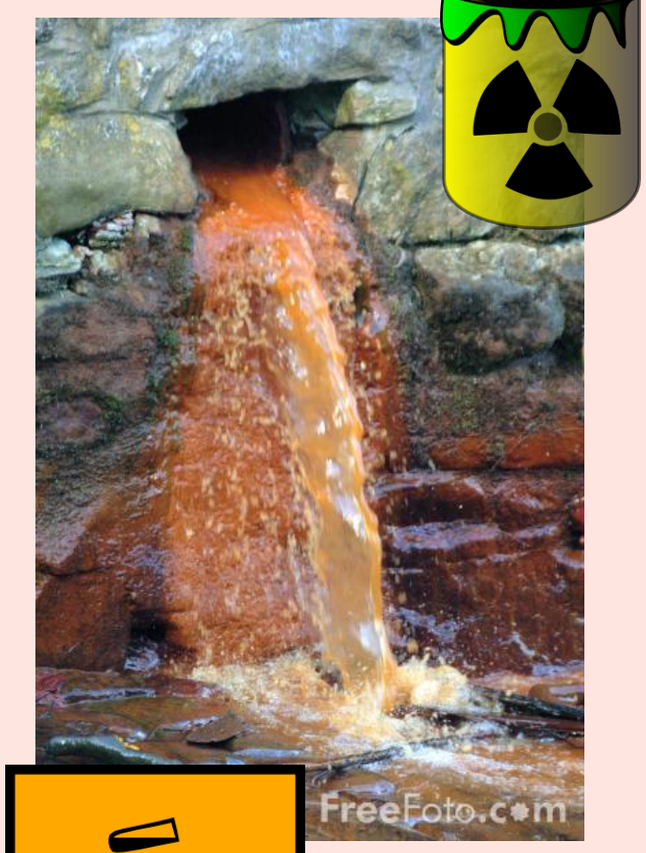
Notes:

1. Ask the students to write answers to the warm up question in their journal.
2. As students are finishing up, ask them if they have ever been to the coast, and to share their experiences. Beaches and the coast are frequent recreational destinations, and the image above is an example of a beautiful coastal scene (Raglan, New Zealand). Coastal pollution threatens the beauty and natural resources (fishing, recreation, etc) of these areas, and poses a risk to public health.
3. Answering the warm up question: Students often believe that polluted water is murky and smells bad, when it can actually come in many forms, sometimes it may look clear. For example, a clear fresh smelling stream may contain garbage, heavy metals, or pesticides. The assumption that polluted water looks and smells “gross” is not always true, and murky water (turbid, or containing lots of fine silt) may be very clean.

how many types of water pollution can you think of?

