

Wonderful Watersheds

A Teacher's Guide to Using New York City's Nature as Classrooms

April 2007 Edition



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Dear Educator:

Welcome to the Wonderful Watersheds Curriculum! In this guide, you will find out what a watershed is, how you can teach your students about watersheds, and how to access our most valuable natural resources in our urban environment.

This guide is meant to be a starting point for learning about the local environment through watersheds, and we encourage you to use your creativity in expanding upon the ideas put forth in this curriculum. We hope you find this guide useful and enjoy using it to introduce environmental concepts and issues to your students.

The primary objective of Wonderful Watersheds is to get you and your students outside to explore your watershed. To help you accomplish this, we have centered this curriculum on field trips to local resources so that your students can learn about the Hudson River Watershed. The lesson plans in this guide are organized into three sections: Pre-Trip, Field Trip, and Post-Trip. Each section contains four detailed lessons in each category and a list of extensions to explore as well. Each lesson plan is correlated to the New York State Standards so that you can easily incorporate the lessons into your school curriculum. Vocabulary words and journal ideas are also listed for each lesson.

The “Teacher Resources” section of this guide includes several resources to help you implement your watershed curriculum. It includes vocabulary words, a list of flora and fauna, and places to go for local field trips. There is a table which shows what you can expect to find at each field trip site, and we have specifically identified sites that have watershed kits for you to borrow. Contact information for nature centers and field stations in each borough is also provided. This section also includes Student Activity sheets for the lessons, which you may photocopy for your students. The bibliography section includes several children’s books, adult books, and websites related to watersheds. These references will provide you with further information on watersheds.

We hope you and your students will enjoy exploring your local environment with Wonderful Watersheds!

The Hudson River Watershed

Everyone lives in a watershed! A watershed is all the land area that contributes water to a specific stream, river, lake, or groundwater supply. All the rain and snow that falls to the ground travels through forests, over farm fields, suburban lawns, and city streets and eventually finds its way into a body of water. It can also seep into the ground and travel as groundwater. These catchment areas are called watersheds.

New York State has 17 major watersheds. The Hudson River Watershed is one of the largest drainage basins on the eastern seaboard, covering over 12,500 square miles. It is home to over 2.5 million people and many species of wildlife.¹

Fig.1 Hudson River Estuary



As watersheds are essentially the land that catches rain and snow, draining it into a body of water, they include both forests and water bodies. We have therefore integrated forest and water studies into one watershed curriculum in order to provide a more holistic view of our surrounding environment.

¹ Arena, Nancy and NYS DEC, SCA, Hudson River Estuary, Americorps. "Hudson River Watershed Poster."

² NY / NJ Harbor Estuary Program.

Section I. PRE-TRIP ACTIVITIES

1. What Is A Watershed?

Activity: Build Your Own Watershed Model

Objective: Children will learn how a watershed functions and understand concepts surrounding water flow issues such as soil erosion and pollution.

Materials (per group)

- 1 Aluminum baking pan (10" x 13")
- Newspaper (1 sheet of NYT, two sheets of smaller papers)
- 1 sheet paper towel
- 1 plastic bag (cut to a flat sheet)
- 2 plastic cups, one with holes on the bottom (use push pins to make ~ 10 holes)

Materials for the whole class

- blue food coloring
- red Jello powder
- bucket or a gallon jug

Preparation

- Make holes on the bottom of plastic cups using push pins
- Color one gallon of tap water with food coloring
- Cut plastic bags into flat sheets
- Ration the blue water in plastic cups for each group

Activity

1. Crumple up the newspaper and place in the pan.
2. Place the plastic bag to cover the newspaper – be sure to create peaks and valleys. This is the landscape.
3. Pour a little of the blue water into the cup with holes and make it rain over the landscape.
4. Observe how the water flows.
5. Place a piece of paper towel over part of the landscape.
6. Pour more blue water and observe where the water goes.
7. Sprinkle a little of the red Jello powder over the landscape.
8. Pour more blue water and observe what happens to the powder.

Discussion topics

- Water *always* flows from high to low places. It does not stay in high places.
- Plastic bag represents paved areas. Paper towel represents forests. Rain water is absorbed into the ground when it rains over a forest, but runs off when it rains over paved areas.

- Red Jello represents pollutants, such as motor oil and pet wastes. Pollutants are washed away into the rivers and oceans when they are on paved surfaces. Pollutants on the forest floor are absorbed into the ground when it rains.
- You live in a watershed of a water body no matter where you live, because water that falls to the ground always goes somewhere – into the ground then to the river, or directly into the river.
- Students will define “watershed” from their experiences in making the watershed model. The class will discuss which definitions are correct.

