U.S. Fish & Wildlife Service

Proctor Creek Urban Environmental Education Guide

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Proctor Creek Education Guide

Background

The lesson plans contained in this guide follow the principle framework for teaching objectives outlined in the Tblisi Declaration (1977), which provides a structure for delivering environmental education content. The "Awareness, Knowledge, Attitude, Skills, and Participation" objective framework given in the Declaration has been modified by assigning "Participation" the synonym "Action" in this set of lessons, thus bringing students from "Awareness to Action." All lessons and content in this guide were created by Elise B. McDonald for the U.S. Fish and Wildlife Service Proctor Creek Environmental Education Program.

How to Use this Guide

Each lesson begins with an objective outline, activity summary and assessment summary. In the outline, objectives are categorized based on the "A.K.A.S.A" framework, and supplies and considerations for activities are detailed in the text as well. Following each lesson objective outline is a protocol which details the chronological progression of the lesson. Modifications to lesson protocols or materials may be necessary, and are encouraged at the discretion of the educator, as lessons are designed to be fully adaptable to a variety of grades, standards, and audiences.

Introduction

The love of the outdoors was instilled in me from a very young age, while traipsing through forests and gardens with my grandfather, who taught me the name and importance of every tree, fish, and insect I wondered at. I first discovered a passion for environmental education, however, as a summer camp counselor, and have been hooked ever since. Each opportunity to teach has helped me grow and allowed me to develop more fun and effective activities and teaching methods. I have also learned how to best tailor lessons to fit each audience. Working in the Proctor Creek watershed of west Atlanta has taught me a lot about the importance of urban environmental education, and how to relate the experiences of urban audiences to my lessons.

My truth as an educator is that nature and education belong to everyone, learning should be fun and impactful, and the best investment one can make in the future of conservation is to invest in children by harnessing their wonder and guiding it to appreciation and responsible stewardship of the natural world.

As an environmental educator, I am always seeking new ways to reach youth through fun and effective lessons and activities. In order to be truly impactful, lessons must be relatable and tailored to fit the needs of each audience. Environmental education involves incorporating peoples' perspectives into each lesson, using it as a stepping stone, and applying that context to inspire change or establish a positive attitude and call to action. Often times getting people to appreciate something starts with channeling or invoking a love for that which is in their own backyard, and see it through a new lens. Another key to inclusivity is to meet students where they are – literally and metaphorically. Bringing environmental education to classrooms or other spaces within a community is invaluable and opens the door to students who might not otherwise have access.

A common misconception is that one must teach in the forest to deliver environmental education. Environmental education **can** be taught anywhere, and that although it can be difficult, outreach is very important and it is important to bring environmental education to people when they cannot come to you. The majority of today's youth grow up in urban areas, and few have regular access to environmental education facilities. Urban outreach is invaluable, yet urban audiences tend to be amongst the most underserved. It is common for people to disassociate nature with the city, and feel that nature exists elsewhere, far away, and to feel removed from it. However, the reality is that nature is all around us, no matter where we live. Ants around a fire hydrant, birds nesting under the awning of an office building, raccoons dumpster diving behind a restaurant are just a few examples. The key is helping others relate to it and realize all things are connected, especially those that feel the most removed.

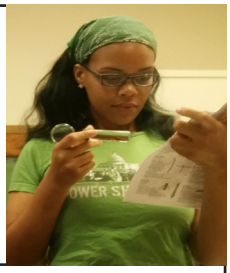
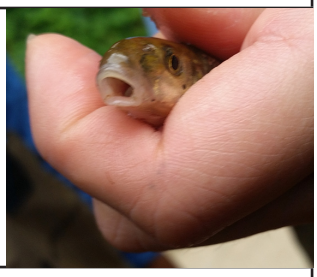
It is my hope that this guide helps educators connect with urban audiences while opening their minds and hearts to the natural world all around us. Environmental education tends to focus on educating at nature centers or other outdoor recreation areas, and relatively few resources exist to help educators cater to urban audiences. This lesson plan guide is intended as one of those resources. My truth as an educator is that nature and education belong to everyone, learning should be fun and impactful, and the best investment one can make in the future of conservation is to invest in children by harnessing their wonder and guiding it to appreciation and responsible stewardship of the natural world. Knowledge is worth nothing if you don't share it with somebody, and you cannot expect someone to love and care for something they do not understand.

Elise B. McDonald

Is there Nature in the City?

Objective Framework

Pre-Lesson Assessment: Students will describe "what nature means" to them.

A	**Gaining AWARENESS** Determine that nature is present everywhere, including urban environments Recognize a wide variety of things as components of "nature"	
K	**Acquiring KNOWLEDGE** Identify specific things as either natural or human-made Identify specific human-made structures as utilizable to wildlife, and explain their use Demonstrate and understanding of predator/prey relationships and the food chain OR food web Relate key terms and concepts	
A	**Developing Positive ATTITUDES** Deconstruct the misconception that nature is absent in the city Decide that nature and wildlife should be treated with respect	
S	**Learning SKILLS** Interpret how and why wildlife use certain human-made structures and goods Compare and contrast the way wildlife fulfill their needs of food, water, and shelter to the way humans fulfill their needs Apply concepts learned in a creative way	
A	**Inspired to Take ACTION** Dispose of waste appropriately, as pollution harms wildlife Respect wildlife by not touching, feeding, or otherwise harming it Revise, or simulate revision of, a familiar urban area to make it more hospitable for wildlife Teach others that nature is everywhere, and should be treated with respect	

Post-Lesson Evaluation

Students will:

- Draw an urban ecosystem.
- Follow up the pre-lesson assessment by writing or drawing how their idea of nature has changed.
- Write a poem or short story about nature in the city.

Key words: nature, urban ecosystem, food chain or food web, predator, prey

Is there Nature in the City?