trash / plastic

chemical



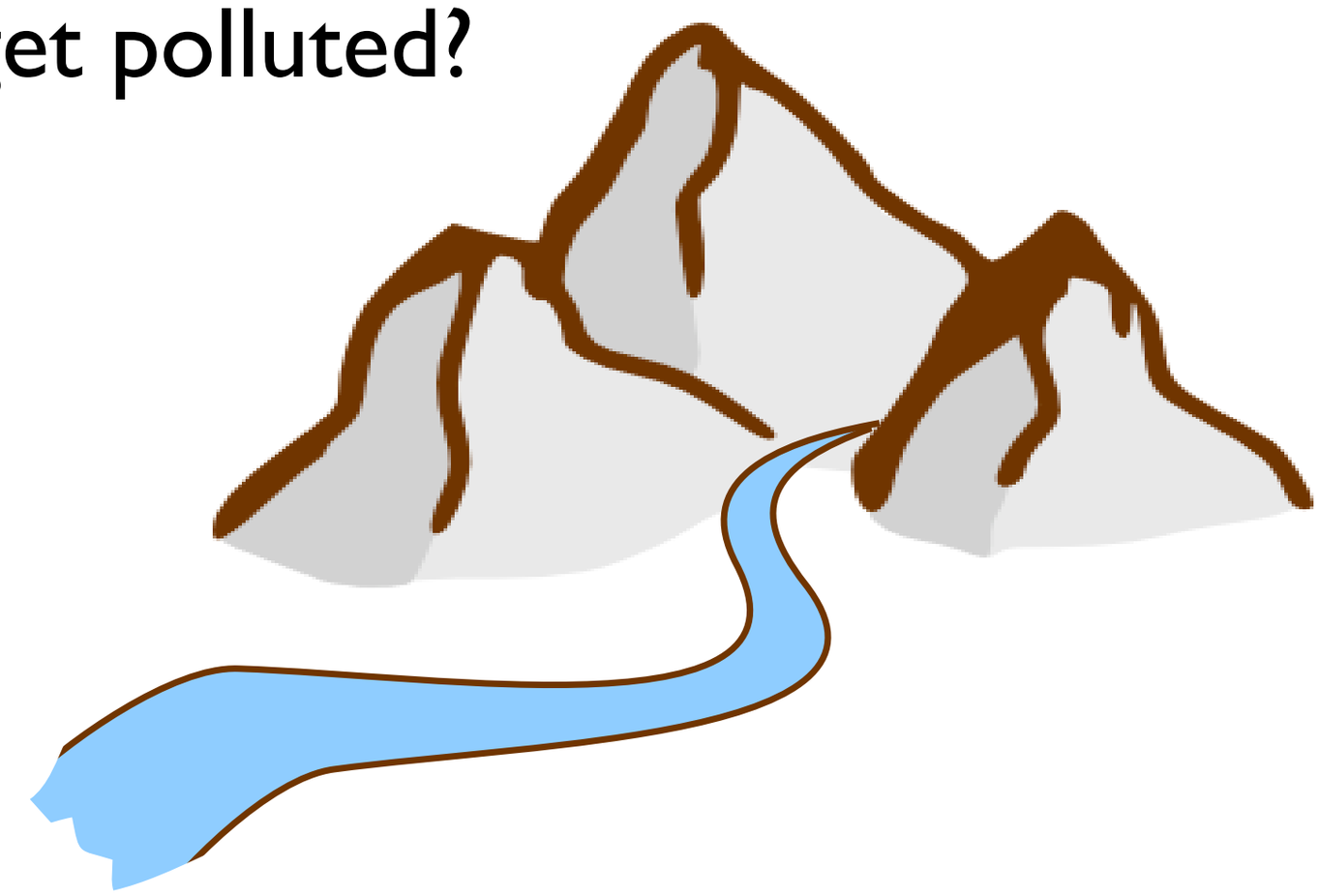
bacteria

beach closure sign

Ask students to come up with as many types of water pollution as they can. Ask them to describe it if they have seen it in person.
Water pollution come in many varieties, but the main three are:
1. Trash: Plastic, metal, and other types of man made debris can last for hundreds or thousands of years, and are often found on beaches, river shores, and even the middle of the Pacific (Pacific Garbage Patch, see lesson 3). Besides being unsightly, trash can entangle or be eaten animals often leading to their death.
2. Chemical pollution can be anything from heavy metals (e.g., mercury from mining activity) to fertilizers and pesticides (agriculture and gardens). Fertilizers often drain off of lawns or agricultural fields because of overwatering, and cause algal blooms in the water. While it might seem like a good idea to promote algal growth in the ocean, it disturbs the ecosystem and can lead to disastrous hypoxia events. The most famous “dead zone” is along the coast of Louisiana where fertilizer runoff from the Mississippi River causes large algal blooms and subsequent bacterial breakdown that strips most of the oxygen from the water column, killing just about everything in the water. Another common source of chemical pollution comes from cars that leave oil, brake dust, and tire rubber on the road all of which gets washed into rivers and streams when it rains. These are just a few examples of chemical pollution, and the list is long.
3. Bacterial pollution is the primary cause of beach closures in the United States. Beach water quality testing checks for fecal indicator bacteria (yep, that’s right, feces), and if the levels are too high the water is closed to swimming for several days. Maintaining low fecal bacteria levels is also important for a clean drinking water supply. Sewage contains extreme levels of fecal bacteria, which is made safe by proper waste treatment.

4. After you make a list of different types of pollution, ask the students what is in rivers that is not pollution.
What is not pollution:
Students often describe sediment laden water or water with a lot of biological matter (leaves, decomposing organic matter, etc.) as being “dirty", and may confuse it with pollution. Detritus, sediment, and other naturally occurring “gross” stuff are part of the ecosystem and not harmful to humans.