Vocabulary Words: watershed, vegetation, soil, stream, contours, valley, estuary, freshwater, saltwater

Journal Idea: Students will write down their own definition of “watershed” and compare it to the final class definition. Students will explain how the model enabled them to understand the concept of “watershed.”

New York State Performance Standards:

Science- S3a, S3c, S4a, S5a, S5e, S5f

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 1: Exploring Properties	Unit 1: Properties of Matter	Unit 1: Forces and Motion		Unit 3: Properties of Water	Unit 4: Exploring Ecosystems

2. Woods, Water and Everything in Between

Activity: Investigating our Local Watershed

Objective: Students will research the plants and animals of their local watershed community to discover that woodlands and water bodies are not separate ecosystems, but work together to form one watershed community.

Materials: Research materials (books, encyclopedias, computers, etc.)

Procedure: The teacher will divide the class into four groups. Group One will research local *forest animals*, and Group Two will research local *forest plants*. Group Three will research local *water animals*, and Group Four will research local *water plants*. Each student will find at least three things about their topic. (Refer to the list of “Woods and Water Plants and Animals” list in the “Teacher Resources” Section of this guide.) **Prediction:** *Students will predict what animals and plants live in their watershed. The teacher should keep these predictions for later use.* The students will research individually and report back to the class on what they discover.

Discussion: Students will compare their predictions of their watershed community with what they discovered in their research. What do woodlands and water have in common? How are they different? The teacher will then draw a diagram, showing how woodlands and water are related.

Vocabulary Words: community, forest, ecosystem

Journal Idea: Students will keep track of their research in their journals. The children may then write what they learned about one other plant or animal from both the water and woods. They will explain how this contributes to what they have learned about the watershed community.

New York State Performance Standards:

Science- S2b, S2c, S5f, S6a, S6c, S7a

English Language Arts- E1c, E2a

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 2: Trees through Seasons Unit 3: Animals	Unit 3: Animal Diversity	Unit 3: Plant Diversity	Unit 4: Plant and Animal Adaptations	Unit 1: Animals and Plants in their Environment	Unit 4: Exploring Ecosystems

3. Wonderful Watersheds

Activity: Classroom Mural

Objective: Students will make a classroom mural of a watershed, using their research from “Woods and Water.” This mural will expand throughout the entire Wonderful Watersheds curriculum as the students’ knowledge grows. The board may be used at the end of this curriculum as an assessment tool for what the students have learned.

Materials: Writing materials, art supplies.

Procedure: Students will use art materials to construct the animal or plant which they researched in “Woods and Water.” They will work together to place the plants and animals in the correct habitat on the watershed classroom mural. After the plants and animals have been added, the students will take time to observe their mural.

Discussion: After observing the mural, students will discuss: how their plant or animal contributes to the watershed; what relationships it may have to other plants or animals in the watershed; and whether or not the watershed could exist without these plants and animals.

Vocabulary Words: habitat, interdependent

Journal Idea: Students will reflect upon the discussion questions above in their journal. Students may suggest what else could be added to the watershed (i.e. houses, people, hospitals, factories, airports, etc.) How do these human needs impact on the watershed? (decrease in habitat, pollution, etc.)

New York State Performance Standards:

Science- S2a, S2d, S3a, S4a, S4b

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 2: Tress through the Seasons Unit 3: Animals	Unit 3: Animal Diversity	Unit 3: Plant Diversity	Unit 4: Plant and Animal Adaptations	Unit 1: Animals and Plants in their Environment	Unit 4: Exploring Ecosystems

Pre-Trip Extension Activities

(1) The Worth of Water

The teacher will ask the students to think about their most recent experience with water. The students will then brainstorm about what water does for people, plants, animals, and the earth in general. The discussion will extend to include ways to conserve clean water.

(2) Forest Layers

Students will study the different layers of the forest: canopy, understory, shrub layer, forest floor and soil. They may then draw pictures on their own to illustrate their understanding of forest layers. Definitions of each forest layer are in the vocabulary list in the Teacher Resources section of this guide.

(3) Neighborhood Explorations

The students will use maps to find the nearest water body and/or forest. They will then discuss as a class if they have visited these sites or not and develop a plan to explore these areas. Students can then work with their teacher to plan some of the field trips. (Write the parent letter, find out directions to the site, develop study questions for each site, etc.)

(4) The Water Cycle

Students may study how the water cycle works and learn about its stages: evaporation, transpiration, condensation, precipitation, and collection. They may work individually or as a class to draw the water cycle and explain how it works.