Objective Framework

Nature is everywhere, even in the city!

Break down misconceptions

- What is nature? What do you normally think of when you hear the word "nature"?

  Write or draw good answers on the board.

- On one side of a sheet of paper, have students draw what "nature" means to them

- Out of the things listed, which have you seen near your school, home, etc. in Atlanta?

  Circle the ones on the board that they have seen, or have a volunteer do it.

- So… do we have nature in the city? Even if we are missing certain components that you normally associate with nature?

  Yes! Nature is everywhere all around us.

  How? Well, under the soil and concrete are worms and insects, in the window ledges are spiders and homes for wasps. In the trees and air are birds, on the flowers on roadsides and in front of neighborhoods are bees, and in the trees are squirrels, etc.

Interconnectedness – How is urban nature connected?

- Spotting Urban Nature

  Take students to an outside area where they can search for and record examples of nature found in their urban environment. They may write, describe, or draw what they see. If going outside is not an option, they may list or draw examples of nature they have seen in the city where they live.

- Demonstrate predator/prey/ food web relationships in urban settings using pre-created creature cards (with bios on back), and connect with yarn or other method

- Show where in the urban landscape different animals and plants can be found through guided exploration of a board with flip-ups, or a power point (ex: slide with a tree in a park, the next slide shows a close-up with a bird nest in the same tree…)

Evaluation

- What does an urban ecosystem look like? OR (follow-up from previous 'draw what nature looks like to you') have then write or draw how their idea of what nature means has changed.

- Write a poem or short story about nature in the city.

Water Pollution and Recycling

Lesson Protocol

Pre-Lesson Assessment: What is pollution? Define.

A	**Gaining AWARENESS** Associate pollution with human activity Recognize that rain picks up pollutants and brings them to water bodies Determine that all people can impact the Earth positively or negatively based on individual choices, such as choosing to litter or to recycle.
K	**Acquiring KNOWLEDGE** Describe pollution, its causes and effects, and what measures of prevention and action can be taken against it Identify sources of pollution Explain key terms Differentiate between various types of recyclables
A	**Developing Positive ATTITUDES** Decide that pollution is a bad thing, but we can all combat it Determine which behaviors are helpful and which behaviors are hurtful to the earth and its water quality Develop or strengthen earth-friendly values
S	**Learning SKILLS** Practice identifying and sorting recyclables Apply concepts learned to create a short story, drawing, poem, or other art form Think critically about how a variety of human actions can lead to pollution in waterways
A	**Inspired to Take ACTION** Dispose of waste appropriately, and recycle Share with others the importance of recycling and responsible waste disposal

Post-Lesson Evaluation

Draw a picture, write a short story, or write a poem detailing a unique journey of a raindrop through a watershed, and the pollution it encounters along the way.

Key words: pollution, waterways, runoff, recycling

Water Pollution and Recycling

Lesson Protocol

Recycle It!

Present a slideshow or tangible pictures of recyclables, or physical objects for students to sort.

"Promise to the Earth" Rap

Supplies: none
Modifications & Considerations:
May want to modify vocabulary slightly for very young audiences

What is Pollution? Define.

- Examples of pollution – Garbage, car oil and gas, chemicals such as cleaners, etc.
- When these things are left outside in places they do not belong, they can hurt wildlife, water, and the earth

Runoff Effects

- What happens to pollution when it rains? Rain falls and travels to places with lots of water, like rivers, oceans, streams, lakes, etc. Have you ever dropped gum, playdough, or something else soft and gooey on the ground? It picks that dirt and other stuff up, and can be really difficult to clean. Rain is sort of like gum or playdough – when it comes into contact with something, it can pick it up. In this way, rain picks up pollution on its way to these waterway, and spreads the pollution there too! This makes our water dirty.
- *Story of a Water Drop

Example:

Journey of a Water Droplet
One day, a large gray rain cloud settles right above your house.

It slowly starts to rain (drum lightly on the tables with your fingertips, encourage the children to join in on making it rain harder and softer). *Finally, the last rain drop falls from the cloud and SPLAT! (clap hands together) lands on the roof of the house!*

What should his name be? (Kids yell out potential names, pick one). *Our rain drop is on a journey. When you go on a long trip, or even to school, you usually take things with you right? This rain drop will bring stuff with him as well, such as his suitcase, and will need to make several stops along the way.*

He rolls down the side of the roof into the rain gutter, and twists like he is in a water slide all the way down until he FALLS out the end onto the wet ground. Where is he trying to end up? (Let the kids shout out what type of waterway he will end up in – choose one).

He picks up his suitcase, and starts running….. Until he runs under the car in the driveway and SLIPS on some oil! He says "Ew! Is this pollution? (Direct question to the students and they will answer "YES!") *This is sticky and I can't get it off! I guess I will have to take it with me."*

Carry on with the story as the raindrop continues to encounter and picks up different forms of pollution as it runs across the landscape. When it finally reaches the water, describe how the pollution he has collected on his body and in his suitcase spreads to the water, polluting it.

Taking Action

- How can we keep the earth safe and clean? Ask students for examples of earth friendly behavior, such as by responsibly disposing of waste, and…

Recycling

- Recycle It!
- "Promise to the Earth" Rap

I will NOT throw trash on the ground!

'Cause it's really bad and makes the Earth frown

It hurts all the plants and animals around

And when it rains it washes it down

Toooooo….

The streams and lakes and oceans and rivers

Gonna do my part to make our water cleaner

I'mmmmm…

Gonna pick up trash and throw it away!

Recycle paper, plastic, and metal each day,

Here I am to do what it takes

To keep pollution out of our waterways!

Evaluation

Draw a picture, write a short story, or write a poem detailing a unique journey of a raindrop through a watershed, and the pollution it encounters along the way.

