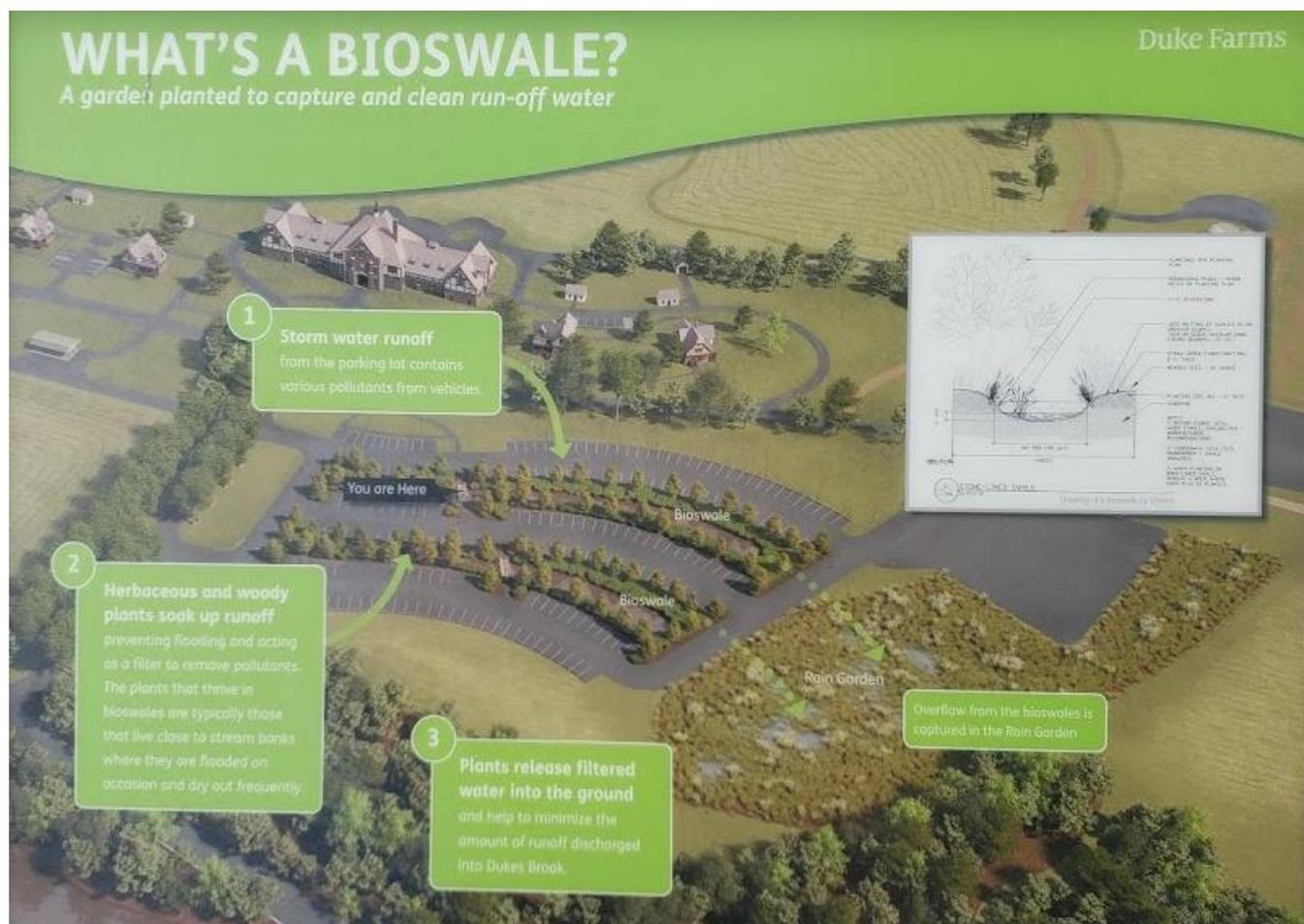


Sustainability September: Bioswales

Understand how bioswales work, find out where you can see them at Duke Farms, and learn how to make your own mini bioswale model at home to explore how they work!

Bioswales are dug-out channels filled with vegetation, meant to filter runoff. Bioswales redirect water down the slope of the bioswale and collect it in the channel. Collecting the stormwater in this highly vegetated area allows the runoff, polluted by rooftops, driveways, parking lots, and roads, to slowly filter back into the watershed and recharge the groundwater while filtering out pollution and silt. Rather than having storm drains that lead directly to rivers and streams to pollute waterways, oceans, and aquatic ecosystems, bioswales allow us to keep the Earth a little bit cleaner and greener. They also cut down on flooding during heavy storms which helps to keep our roads, houses, and businesses safer long term. The bioswales at Duke Farms are installed in the main parking lot.



