ACTIVITY F

URBAN GARDENS

Time Frame: Three 45-minute sessions

Learning Objectives:

- Learn how urban gardens and green spaces serve as natural drains for rain and storm runoff, along with purifying the air we breathe.
- Use scientific inquiry to brainstorm creative strategies for improving city green spaces and urban planning.

Materials for activity:

- Computer with Internet access
- Projector
- Cardboard boxes, assorted sizes
- Markers, duct tape, scissors any other art supplies
- Sponges of varying sizes, textures and thicknesses
- Pieces of brick, concrete and asphalt; small rocks and pebbles
- Scraps of felt, carpet (optional)
- Tarp or large plastic garbage bags (if indoors)
- Spray bottle
- Watering can
- Hose with multiple spray setting (if outdoors)

Overview:

In this activity, students will learn the importance of urban farms, gardens and green spaces for drainage and storm runoff, making connections to their own cities. Additionally, the class will brainstorm creative solutions for city farming, and start their own urban garden, if possible.

Essential Questions:

- Why are green spaces (such as urban farms/gardens) so important in cities? What would happen if we didn't have them?
- How can natural design features benefit urban residents and surrounding ecosystems as well?

Teacher Preparation:

Using cardboard boxes, construct a very basic model of a city in two halves: One half with no green spaces (asphalt/concrete only), and one half with green spaces (strips of grass, gardens, urban farm). Use small rocks, scraps of asphalt or concrete and sponges.

Session One (45–60 minutes)

1. Ask students if they have ever witnessed flooding after a rainstorm. Where do they see the most flooding? Why is this the case? (5-minute discussion)
2. Show the following video to students:

Video: The Reason Urban Areas Are More Flood Prone

Description: The way concrete absorbs water plays a major role in why urban areas are more likely to flood as compared to rural locations.

1. After the video, allow students to respond to what they saw. (1 minute)
2. Present your pre-built model city (see Teacher Preparation instructions above). Tell them to imagine this is made of part concrete and part rain garden and natural solutions.
3. Now test this with different forms of rainwater. Use a spray bottle and watering can. (5 minutes)
4. Discuss.
5. Present the following design challenge: Working in small groups, brainstorm, design and build a model city district. Use your knowledge of soil, plants and farming to help solve urban flooding.
6. As the challenge and materials are introduced, provide students with an additional question to consider: In what other ways will your natural design benefit urban residents and surrounding ecosystems as well?
7. Students should spend the rest of the session planning and drawing.

Session Two:

Watch the following videos and then reflect on your own designs:

Video: Soils Support Urban Life | Soil Science Society of America (2.33 mins)
Description: Do you live in a city? Most people do. Under all of this city space, even under the concrete, is a lot of soil, and it's a complex mixture of minerals, water, air and organic matter that perform many critical functions. Help the soil serve you by making rain gardens, making and using compost, and making an urban garden.

Video: Design and Build a Rain Garden | The Nature Conservancy (7.55 mins)
This video teaches about rain gardens and shows students how to begin to take their designs further.

Optional Extension:

If space is available, consider starting a class "farm" or small garden in an outdoor area of your school. Have the students research which plants would grow well for your climate, and vote as a class on what to plant.

If starting your own farm is not an option, take a class field trip to a local urban farm to learn about what they're doing! If you are unable to take a fieldtrip, write a letter to an urban farm in your area with the strategies that were brainstormed for creative city farming.

Teacher Reference:

Storm Water Management Lesson Plans for Grades 3-12 | U. of Maryland
https://cbtrust.org/wp-content/uploads/EPA-SW-Lesson-Plan-Book.pdf

Learn about "Green Infrastructure as Outdoor Environmental Laboratories." This resource covers information about:

- Green Roofs
- Rain Barrels
- Rain Gardens
- Rain Garden Plants
- Soils
- Permeable Pavement
- Hydrology

Grass filter strip: an area of land planted with grass where water can flow instead of running into a storm drain.
Diversion ditch: a channel lined with grass or rocks used to direct water away from an area. Diversion ditches channel untreated water to open lands or ponds where it can collect and be slowly absorbed into the ground.
Bioswale: a wide, shallow, manmade ditch meant to replace traditional gutters and curbs in parking lots and streets.
Impervious: a surface such as rock or pavement that water cannot penetrate.
Pervious: a porous surface such as mulch or soil through which water can flow

Storm water that remains on the surface eventually flows into storm sewers (sometimes called storm drains), ditches, rivers and lakes. As storm water flows along, it picks up pollutants from the land's surfaces and carries them to lakes, rivers, and streams.

Pervious surfaces (wetlands, fields, forests, boardwalks, wood-chipped walkways) allow water to soak into the ground (a process called infiltration). Infiltration decreases the amount of surface water, reduces the flow of water over the landscape, and increases ground water.

Impervious surfaces (roads, rooftops, parking lots, and other hard surfaces) do not allow water to soak into the ground, which means more water flows over the surface of the landscape.
Increased surface flow also increases the speed at which water moves over the watershed. Impervious surfaces decrease ground water.

Further Reference:
How Do Rain Gardens Help With Storm Water?
Read about how cities like Chicago are now focusing on more sustainable systems to manage storm water runoff. Rain gardens are one such example of this "green infrastructure."

Urban Gardens Promote Education, Nutrition and More | USDA Blog
The Prosperity Gardens are educational, bringing at-risk students to work the ground, grow the plants and sell the produce at local farmer's markets. Read more about this important endeavor through The People's Garden, USDA's collaborative community garden initiative with more than 1,300 local and national organizations all working together to establish community and school gardens across the country.

Urban Agriculture | USDA: Alternative Farming Systems Information Center
City and suburban agriculture take the form of backyard, roof-top and balcony gardening, community gardening in vacant lots and parks, roadside urban fringe agriculture and livestock grazing in open space. Explore information and tools on urban agriculture.

Urban Farming Photo Gallery / Time Inc.
http://content.time.com/time/photogallery/0,29307,1825907,00.html
Images of urban farming, vertical farms, victory gardens, rooftop gardens, and community supported agriculture projects in the U.S. and around the world.

Urban Stormwater Teacher Resources | Colorado Dept. of Public Health
https://www.colorado.gov/pacific/sites/default/files/WQ_Teacher-Resources.pdf

Next Generation Science Standards:

NS. 5-8.1 Science as Inquiry

As a result of activities in grades 5-8, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

NS.5-8.3 Life Science

As a result of their activities in grades 5-8, all students should develop an understanding of:

- Structure and function in living systems

NS.5-8.2 Physical Science

As a result of their activities in grades 5-8, all students should develop an understanding of:

- Properties and changes of properties in matter
- Motions and forces

NS.5-8.4 Earth and Space Science

As a result of their activities in grades 5-8, all students should develop an understanding of:

- Structure of the earth system