Watersheds and Runoff

Objective Framework

Pre-Lesson Assessment:
Students will draw a picture of what they think a watershed is based on prior knowledge.

A	**Gaining AWARENESS** Understand that every place is within a watershed Recognize actions that impact watersheds, especially nearby Proctor Creek Make the connection that keeping watersheds healthy helps keep people within them healthy
K	**Acquiring KNOWLEDGE** Describe a 'watershed' Discuss 'runoff', how it can be harmful, and its role in a watershed Identify different forms of pollution that affect urban watersheds
A	**Developing Positive ATTITUDES** Discuss why protecting watersheds is important Understand that Proctor Creek is a place worth protecting Interpret how every person has the power to make a difference
S	**Practicing SKILLS** Identify potential sources of pollution Think critically about how individual actions impact the future of watersheds and the environment Interpret the health of the environment (recognize what a healthy environment looks like)
A	**Inspired to Take ACTION** Visit and learn more about Proctor Creek Dispose of waste appropriately Become involved in active cleanup efforts Encourage others to care for their watershed as well

Post-Lesson Evaluation

Students will draw a watershed again at the end of class, make edits to their original drawing, or describe on the back of the original the edits they would make based on new knowledge

Express new knowledge in another way, such as through skit, poem, or short write-up.

Key words: watershed, runoff, pollution, pollutants

Watersheds and Runoff

Lesson Protocol

Runoff Journey

Supplies:
Prepare ahead of time: 8 paper or cardboard cubes at least 4”x4”x4”

If desired, find graphics representing 7 different pollutants (sediment, car chemicals, household chemicals, grease/oil, pet waste, farming, pesticides) as well as a river or other body of water.

8 colors of playdough or clay, 7 colors for the pollutants, blue for the raindrop

Prepare 8 stations. Each station should have a sign indicating which it is, a bowl with pre-made pollutant bits, and a cube.

Modifications & Extensions:
Use small colored beads to stick in the playdough or clay to represent each pollutant

“Watershed in Your Hands”

Supplies:
Wax paper

Eye dropper or spray bottle

Blue food coloring

Modifications & Extensions:
Use spray bottles in place of eye droppers if manageable to more accurately simulate rain

Add spices or other small features to the landscape to be picked up by the water droplets, simulating pollutants, etc.

Meet Your Local Urban Watershed

Supplies:
Slideshow or copies of pictures of Proctor Creek, or other urban watershed

Watershed

- What do you think a watershed is? Ask students to draw a picture of what they think a watershed is.
- Definition/explanation - > questioning

Runoff – Something that is Very Important in Watersheds

- When it rains, where does the water go? When water falls, it falls and flows downward with gravity. Remember: Water falls to the ground and RUNS OFF downhill to a water source like a stream or river. It picks up a lot of stuff along its journey. *Define runoff.
- What is pollution, and what kinds of pollutants can water come into contact with on its way to a stream or river?
- Tell a personified story to the class about a water drop that finds itself falling from the sky and landing in a watershed. Tell about how it picks up things along the way (pollutants), packing more and more stuff into his ‘suitcase’. Finally, he reaches his destination, and bring all that icky baggage in with him, polluting the water! Have students interact with the story by having them act out what is happening, such as drumming on the table when it rains, or asking them to answer questions out loud. See objective outline of “Water Pollution and Recycling” for an example.
- Runoff Journey: Each child gets a small ball of blue play-dough. There are multiple stations, color-coded to represent different pollutants a water

Watersheds and Runoff

Lesson Protocol

drop could encounter during its journey across a watershed. Teeny pieces of play-dough or teeny beads are at each station to represent that pollutant. Each child is assigned (by drawing an initial bead, etc.) a station to start at. There is a large cube that they 'roll' to tell them what station to go to next. Each time they go to a new station, they put the mark of that pollutant on their droplet. After a certain number of rounds, all droplets get to go to the "water source" and the journey is over. Discuss what the drops look like, and clarify that in real life you would probably not be able to see the pollutants.

Procedure:
Each student is given a 'raindrop' and starts at the cloud station. Each student rolls the cube at the cloud station to determine which pollutant it will first come into contact with, goes to that station and sticks that pollution ball to their raindrop. They then roll the cube at that pollutant station, and repeat the process until they reach the body of water. After some time, send everyone to the body of water. Have them summarize the pollutants on their raindrop, observing how colorful they have become. Finally, have students press their raindrops together on a surface or drop them into one large clear container to demonstrate the runoff coming together in the river/ocean/etc.

In a pinch, do a Play-dough demo which shows what happens when you roll a ball of clay or "water" around – it picks up everything it comes into contact with!

Watershed and Runoff: Bringing the concepts together

- So, when there is pollution around a watershed, what happens to the water source? (Becomes polluted)
- Watershed Simulation – Use crumpled wax paper, newspaper, or shaped modeling clay to create a 'landscape' with ridges and valleys. Simulate rain over the landscape, using spray bottles OR eyedroppers, coloring the water blue with food coloring. Talk about where the runoff goes. Use effective questioning to tie in the concepts.
- Everyone lives in a watershed. Yours is called Proctor Creek, and at the end of its journey, water in this area ends up here (project or pass out a picture of Proctor Creek)
- Did you know there was a place like this right here in Atlanta?
- What are some things we can do to protect Proctor Creek from harmful runoff?

Evaluation/Final Activity

- Draw a watershed
- Write a story (or poem, or even a skit if you have lots of time) about a water droplet that goes through the journey across a watershed to a water source.

Downstream Impacts

Objective Framework

Pre-Lesson Assessment:
Students will describe through drawing or writing their dream water front property.