(5) Water Works

Students will learn the properties of water including the following: adhesion, boiling point, capillary action, cohesion, condensation, density, evaporation, freezing point, gas, liquid, solid, melting point, surface tension, etc.

(6) How A Tree Works

Students will learn how a tree functions by looking at its different parts: roots, trunk, bark, leaves, fruits, and seeds. They will study how the different parts help the tree to function as a whole.

(7) Leaf Identification and Classification

Students will learn to distinguish between different leaves by looking at the leaf shape, the veins of the leaf, and the margins of the leaves. They may further research leaf identification to find even more distinguishing characteristics of leaves.

Section II. FIELD TRIP ACTIVITIES



Forest



Waterbody

These icons help you quickly identify a field trip.

1. Investigating Our Local Environment



Activity: Surveying Your Surroundings

Objective: Students will use their observation skills and record what they see during their watershed field trip on the “Surveying Our Surroundings” handout in the “Activity Sheets” section.

Materials: “Surveying Our Surroundings” Handout, pencil, clipboard.

Procedure: Children will use their handout on the trip to record their animal and plant sightings. The teacher will allow time for the students to observe their local environment and record their findings on the handout.

Discussion: After making and recording their observations, students will discuss what they experienced and compare their experiences to other students’ experiences. Did they have similar or different experiences? Why or why not?

Vocabulary Word: environment

Journal Idea: Students will discuss why it is important to study our *local* environment.

New York State Performance Standards:

Science- S2a, S2c, S2d, S3a, S4b, S5a, S5b, S5e, S5f

English Language Arts- E2a

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 1: Exploring Properties Unit 2: Trees through the Seasons Unit 3: Animals	Unit 1: Properties of Matter Unit 2: Weather and Seasons Unit 3: Animal Diversity	Unit 2: Earth Materials Unit 3: Plant Diversity	Unit 1: Matter Unit 4: Plant and Animal Adaptations	Unit 1: Animals and Plants in their Environment Unit 4: Interactions of Air, Water and Land	Unit 4: Exploring Ecosystems

2. Trees

Activity: Tree Profiles

Objective: Students will use the “Tree Profile” handout to more closely examine individual trees for data collection. This handout can be found in the “Activity Sheets” section of this guide.

Materials: “Tree Profile” handout, pencil, ruler, string, clipboard.

Procedure: Children will use their “Tree Profile” handout on the trip in order to record data. They will record information about the size of the tree, the shape and size of its leaves, and anything else they observe about the tree.

Discussion: After making and recording their observations, students will discuss their trees. Did they see trees of similar size and shape? Why or why not?

Vocabulary Word: circumference

Journal Idea: The students will write a story or poem about the tree they studied on the field trip. (Helping hints: Does it live alone? What animals live nearby or in the tree? Is it big or small? What are some descriptive words that make this tree unique?)

New York State Performance Standards:

Science- S2a, S2c, S4b, S5a, S5b, S6a

English Language Arts- E2a

Math- M2g, M2i, M6b, M6c, M8b

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 1: Exploring Properties Unit 2: Trees through the Seasons	Unit 2: Weather and Seasons	Unit 3: Plant Diversity	Unit 1: Matter Unit 4: Plant and Animal Adaptations	Unit 1: Animals and Plants in their Environment	Unit 1: The Nature of Science Unit 4: Exploring Ecosystems

3. Forests

Activity: My Forest Community

Objective: Students will sharpen their observation skills to record forest data onto the “Forest Data” sheet, concentrating on forest layers and the habitats forests provide. The “Forest Data” handout can be found in the “Activity Sheets” section of this guide.

Materials: “Forest Data” handout, pencil, clipboard.

Procedure: Students will use their “Forest Data” handout on the trip in order to record their forest observations. They will work individually to answer the questions on the sheet, focusing on how the forest feels in comparison to their neighborhood, what animals they see in the forest, and how the forest layers work together to make up the forest. They will have an opportunity to draw their observations as well.

Discussion: After making and recording their observations, students will discuss what they experienced and compare their observations to other students’ experiences. Did they have similar or different experiences? Why or why not?

Vocabulary Words: environment, canopy, understory, shrub layer, forest floor, soil

Journal Idea: Students will choose a favorite animal observed on the trip and sketch it. Additionally, they can write about the characteristics of the animal. How does a forest protect the watershed? (prevents soil erosion, habitat for wildlife, cleans the air, etc.)