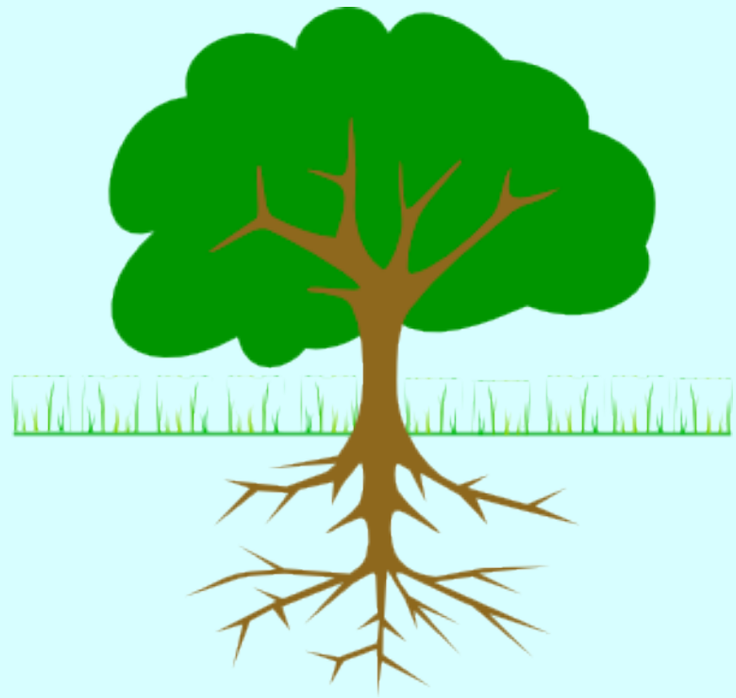
How did the water get polluted?



- where does pollution come from?
- how did get into the water?
- once in the water, where does it go?

Water pollution is a man made problem. The wastes, bacteria, fertilizers, oils, and other pollutants mostly come from our activities on land and are carried to rivers and streams by rain or man made runoff (e.g., over watering). The water then flows down the rivers to ponds, lakes, and the ocean. Thus, pollution from your home effects every ecosystem that your runoff passes through.
Ask: is there a river nearby? describe it.

Can you think of some good things rivers might bring to lakes and oceans?



To avoid students thinking water is a bad thing, this is a good time to highlight some good things that run down rivers. The lesson may seem a bit negative at this point, and it's good to generate some enthusiasm for the student's local environment.

1. Rivers and streams bring nutrients to the ocean and help maintain the diverse ecosystems along their paths. The nutrients enrich the soil along their banks (some of the most fertile farm land is on river flood plains).
2. They also deliver new water to lakes, and provide water for drinking and agriculture.
3. Rivers carry sediment that feeds beaches along the coast. The beaches help protect the coast from erosion and provide a place of recreation.
4. Rivers are a spawning ground for many species of fish.

Have the students ever enjoyed sitting by a creek or swimming in a river?

How does water get from my neighborhood to the ocean or a lake?

Have you seen one of these?

1. This is a picture of a storm drain. Students often think these drains go to a sewage treatment plant along with household waste water. However, storm drains rarely go any further than the nearest stream, river, or drainage culvert. Storm water and runoff goes untreated and carries all the trash, chemicals, and bacteria from the land it drained off of.
2. Once students have identified the picture above, it's fun to ask them if they've ever lost anything into a drain or climbed down in one (not recommended!)... you'll get some funny answers.

3. If you can find a map of your local storm drains (often available from the city or county) it usually looks like a jumble of short lines that aren't connected to each other. This is a great way to show that the storm water system doesn't take water to a treatment plant, but only moves it off the street.

Activity: the storm drain hunt

- make a map of the storm drains around your school... can you find them all?

- collect debris and trash that might flow into the drains... what will you find?

This slide is an introduction to Activity 1. Please refer to the activity instructions.

Back from the hunt:

- did you notice anything about the storm drain locations?
- what debris did you find?
- how do you feel about the health of the school's runoff?

This slide is for wrapping up Activity 1. Please refer to the activity instructions for more information.

what can I do to keep my water clean?

put trash in its place

don’t over water

drive less and maintain your vehicle

This lesson should make students aware of water pollution as a potential (or real) problem in their community. To end on a upbeat note, ask the students to think of ways they can keep their watershed clean. The examples above are just a few of the many things you can do.

1. Put trash in its place: plastic and other debris makes a real mess in rivers and the ocean, but it can be controlled by making sure it goes to a dump.
2. Pouring chemicals down a storm drain or onto the street is extremely harmful to the environment, and all the ecosystems along your runoff’s path.
3. Overwatering carries fertilizers and pesticides to places where they shouldn’t go, and wastes water too.
4. Driving less means you produce less brake and tire dust that gets washed off the street and into waterways, and produces less exhaust fumes that can turn into acid rain. Driving less also saves you money. Fixing an oil leak on your car keeps that nasty oil out of the ocean and makes sure your car will last longer.

Other things you can do:

A. Buy less plastic
B. Recycle and reuse so less waste is produced
C. Use less fertilizers and pesticides (or better yet, don’t use them at all)
D. Plan native or low water plants that that will thrive with little to no watering or fertilizer.