A	**Gaining AWARENESS** Recognize that human landscape design can result in harmful runoff that impacts our neighbors and waterways Recognize that individual actions make a difference
K	**Acquiring KNOWLEDGE** Discuss how environmental protection regulations protect communal waterways Consider how the level of harm presented by different human structures and activities comes into play when designing city layouts
A	**Developing Positive ATTITUDES** Decide that regulations are fundamental to preventing harm to private and public waterways Demonstrate that being considerate of others and able to compromise is important
S	**Learning SKILLS** Practice debating policy and defending viewpoints Develop tact in navigating different perspectives and exploring ethics Dissect facts and think critically to form opinions Demonstrate how compromise is achieved professionally
A	**Inspired to Take ACTION** Show respect for waterways by managing land and disposing of waste responsibly, and encourage others to do the same Demonstrate consideration of others Evaluate how individual actions impact others Demonstrate how to negotiate and reach positive compromise in the future

Post-Lesson Evaluation

Students will reflect on the opening activity and revise it based on what they learned.

Key words: watershed, upstream, downstream, pollution, environmental protection regulations

Downstream Impacts
Lesson Protocol

Watershed Impacts

Supplies:
Large map with divided plots, paper, and drawing utensils

or

Large map with numbered plots, index cards, and drawing utensils

or

Paper with shaded region (printed or drawn) and drawing utensils

Group Draw

Supplies:
Large whiteboard or chart paper

Markers

Modifications & Considerations:
Can be applied to a variety of lessons or workshops

The Great Land Use Debate

Supplies:
Paper

Pieces of labeled paper representing town components to be moved around and finally glued to a base map

or

Felt board with laminated pieces of paper representing town components, attached to board by Velcro

Water Pollution and Human Expansion/Cooperative Use

Being considerate to neighbors that share the same resource; establishing the purpose of environmental protection laws

Define a watershed
Watershed Impacts – Students will design their dream property, then discuss what effects each plot of land has on surrounding properties and the watershed as a whole. The objective is to show how plots of land interact within a watershed.

- Assign each student a plot of land indicated on a map by a number. The map should have a waterway or body of water on it. They then choose to do whatever they want with their plot of land, and design it on a sheet of paper. When everyone has drawn what their ideal property would have on it, the plots of land are arranged on the floor according to the numbers indicated on the map.
- Each student randomly draws a numbered index card, indicated on a map. On the back is what is going on already in that plot of land, and the kids have to say what they would change, or what is good about what is happening on that plot of land.
- Each student inherits water front property! Give each of them a sheet of paper with some of it shaded to represent the water's edge. When finished, have students line their properties beside and across each other and share.
- Establish "upstream" and "downstream"
- Once everyone has their drawings put together and tells a little about their property, ask questions. Q: When you were building, did you consider how certain structures or features might lead to pollution? If you live upstream, how can you [give a specific example] negatively impact someone downstream?

A lot of people are not aware that certain things may cause harmful runoff and pollute the watershed. This is why we have environmental protection regulations that help educate people about what hurts the environment before they build!

What each of us does makes a difference!
Group Draw – Each person draws a small ambiguous detail on a whiteboard or large paper, each new line or detail adding to the picture. The picture evolves with each person's contribution. By the time every person has gone once or twice (or more, if there is time) a picture has been formed. This demonstrates that every person's actions, big or small, impact the formation and outcome of the overall big picture.

What we do affects our watershed and those downstream.
Q: What are some possible regulations that could help prevent pollution of a shared water source, such as a beautiful river, along which a lot of people own property?

(Older students) Share with students some regulations and guidelines (such as from the EPA) that are already in place

Downstream Impacts
Lesson Protocol

*Take-home: Have students research an environmental regulation and return a summary of it as well as its pros and cons to their teacher

Conflicts of Interest and Cooperation/Compromise

Simulate the process of urban planning and the complexities of environmental protection and human dimensions. Conservation decisions are complicated!

- Human beings have a variety of viewpoints and priorities, which is part of what makes life diverse and interesting. However, conflicting interests can also make it difficult to come to decisions about what to do with public land. What is most profitable for a company may be harmful to the environment; the best location for a soccer field might also make a great spot for a wastewater treatment plant. When deciding how best to utilize an area, people representing multiple perspectives must get together and compromise in order to form a plan that works the best for everyone.
- The Great Land Use Debate
  The object is to structure a public area in a way that somewhat accommodates each interest group. Each student represents a different perspective/interest group.

  Assign groups where each person in the group is a member of a different interest group. They are all deciding what to do with a plot of land (a town, a park, etc.). How much should be wooded? Where should we put the landfill, the farm, the main highway, in relation to the river? What if we put these towns side by side? Even after they come to a decision as a group, how do their decisions impact their neighbors downstream? Each team will be given a map on which to arrange the features of their scenario. Each person in a group is assigned a perspective or interest group to represent.

Scenario Examples:

Forest Land Use

Decide how to use 300 acres of publicly owned forested land for outdoor recreation purposes. There is a 5-acre lake in the center of the property.

Interest groups may include: hikers, fishermen, hunters, campers, bird watchers, recreational ATV operators, boaters, horseback riders, and more. Divide the class into teams with each person representing one interest group.

Next, have all members of the same interest group from different teams come together to discuss their goals. After this discussion, interest groups disperse back to their original teams so debate ho the land should be used.

What activities should be allowed or prohibited? Which activities are compatible in shared spaces?

Urban Planning

Decide how to build a town with a beautiful natural body of water in the middle of it. The body of water feeds into a river or stream.

Components of a town include: grocery store, school, gas station, houses, restaurant, farm, factory, firehouse, park, landfill, highway, and more. Consider the pros and cons of the location of each component, and lobby for your side.