New York State Performance Standards:

Science- S2a, S2c, S4b, S5a, S5b, S6a

English Language Arts- E2a

Math- M2g, M2i, M6b, M6c, M8b

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 1: Exploring Properties Unit 2: Trees through the Seasons	Unit 2: Weather and Seasons	Unit 3: Plant Diversity	Unit 1: Matter Unit 4: Plant and Animal Adaptations	Unit 1: Animals and Plants in their Environment	Unit 1: The Nature of Science Unit 4: Exploring Ecosystems

4. Water Observation

Activity: Understanding Water

Objective: Students will use their observation skills and record properties of water bodies they encounter on their watershed field trip. The “Water Observation” handout can be found in the “Activity Sheets” section of this guide.

Materials: “Water Observation” handout, pencil, clipboard.

Procedure: Students will use their handout on the trip in order to record their observations of water and water cycles. They will record how they feel near the water, how the water looks to them, and what animals they see.

Discussion: After making and recording their observations, students will discuss what they experienced near the water and compare their observations with each other.

Vocabulary Words: properties, observation

Journal Idea: Students will reflect on the water they saw on their field trip. Did it look clean or dirty? Why do you think it looked this way? Where does the water come from, where does it go?

New York State Performance Standards:

Science- S1a, S2d, S3c, S4b

English Language Arts- E2a, E3b

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 1: Exploring Properties	Unit 1: Properties of Matter		Unit 1: Matter	Unit 3: Properties of Water Unit 4: Interactions of Air, Water and Land	Unit 1: The Nature of Science Unit 4: Exploring Ecosystems

Field-Trip Extension Activities

The following are five activities that you can implement with your students on the field trip. There are endless numbers of activities that your class can participate in on a trip in an outdoor classroom. We encourage you to spend more time and choose additional activities that will meet the needs of your students. Below are some ideas that you may want to incorporate.

(1) Watersheds Count

Extend your math lessons by investigating small plots of land using a variety of math skills like estimating, measuring, graphing, tallying, sorting and classifying. Have your students discover and describe what is in their small plot. They can ask questions and draw conclusions about their plot of land. When they are finished they can graphically display their data.

(2) Creativity in the Watershed

Students can discover different textures of objects by doing rubbings. They can make rubbings of leaves or tree bark. Students can also sketch pictures of their surroundings.

(3) Water Quality Testing

Students can discover the health of the water by testing for dissolved oxygen, pH level, temperature, and salinity. They can also record aquatic animals that inhabit the water body. Students should collect a small sample of the water that they can bring back to the classroom for further investigations.

(4) Nature Tales

While in the outdoors, children get inspired by the natural world. This is a wonderful opportunity to put their ideas on paper. Students can study different forms of poetry prior to the field trip. On the trip they can use what they learned to create their own poetry. Students can also write stories about their experiences in a natural environment.

(5) Operation Clean-Up

Contact your local park or environmental group and participate in a park or beach clean up activity with your students. See Teacher Resources Section for Contacts.

Section III. POST-TRIP ACTIVITIES

1. Mapping the Watershed

Activity: Changes through Time

Objective: The children will use the historical and present-day watershed maps to examine and reflect upon changes in their watershed over time.

Materials: Maps (historical, present-day; both found in “Teacher Resources”), paper, crayons, colored pencils, or markers.

Procedure: Students will examine both historical and present-day maps of their watershed and think about changes in the watershed over time. **Prediction:** *Students will initially examine only one of the maps and predict what the other map may look like.* The students will then examine the second map and determine how the maps look different.

Discussion: Students will discuss in small groups changes in their watershed. How do the changes impact the watershed? Can you imagine how the watershed might have looked before even the oldest map? Draw what you think it would have looked like.

Journal Idea: Students will compare their predictions of their local water environment with what they actually experienced. What changed? What was similar? Students will draw a watershed map of the future to illustrate how they think the area might change over time.

New York State Performance Standards:

Science- S2d, S3a, S4b

English Language Arts- E2a

Math- M2k

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit			Unit 2: Earth Materials		Unit 1: Animals and Plants in their Environment Unit 3: Properties of Water Unit 4: Interactions of Air, Water and Land	Unit 1: The Nature of Science Unit 2: Earth Science Unit 4: Exploring Ecosystems

2. Water Worries

Activity: Caught!

Objective: Students will examine the effects of pollution on watersheds.

Materials: Rubber bands, journals, pencils.

Procedure: The teacher will first tell the class that they will be exploring the effects of pollution and waste on wildlife. Data from National Beach Clean Up can be used to introduce the topic to students. In 2003, volunteers cleaned and documented over 334,421 pounds of debris at 351 beaches across New York. Additional information and data are available on the American Littoral Society website (<http://www.alsnyc.org/cleanup.htm>).