Duke Farms bioswales

In addition to cleaning water, bioswales also create habitat for animals. Look below to see what you are likely to find living in the bioswales at Duke Farms. Next time you visit, look out for this type of **green infrastructure** in the parking lot and all the beautiful species that inhabit it.



Red-winged blackbird
(*Agelaius phoeniceus*)



Common cattail
(*Typha latifolia*)



American sweetgum
(*Liquidambar styraciflua*)



Sweetbay magnolia
(*Magnolia virginiana*)



Carolina mantis
(*Stagmomantis carolina*)



Bergamot
(*Monarda didyma*)



Black gum
(*Nyssa sylvatica*)



Mountain mint
(*Pycnanthemum virginianum*)



Slaty skimmer
(*Libellula incesta*)



Activity: Bioswale Model

For this STEM activity you can create your own mini bioswale model! Here's how:

Materials needed:

- 2 of the same sized plastic containers, 1 with a lid
- Scissors
- 1 coffee filter
- Sand
- Small pebbles
- Soil or compost
- Vegetation (you can use fake vegetation or some weeds/grass from your lawn)
- A cup
- Items to pollute your water
 - To pollute your water, you can use any combination of the following things: glitter, leaves and grass, twine, and dirt, or basically anything else you can think of.
 - You may wish to ask your students for ideas.

Instructions:

1. Take the lidless plastic container and cut a few holes in the of the bottom (place holes in the center of the base).
2. Take the lidded container and cut a hole in the lid so that the center of the lid is open, just enough so that the other container can sit on top without falling through.
3. Stack the containers like so: the lidded container on the bottom (to represent groundwater) and the lidless on top (to represent a bioswale).
4. In the top container place a coffee filter, a layer of sand, a layer of small pebbles, a larger layer of soil or compost, and then some vegetation.
5. Take your cup and fill it with some water (about 6-8oz should do depending on the size of your containers). Now take your pollutants and pollute your water (to represent polluted stormwater runoff).
6. Pour the polluted water into your bioswale and observe what happens.

Guiding Questions:

1. Why is water important? Why is *clean* water important?
2. Who and what does polluted water affect?
3. What pollutants can be found in waterways and bodies of water? Where do pollutants come from?
4. What can be done about water pollution? Can you think of any solutions?
5. What can *you and your family* do to prevent water pollution?

Original activity from Cincinnati Museum Center, check out the video [here](#)



An activity from British Columbia:

If you would like more ideas on how groups of students can explore water filtration, Science World also has an activity to compare and contrast simple filtration systems. On this site, you can also learn a bit about Vancouver BC and water sources there. As described on the attached link:

In this activity, students will compete in groups to make the most effective filtration system for clarifying dirty water. While, this activity does not filter the water to reach drinking standards, it does help students explore the first stage of water treatment— **filtration**.

Clean water for us to drink is not always easy to find without us having to treat it first. The water that comes out of our taps in British Columbia goes through two types of treatment. It goes through physical filtration and chemical disinfection and is sampled before it is declared safe to drink.

View the full activity [here](#).

Flooding, Drought and Water Related Resources

Bioswales help control flooding on a localized and important level. For a more expansive view, you can research water conditions in the United States by exploring this site. There are numerous features including real time stream flow and a way to access historical data. You can also search rivers by name with interactive maps and data. As just one idea in virtual or live classrooms, each student could be assigned a US state to research droughts and flood conditions. Students can discover the compounding and critical issues related to **climate change** using this resource.

<https://waterwatch.usgs.gov/>



Learning about the Duke Farms bioswales aligns with the newly adopted NJ Student Learning Standards. For more information about how you may use this topic to address water treatment, flooding, and other factors related to climate change in your PK-12 and beyond classrooms, contact Kate Reilly, Manager of Education, Duke Farms at kreilly@dukefarms.org.

Adopted 2020 New Jersey Student Learning Standards (NJSLS)

Climate Change

New Jersey is the first state in the country to require climate change curriculum across all content areas and at a K-12 level. As stated by the NJDOE:

On June 3, 2020, the State Board of Education adopted the 2020 NJSLS in the following content areas:

- Career Readiness, Life Literacies, and Key Skills;
- Comprehensive Health and Physical Education;
- Computer Science & Design Thinking;
- Science;
- Social Studies;
- Visual and Performing Arts;
- and World Languages.

These standards truly represent a foundation from which districts will build coherent curriculum and instruction that prepares each New Jersey student with the knowledge and skills to succeed in our rapidly changing world. They will put New Jersey again at the forefront of national education by including the following:

- Climate Change across all content areas, leveraging the passion students have shown for this critical issue and providing them opportunities to develop a deep understanding of the science behind the changes and to explore the solutions our world desperately needs.