Evaluation

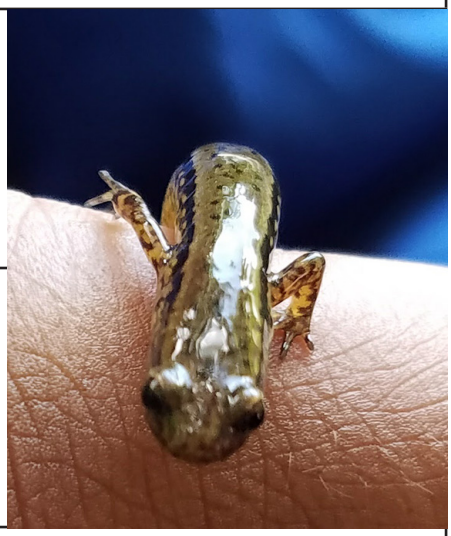
On the back of their property design, have students briefly describe any changes they would make to their original property design after everything they learned today, and why they did or did not make those changes.

Predator/Prey Relationships and Adaptations to Urban Environments

Objective Framework

Pre-Lesson Assessment: Students will describe what they think a food chain is, and how different animals and plants make up the food

A	**Gaining AWARENESS** Associate animals with different parts of the food chain Recognize that everything must secure food, water, and shelter Interpret that each part of the food chain as crucial to environmental balance Discuss animal adaptations, and how they help animals survive in rural and urban environments
K	**Acquiring KNOWLEDGE** Identify the components of the food chain (and what sources of nutrients are required of each component) Defend that food, water and shelter are essential to life Discuss physical vs. behavioral adaptations
A	**Developing Positive ATTITUDES** Recognize each part of the food chain as equally important (even 'icky' decomposers)
S	**Learning SKILLS** Describe the roles/ function of each component of the food chain Identify potential sources of food, water and shelter for wildlife in urban areas
A	**Inspired to Take ACTION** Establish wildlife habitat in the city, such as bird feeders or gardens Disseminate awareness of urban wildlife to others Exhibit and encourage responsible environmental stewardship



Post-Lesson Evaluation

Students will reflect on the opening activity and revise it based on what they learned.

Key words: food chain, adaptations, decomposers, environmental stewardship

Predator/Prey Relationships and Adaptations to Urban Environments—*Lesson Protocol*

Food Chain – What is it?

- Write a Skit: Children volunteer to be each step of a food chain (sun, producer, herbivorous consumer/prey -> omnivorous or carnivorous consumer/ predator, decomposer). They act it out in front of the class with instructions. It all starts with the sun coming up, and after the flower jumps up and absorbs the sun's energy, the transfer of energy begins as each organism is consumed by the next.
- Discuss what the skit illustrates What is a predator? Which of the animals we acted out was a predator? What do you call the thing it eats? (Prey)

Resources

For animals to live, they need resources (food, water, shelter, space)

- What sort of things and places are resources for animals in the city? How does wildlife find, or learn to use these resources? The ways these animals learn to make a living in an urban setting are adaptations to their environment.

Adaptations

There are different kinds of adaptations (physical, behavioral)

- (Physical) What are some adaptations that animals have? (turtle shells, camouflage, webbed feet – anything that makes life easier to live)
- (Physical) Name some adaptations for predators and prey. What physical characteristics make some animals better at living in the city than others? (ex. Raccoons with opposable thumbs that help open human-made containers)
- (Behavioral) Discuss how animals change what they eat and how they survive in different environments, specifically urban adaptations. Animals are all around us. Where do they hide? How do they survive? How do they avoid human contact?

Poster or PowerPoint showing where animals sleep/hide, get food and water in the city.

Habitat Fragmentation

Objective Framework

Pre-Lesson Assessment: Students will answer a question, discuss or draw something related to one or more of the concepts covered in this lesson, such as listing the resources needed by living things.

A	**Gaining AWARENESS** Recognize that all living things use resources, with humans using the most of all Interpret that as the human population increases, so does our resource use Determine that human expansion leads to habitat loss for wildlife Recognize that space on earth is finite and resources must be used responsibly
K	**Acquiring KNOWLEDGE** Identify the basic needs of all living things Explain how population growth impacts resource availability Discuss how human population growth displaces wildlife and results in habitat fragmentation Determine ways animals adapt to habitat fragmentation, and the results of those behavioral adaptations Describe conservation efforts that reduce effects of habitat fragmentation
A	**Developing Positive ATTITUDES** Determine that there are things being done to reduce impacts of habitat fragmentation, and we can continue to help reduce impacts
S	**Learning SKILLS** Predict the impacts of various human actions on wildlife habitat, and what the results would be Identify examples of habitat fragmentation Brainstorm potential future conservation strategies to reduce impacts of habitat fragmentation
A	**Inspired to Take ACTION** Explain to others why so many animals are seen crossing the road or using human structures Employ concepts learned to be an advocate for improving urban areas for wildlife in the future

Post-Lesson Evaluation

Students will draw a picture of fragmentation, applying the home metaphor used in the lesson to an animal in the forest.

Key words: resource, habitat fragmentation, habitat loss, crowding, deforestation, adaptation, conservation

Habitat Fragmentation

Lesson Protocol

Habitat in Half

Supplies:
Large sheet or tarp

Modifications & Extensions:
Use multiple sheets for very large classes.

Habitat Obstacle Course

Supplies:
Improvised objects to represent various structures in an urban landscape that might hinder wildlife on their way to resources.

Natural Resource Use

All living things use resources, and humans use the most of all.

- Food, water, shelter, space – the basic needs of all living things; different living things have different living requirements, so what may constitute as food or shelter for one animal may not be useful to another animal. Could mention that an animal's niche determines what characteristics within a habitat it utilizes as food, or shelter, as well as spatial requirements.
- As human populations increase, we demand more and more resources. Along with needing more water and food, we build more shelters, and take up more space.

  As humans, we benefit a lot from some of the things we build. A lot of people feel that many of the things we have built and technologies we have developed have improved our quality of life. But as in a lot of things, there are pros and cons to our growing cities and populations.