Each teacher will hand out one rubber band to each child. The teacher will then demonstrate for the children how to place the rubber band on their hand (attach around thumb and pinky finger, letting the rubber band rest on the backside of the hand). Have the students then try to remove the rubber band without the use of their other hand. The teacher will then explain that this “caught” feeling is similar to how aquatic animals feel when caught in plastic rings from six-packs of soda, or get tangled in fishing lines, and floatable debris.

Discussion: Students will discuss how pollution may impact on local wildlife and what people can do to prevent such things from happening to our local wildlife. The class can then create a list of ways to prevent pollution and waste. Students will specifically target what they can do as individuals to help their local environment.

Journal Idea: Students will record the words used to describe the animals’ feelings in their journal.

New York State Performance Standards:

Science- S2c, S4a, S5e

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 3: Animals	Unit 3: Animal Diversity		Unit 4: Plant and Animal Adaptations	Unit 1: Animals and Plants in their Environment	Unit 4: Exploring Ecosystems

3. Testing Our Watershed Knowledge

Activity: The Wonderful Watershed Game

Objective: Students will assess what they have learned about watersheds by creating their own Watershed Game.

Materials: Paper, art supplies, maps, research materials.

Procedure: Children will use the game to refresh their knowledge of the watershed. The students may decide to design their game after one they already know (such as Jeopardy, Candy Land, etc.). They will be as creative as possible to produce both their game and the title of their game. They could include vocabulary words, true and false questions, or open-ended questions. The goal is to create a game which either the whole class or smaller groups within the class can enjoy playing.

Journal Idea: Have students write about what they have learned about their own watershed.

New York State Performance Standards:

Science- S5a, S5f

English Language Arts- E1c, E2d

New York City Scope and Sequence Alignment:

Grade	K	1	2	3	4	5
Unit	Unit 2: Trees through the Seasons Unit 3: Animals	Unit 3: Animal Diversity	Unit 3: Plant Diversity	Unit 4: Plant and Animal Adaptations	Unit 1: Animals and Plants in their Environment Unit 4: Interactions of Air, Water and Land	Unit 4: Exploring Ecosystems

Post-Trip Extension Activities

(1) Pollution and Water

Students will explore pollution in the watershed. The teacher will fill bins with water. Some students will drop oil into half of the bins with eye droppers. The other students will then dip a feather into a clean bin and an oily bin. They will immediately take the feathers out and examine the difference between the two wet feathers. They will then brainstorm about how the difference might affect watershed plants and animals, particularly birds. The children may reflect on this and brainstorm about pollution prevention.

(2) Graphing the Watershed

Students will use the information recorded at the field trip site to graph the different types of animals found on the trip. The children will use research and graphing skills to complete this activity. The graphs will illustrate the most abundantly seen animals on the field trip.

(3) Habitat Preferences

The students will use the data collected on the “Forest Data” handout to discuss why different animals prefer different habitats. For example, why might a chipmunk prefer the forest floor to the canopy?

(4) Learning through Literature

Read The Lorax by Dr. Seuss and/or The Magic School Bus at the Waterworks by Joanna Cole to the class. The discussion after the reading will focus on environmental problems and solutions. The teacher may choose to create a t-chart for listing such problems and solutions.

(5) Taking Action

Students will use what they have learned about environmental problems and solutions to create bumper stickers or posters that reflect their knowledge. These can be displayed throughout the school to spread awareness.

Section IV. Teacher Resources

1. Vocabulary Words

Brackish – a mix of salt and fresh water; water with a salt content between 0.5 and 3.0 parts per thousand

Canopy – the uppermost vegetation layer of the forest, formed by the tallest trees

Circumference – the perimeter of a circle

Community – an association of plants, animals, and all other organisms, such as bacteria, protists, and fungi, that live in a common environment and interact with each other in energy flow and nutrient cycling processes

Contours – the outline of a figure

Ecosystem – a community made up of populations of organisms that interact with each other and with the non-biological elements in their environment

Environment – the surroundings. Can be natural or manmade.

Erosion – the action of water and wind that wears away rocks and moves soil downstream

Estuary – a semi-enclosed body of water where freshwater from a river mixes with saltwater from an ocean forming brackish water

Forest – a large area covered with trees and underbrush; a wooded area

Forest floor – the place in the forest where wildflowers, ferns and mushrooms grow

Fresh water – water with a low content of salt minerals (less than 0.5 parts per thousand dissolved in the water)

Habitat – the place where an organism normally lives and grows

Interdependent – describes organisms which are mutually dependent or in need of other organisms

Map – a diagram of any area showing the relationship of key features which are usually countries, rivers, lakes and mountains; can also depict elevation, vegetation, rock formations and other features

Pollution – an adverse alteration in the quality of the environment

Properties – characteristics of an object, for example, size, shape, color, boiling point and freezing point

Saltwater – water with a relatively high content of salt minerals (over 3.0 parts per thousand dissolved in the water)

Soil layer – the top layer of the earth's surface. This layer has mineral particles and organic materials. It is a home for millions of invertebrates like sow bugs, spiders and earthworms that feed on the organic matter and help replenish the soil.