(Be sure to really point out that human existence is not evil, and not to demonize urbanization.)

Deforestation – removal of the trees reduces the plant species, which affects the animals that depend on those plant species for habitat (including humans, who need the oxygen created by forests!)

- Fragmentation

  Oftentimes when humans build structures like roads, neighborhoods, or malls, the natural habitat and its community of animals is not taken into consideration, and we break up the habitat and create obstacles for wildlife.

Habitat Fragmentation

Lesson Protocol

Draw on the board or illustrate in some other way: Imagine someone built a highway right through the middle of your house, between the kitchen and the bedroom! You would have to cross this dangerous highway to eat and drink, and cross it again to go to bed. This is dangerous for animals.

Or what if there was a really tall wall through your house? Or a mall you could not walk through? In this case accessing all of your needs would not only be dangerous and difficult, but almost impossible!

This is fragmentation – the natural habitat of animals being broken up by human activity and structures.

Have students draw fragmentation, either using the example of a human home or drawing it taking place in a natural setting.

- Habitat Loss and Crowding

  What is habitat loss? (As deforestation continues, so does habitat loss..) Q: Why is habitat loss bad for wildlife?

  Crowding – the result of habitat loss, especially when coupled with population growth

  Activity: Have students (perhaps in groups if a large class) stand on a sheet. They all fit! Tell a story about habitat loss to go along with the exercise. (ex: You are a bunch of deer in a forest. Humans come along and build homes, and a few stores taking up half of your habitat… a mall, taking up another half… etc.) Each round, fold the sheet in half and have the students continue to try and fit. Eventually they will no longer be able to. This is crowding! Discuss.

- Adaptations

  How have animals adapted to fragmentation and habitat loss? What do these things result in?

  Animals living in urban settings and utilizing human waste and structures, roadkill, learning to come to feeders, opossums or raccoons eating cat or dog food eft on a porch in the suburbs, turtles crossing the roads.

  Play an active fragmentation game where students must cross barriers/obstacles in order to access/reach different resources.

- Conservation Efforts

  What can we do, and what is being done to reduce the impacts of habitat fragmentation?

  Discuss various management practices. With older groups, discuss complex solutions such as culverts to let animals pass under roads, connecting habitat

Evaluation

Drawing a picture of fragmentation could be moved here; have students label the causes of fragmentation

Why Should We Protect Our Urban Environment?

Objective Framework

Pre-Lesson Assessment: Students will answer "Do we have nature in the city?" They may be asked what nature "means" to them, and to name some of these things they see in the city, such as wildlife, plants, etc.

A	**Gaining AWARENESS** Recognize that there is nature in the city Recognize that the health of the environment, including urban ecosystems, is important Determine that human actions impact the health of the environment	
K	**Acquiring KNOWLEDGE** Differentiate between natural and human-introduced aspects of a city Distinguish wildlife and domestic animals Identify ways wildlife adapt to and utilize urban settings Recognize environmentally harmful and helpful human actions Describe key words	
A	**Developing Positive ATTITUDES** Determine that nature is a positive asset in urban environments, and is enjoyable Decide that being environmentally conscious is important	
S	**Learning SKILLS** Interpret how wildlife uses features and resources within the urban landscape Establish a (list of enviro friendly things?) by thinking critically about various human behaviors Work together to develop a set of environmental ethics that are agreed to be top priority	
A	**Inspired to Take ACTION** Develop and aspire to implement habitat improvement for urban wildlife Exhibit environmentally conscious behavior Influence others to be environmentally conscious	

Post-Lesson Evaluation

Students will: Develop a personal code of ethics and write an 'eco-pledge', or commitment to helping the earth in a specific way, on a notecard

Key words: nature, wildlife, adapt, environmentally conscious

Why Should We Protect Our Urban Environment?

Lesson Protocol

Urban Wildlife Slideshow

Supplies:
Slideshow of wildlife in urban settings, utilizing human-made structures, human waste, etc. to secure food, water, or shelter

Meet Your Local Urban Watershed

Supplies:
Slideshow or copies of pictures of Proctor Creek in Atlanta, or other urban watershed

Earth Pledge

Supplies:
Note cards

Establish that there is nature in the city

Breaking down misconceptions

- Do we have nature in the city? Do we have wildlife?

  Name some examples, write them down on the board, perhaps show pictures of animals and plants in the city.

- What do you normally think of when you hear the words "nature" and "wildlife"? What do these places look like?

- How is the imagery that you just mentioned [the woods, etc.] different from Atlanta (or applicable city)? What are some ways animals have adapted to live here (finding food, water, shelter, and how these things are different to what they would naturally use)?

  Show pictures of these behavioral adaptations, such as a squirrel eating human food, bees or birds nesting in odd spots, birds perched on power lines, etc.

- Show pictures and briefly discuss Proctor Creek, a place that exists right in the city of Atlanta!

Improving Urban Wildlife Habitat

Making responsible choices

- Initiate a class debate by asking the following questions; with older groups, discuss the pros and cons of environmentally conscious decisions, or the choice to not be environmentally conscious.

- What are some things humans do to that impacts the environment, either altering or harming it?

- What can we do to help the nature around our city and the environment as a whole?

- What are some things you have seen or heard of people putting around the city or around other places – even at your own homes – that provide shelter or other uses to wildlife?

- Group drawing exercise – You **can** make a difference!

- "Improving Wildlife Habitat in the Community" (WILD pg. 440)

  Ask younger students to come up with ways to improve an area for wildlife, perhaps as a group list or class discussion.

For older students, have them come up with a project in groups they may want to do to improve the area around their school for wildlife (give ideas or show pictures for inspiration, if necessary).

Pick or vote on one that will be implemented later as a class or school project

Evaluation

Develop a personal 'code' of environmental ethics. Have each student write an "Eco-Pledge" on a notecard, and sign the back – maybe the teacher will hang them up.

Bird Survey

Objective Framework

Pre-Lesson Assessment:
Students will discuss what they think "wildlife management" means.

A	**Gaining AWARENESS** Recognize that wildlife management contributes to a balanced ecosystem Recognize there are a variety of wildlife management strategies
K	**Acquiring KNOWLEDGE** Identify major wildlife management methods and their uses Discuss different wildlife surveying techniques, and what information they can provide Memorize names and characteristics of several native birds Discuss what the presence or absence of different birds indicates about resources present in the environment
A	**Developing Positive ATTITUDES** Determine that the birds present indicate what resources are also present in the environment Recognize the importance of surveying wildlife in an ecosystem to determine the health and resources of that ecosystem
S	**Learning SKILLS** Practice using identification guides Identifying birds by sight and sound Interpret the results of the bird survey Brainstorm future management options
A	**Inspired to Take ACTION** Recall names and characteristics of several native bird species in the future Demonstrate consideration to birds by disposing of waste responsibly

USFWS/Garry Tucker

Post-Lesson Evaluation

Students will make inferences about resources in the area based on the birds observed.

Key words: native birds, birdwatching, bird calls, surveys, migration, adaptation

Bird Survey
Lesson Protocol

Designed as a parent/guardian and child bonding activity out at Proctor Creek.

Will need:
Identification chart or book. Consider contacting a member of the Atlanta Audubon Society to join or co-facilitate the survey

Wildlife Management

Discuss:

- What does this mean? Why do we need it?
- What are some different methods, and who implements them?
- Surveys – what can they tell us?

  Populations of animals of interest, migration routes (especially birds)

  Ecosystem health

  Population of another animal's food supply; ecosystem dynamics

  Wildlife management agencies use what you find! This survey helps us learn about the health of the Atlanta bird population. There are lots of other ways you can report your findings! (eBird, etc.)

Conduct Survey

- What kinds of birds might we see or hear? (Encourage environmental interpretation here)
- Hand out guides and ask students to record what they see.

  Optional: Before beginning, play different relevant bird calls. Consider bringing these recordings with you as a reference tool during the survey. Otherwise, be able to interpret calls.

Conclusion

Summarize the findings of the group, and discuss the implications. If few birds were detected, what is a possible reason? Why might certain birds have been present, and others not?

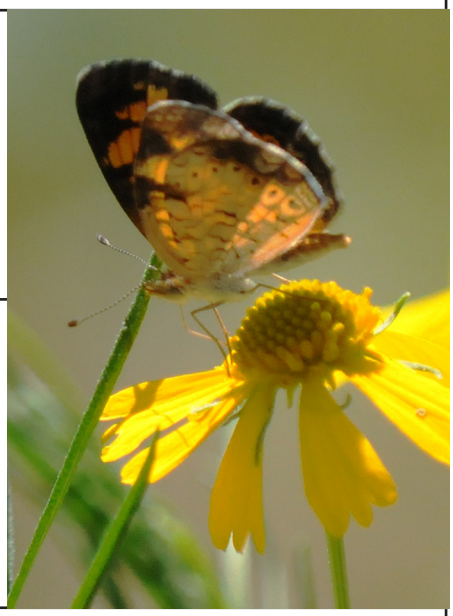
Pollinators

Objective Framework

Pre-Lesson Assessment: Students will write, draw or discuss: what they think a pollinator is, what they already know about pollinators, or why they think starting a pollinator garden is a good idea.

A	**Gaining AWARENESS** Identify pollinators as vital to the world's plant diversity and food security Recognize that pollinator populations are decreasing, largely due to human activity
K	**Acquiring KNOWLEDGE** Define and discuss 'pollinators' and why they are important Differentiate human actions that are harmful to pollinators from those that are helpful List and discuss several organizations that protect pollinators Identify and discuss native plants preferred by different pollinators
A	**Developing Positive ATTITUDES** Determine that pollinators are important and worth protecting Determine that something worth protecting is worth working hard for Develop positive associations of physical activity with creativity and enjoyment
S	**Learning SKILLS** Practice working with a team to develop and execute a plan Develop basic construction and gardening skills Demonstrate progressive proficiency and confidence in using hand tools Strengthen responsible tendencies by committing to the ongoing maintenance of the pollinator garden
A	**Inspired to Take ACTION** Develop and execute a plan for a pollinator garden Encourage others to protect pollinators through responsible actions Promote and contribute to the construction and maintenance of future pollinator gardens Educate others about the importance of pollinators, and correct misconceptions

USFWS/Garry Tucker



Post-Lesson Evaluation

Students will present their pollinator garden design ideas. The final plan will be approved by the instructor and implemented.

Key words: pollinators, pollinator garden, nature, backyard wildlife

Pollinators
Lesson Protocol

Pollinator Garden Design

Supplies:
Paper

Drawing or writing utensils

Pollinator plant identification guides

Modifications & Considerations:
Consider which plants and pollinators are native to your area

Pollinator Garden Planting

Supplies:
Plants

Potting soil (if necessary)

Shovels or trowels

Barriers of brick, wood, etc. as necessary

Intended as a lesson given prior to implementing a pollinator garden project

Pollinators

What are they? Define.

- Pollinators (mostly insects) make 67% of the world's crops grow
- Give examples of pollinators (bees, birds, wasps, bats)
- Why do we need them?