Stream – any body of running water moving through defined natural channels

Shrub layer – vegetation layer that consists of woody plants with multiple stems that grow four to eight feet tall

Understory – layer of the forest that consists of young canopy trees and small shade-loving trees like flowering dogwood and sassafras that grow twenty feet tall

Valley – the low land between hills and mountains

Vegetation – plant life in a habitat or ecosystem

Watershed – the land area from which surface runoff drains into stream channels, lakes, reservoirs or other bodies of water

2. Woods and Water in NYC

Natural Features:						
	Forest	Meadow	Wetlands	Open Water	Pier Access	Rest-rooms
Bronx						
Bronx Park	✓			✓		
Ferry Point Park		✓	S			
Pelham Bay Park	✓	✓	S	✓		
Raoul Wallenberg Park	✓					
Riverdale Park	✓			✓		
Seton Falls Park	✓			✓		
Soundview Park		✓	S			
Spuyten Duyvil Park	✓			✓		
Van Cortlandt Park	✓	✓	F	✓		
Brooklyn						
Brooklyn Bridge Park						
Four Sparrow Marsh	✓		S	✓		
Fresh Creek		✓	S	✓		
Marine Park		✓	S	✓	✓	
Prospect Park	✓	✓		✓		
Spring Creek		✓	S	✓		
Manhattan						
Battery Park					✓	
Central Park	✓	✓		✓		
Chelsea Piers						
East River Park					✓	
Fort Tyron Park	✓					
Fort Washington Park	✓	✓				
Highbridge Park	✓					
Hudson River Park					✓	
Inwood Hill Park	✓		S	✓		
The River Project					✓	
South Street Seaport						
Stuyvesant Cove					✓	
Swindler's Cove						

Natural Features (cont.):						
	Forest	Meadow	Wetlands	Open Water	Pier Access	Rest-rooms
Queens						
Alley Pond Park	✓	✓	S/F	✓		
Cunningham Park	✓	✓	F			
Dubos Point Sanctuary			S			
Flushing Meadows Park		✓	F	✓		
Forest Park	✓					
Idlewild Park		✓	S			
Kissena Park	✓	✓		✓		
Oakland Lake	✓		F	✓		
Powell's Cove		✓	S	✓		
Potomogeton Pond	✓					
Udall's Park Reserve	✓		S	✓		
Staten Island						
Arden Woods	✓	✓	F	✓		
Bloomingdale Woods	✓		F	✓		
Blue Heron Park	✓	✓	F	✓		
Clove Lakes Park	✓					
Conference House Park	✓					
Eib's Pond		✓		✓		
Evergreen Park	✓		F			
Fort Wadsworth Park	✓	✓		✓		
Great Kills Park						
The Greenbelt	✓	✓	S/F	✓		
Harbor Herons Refuge			S	✓		
High Rock Park	✓				✓	
Kingfisher's Pond			F	✓		
Lemon Creek Park			S	✓		
Wolfe's Pond Park	✓		S/F	✓		

S = salt water F = fresh water

3. Local Field Trips

Brooklyn

Floyd Bennett Field

Jamaica Bay National Recreation Area
Building 272
Brooklyn, NY 11234
(718) 252-7307

Marine Park

2880 Flatbush Ave
Brooklyn, NY 11234
(718) 965-6551
www.nycparks.org

New York Aquarium

2377 Ralph Ave
Brooklyn, NY 11234
(718) 251-7389

Bronx

Bronx River Alliance

1 Bronx River Pkwy
Bronx, NY 10462
(718) 430-4665
(718) 430-4658

Riverdale Park

Hudson River, W. 254th St,
Palisade Ave, W. 232nd St
www.nycparks.org

Van Cortlandt Park

Van Cortlandt Park South
Bronx, NY 10468
(718) 548-2415
www.nycparks.org

Manhattan

Battery Park City Parks

2 South End Ave
New York, NY 10280
(212) 267-9700
bpcparks@idt.net

(Manhattan continued)

Inwood Hill Park

218th St and Indian Rd
New York, NY
(212) 304-2365
www.nycparks.org

The Lower East Side Ecology Center

E. 7th St. between Ave B and Ave C
New York, NY
(212) 477-4022

River Bank State Park

679 Riverside Dr
New York, NY 10031
212-694-3600
www.nycparks.org

The River Project

Pier 26
North River
New York, NY 10013
(212) 431-5787
<http://www.riverproject.org/>