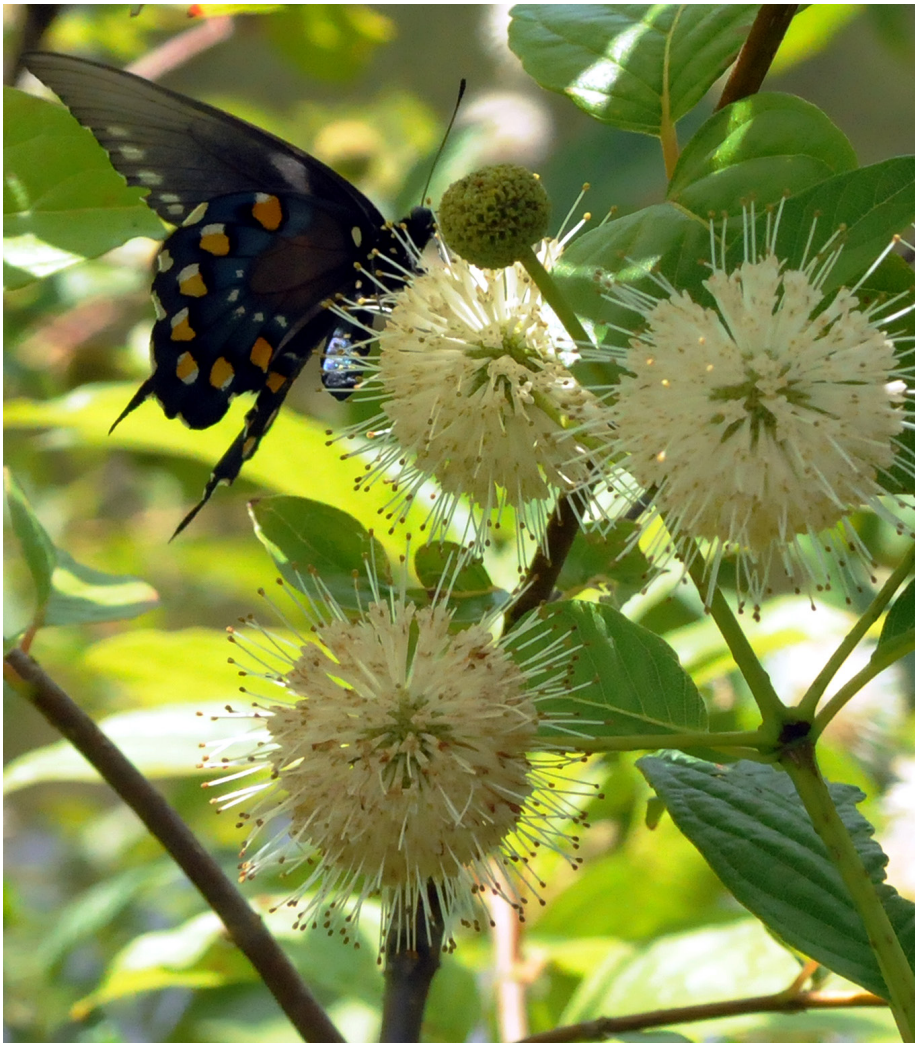
  Food and plant diversity

  Food quantity: Losing pollinators would cause food shortages

Decline

Pollinators are in trouble! Why?

- Pollution, pesticides (noenicitinoids, etc.)
- Human misconceptions: People sometimes have bees killed.



  Usually this is out of fear and lack of understanding of the bees' important ecological role.

Conservation

How can we help?

- Discuss ways people help pollinators, as well as government agencies and laws that protect pollinators
- Learn a few different plants (non-invasive, native is best) that pollinators favor. (Ex: Monarch butterflies feed on milkweed)

Activity

Design a pollinator garden!

- In teams or individually, create a layout for a pollinator garden. Utilize pamphlets, books, or other resources to choose specific plants to include. Designs created during this time will be considered when planning the real project!
- At a later date, the class will work together to create a pollinator garden based off of exemplary student designs.

Stream Ecology

Objective Framework

Pre-Lesson Assessment: Students will describe ecology, and why they think it is important to learn about ecosystems by conducting catch-and -release studies such as this.

A	**Gaining AWARENESS** Recognize the importance of a healthy stream ecosystem Recognize the existence of small macro-organisms in aquatic ecosystems
K	**Acquiring KNOWLEDGE** Define key terms Discuss how native stream plants and animals interact in the food chain Discuss what the presence or absence of different organisms indicates about a stream's health
A	**Developing Positive ATTITUDES** Determine that organisms present in the stream are indicators of environmental health Discuss the importance of surveying ecosystems to determine their health Determine that it is important for streams to be heathy
S	**Learning SKILLS** Interpret what the presence of different species indicates about the health of the stream Practice using identification guides Identify organisms caught Brainstorm future management steps
A	**Inspired to Take ACTION** Demonstrate responsible waste disposal Participate in water cleanup events in the future

Post-Lesson Evaluation

Students will discuss organisms found and use their findings to interpret the health and overall ecology of the stream.

Key words: macroinvertebrates, biological indicators, ecology, surveys, field guides

Stream Ecology
Lesson Protocol

Stream Sampling

Supplies:
D-nets for stream sampling

Shallow tubs for temporary specimen collection

Macroinvertebrate identification guides

Ecology

Define and segue into stream ecology. What is ecology?

- The study of living and non-living things and how they interact in their environment.
- We will talk specifically about stream ecology today!

Native Streams

What lives in ours?

- Learn some native fish and other aquatic organisms. Discuss the food chain of the stream.
- Discuss a variety of life and things that rely on the stream, which is important for not only aquatic organisms, but surrounding plants and animals as well that use is as a water source or place to find food.

Biological Indicators

Main point. Why study stream ecology? What can these critters tell us?

- Biological indicators – The presence or absence of certain plants and animals can tell us a lot about the health of the stream and surrounding environment.
- Introduce the macroinvertebrate identification guide and how to use it.
- Demonstrate how to use nets as a sampling method and explain how we will use the information we gather.

Wrap Up

- Discuss findings as a group and draw general conclusions.
- Discuss possible 'next step' management measures.