South Street Seaport

12–14 Fulton St
Offices: 107 Front St
New York, NY 10038
(888) SOUTHST
<http://www.southstseaport.org/>

Stuyvesant Cove Park

P.O. Box 178
Peter Stuyvesant Station
New York, NY 10009
(212) 673-7507
<http://www.stuyvesantcove.org/>

Queens

Alley Pond Park

228-06 Northern Blvd
Douglaston, NY 11363
(718) 229-4000

<http://www.alleypond.com/>

Forest Park

Woodhaven Blvd and Forest Park Dr
(718) 846-2731

www.nycparks.org

Staten Island

Blue Heron Nature Center

222 Poillon Ave
Staten Island, NY 10312
(718) 667-4597

www.nycparks.org

Fort Wadsworth

Gateway National Recreation Area
Rosebank
Staten Island, New York
(718) 354-4500

Citywide

Beach Clean-Up

American Littoral Society

<http://www.alsnyc.org/cleanup.htm>

To organize a clean-up in your area:

contact Barbara Cohen at 718-471-2166 or
alsbeach@aol.com.

4. Common Plants and Animals in Our Watershed

Plants and Shrubs

American Beachgrass, *Ammophila brevigulata*
American Holly, *Ilex opaca*
Arrowhead, *Sagittaria latifolia*
Bayberry, *Myrica pennsylvanica*
Cattail, *Typha angustifolia*
Flowering Dogwood, *Cornus florida*
Highbush Blueberry, *Vaccinium corymbosum*
Honeysuckle, *Lonicera spp.*
Ironweed, *Veronia noveboracensis*
Japanese Barberry, *Berberis thunbergii*
Jewelweed, *Impatiens capensis*
Mapleleaf Viburnum, *Viburnum acerifolium*
Pickerelweed, *Pontedaria cordata*
Red Algae, *Cystoclonium spp.*
Rockweed, *Fucus spp.*
Salt Grass, *Distichlis spicata*
Saltmarsh Cordgrass, *Spartina alterniflora*
Sea Lavender, *Limonium spp.*
Sea Lettuce, *Ulva lactuca*
Spatterdock, *Nuphar luteum*
Spicebush, *Lindera benzoin*
Sweetpepper Bush, *Clethra alnifolia*
Virginia Creeper, *Parthenocissus quinquefolia*
Wild Rice, *Zizania aquatica*

Trees

Ailanthus, *Ailanthus altissima*
American Beech, *Fagus grandifolia*
American Elm, *Ulmus Americana*
Arrowwood, *Viburnum dentatum*
Black Cherry, *Prunus serotina*
Black Locust, *Robinia pseudoacacia*
Black Oak, *Quercus velutina*
Eastern Hemlock, *Tsuga Canadensis*
Norway Maple, *Acer platanoides*
Pin Oak, *Quercus palustris*
Red Maple, *Acer rubrum*
Red Oak, *Quercus rubra*
Sassafras, *Sassafras albidum*
(Trees continued)
Staghorn Sumac, *Rhus typhina*

Sugar Maple, *Acer saccharum*
Sweetgum, *Liquidambar styraciflua*
Tuliptree, *Liriodendron tulipifera*
White Oak, *Quercus alba*
White Pine, *Pinus strobus*

Fish

American Shad, *Alosa sapidissima*
Atlantic Needlefish, *Strongylura marina*
Atlantic Tomcod, *Microgaus tomcod*
Banded Sunfish, *Enneacanthus obesus*
Black Sea Bass, *Centorpristtis striata*
Bluefish, *Pomatomus saltatrix*
Bluegill, *Lepomis macrochirus*
Carp, *Cyprinus carpio*
Chain Pickerel, *Esox niger*
Common Shiner, *Luxilius cornutus*
Eastern Silvery Minnow, *Hybognathus regius*
False Albacore, *Euthynnus alletteratus*
Hogchoker, *Trinectes maculates*
Juvenile White Perch, *Morone Americana*
Killfish, *Fundulus heteroclitus*
Largemouth Bass, *Micropterus salmoides*
Mud Sunfish, *Acantharcus pomotis*
Northern Kingfish, *Menticirrhus saxatilis*
Northern Puffer, *Spherooides maculates*
Pumpkinseed Sunfish, *Lepomis gibbosus*
Redbreast Sunfish, *Lepomis auritus*
Sheepshead Minnow, *Cyprinodon variegates*
Shortnose Sturgeon, *Acipenser brevirostrum*
Silver Perch, *Bairdiella chrysoura*
Smallmouth Bass, *Micropterus dolimieu*
Spanish Mackerel, *Scomberomorus maculates*
Spottail Shiner, *Notropis husdonius*
Stargazer, *Astroscopus guttatus*
Striped Bass, *Morone saxatilis*
Striped Killfish, *Fundulus majalis*
Windowpane Flounder, *Scophthalmus aquosus*
Winter Flounder, *Pleuronectes americanus*

Mollusks

Bay Scallop, *Aequipecten irradians*
Channeled Whelk, *Busycon canaliculatum*
Common Oyster, *Crassostrea virginica*
Knobbed Whelk, *Busycon carica*
Lobed Moon Shell, *Polinices duplicatus*
Ribbed Mussel, *Modiolus demissus*
Salt Marsh Snail, *Melampus bidentatus*
Soft-Shell Clam, *Mya arenaria*
Surf Clam, *Spisula solidissima*

Reptiles

Bog Turtle, *Clemmys muhlenbergii*
Common Map Turtle, *Graptemys
geographica*
Eastern Box Turtle, *Terrapene Carolina*
Eastern Painted Turtle, *Chrysemys picta
picta*
Garter Snake, *Thamnophis sirtalis sirtalis*
Northern Water Snake, *Nerodia sipedon
sipedon*
Ribbon Snake, *Thamnophis sauritus
sauritus*
Spotted Turtle, *Clemmys guttata*

Amphibians

American Toad, *Bufo americanus*
Green Frog, *Rana clamitans*
Northern Grey Tree Frog, *Hyla vericolor*
Red-Spotted Newt, *Notophthalmus
viridescens*
Redback Salamander, *Plethodon cinereus*
Spotted Salamander, *Ambystoma*
Spring Peeper, *Pseudacrus crucifer crucifer*

Annelids

Clam Worms, *Nereis spp.*
Blood Worms, *Glycera spp.*
Red-gilled Mudworms, *Scolecopides
viridis*

Arthropods

Blue Crab, *Callinectes sapidus*
Fiddler Crab, *Uca spp.*
Grass Shrimp, *Hippolyte spp.*
Hermit Crab, *Pagurus spp.*
Horseshoe Crab, *Limulus polyphemus*

Long-clawed Hermit Crab, *Pagurus
longicarpus*
Mantis Shrimp, *Squilla empusa*
Northern Lobster, *Homarus americanus*
Spider Crabs, *Libinia emarginata*

Insects and Spiders

Cabbage White, *Pieris rapae*
Common Wood-Nymph, *Cercyonis pegala*
Damselfly, *Enallagma ebrium*
Dragonfly, *Anax junius*
Eastern Swallowtail, *Papilio polyxenes*
Horse Fly, *Tabanus atratus*
House Mosquito, *Culex pipiens*
Mayfly, *Ephemeroptera spp.*
Monarch, *Danaus plexippus*
Painted Lady, *Vanessa cardui*
Tiger Beetles, *Cicendella hirticollis*
Water Boatman, *Arctocorixa interrupta*
Water Strider, *Gerris marginatus*
Whirligig Beetles, *Dineutes americanus*

Birds

American Crow, *Corvus brachyrhynchos*
American Robin, *Turdus migratorius*
Blue Jay, *Cyanocitta cristata*
Bufflehead, *Bucephala albeola*
Canada Goose, *Branta canadensis*
Common Loon, *Gavia immer*
Common Merganser, *Mergus merganser*
Double-crested Cormorant, *Phalacrocorax
auritus*
Downy Woodpecker, *Picoides pubescens*
Glossy Ibis, *Plegadis falcinellus*
Great Horned Owl, *Bubo virginianus*
Mallard, *Anas platyrhynchos*
Northern Cardinal, *Cardinalis cardinalis*
Red-tailed Hawk, *Buteo jamaicensis*
Ruddy Duck, *Oxyura jamaicensis*
Starling, *Sturnus vulgaris*
(Birds continued)
Wood Duck, *Aix sponsa*

Mammals

Eastern Chipmunk, *Tamias striatus*

Eastern Cottontail Rabbit, *Sylvilagus
floridanus*

(Mammals continued)

Eastern Gray Squirrel, *Sciurus carolinensis*

Eastern Mole, *Scalipous aquaticus*

Northern Flying Squirrel, *Glaucomys
sabrinus*

Raccoon, *Procyon lotor*

White-Footed Mouse, *Peromyscus leucopus*

5. Activity Sheets

The following section includes all of the handouts mentioned in the lesson plans throughout Wonderful Watersheds which may be photocopied for classroom use.

1. Surveying Our Surroundings
2. Tree Profile
3. Forest Data
4. Water Observation

Surveying Our Surroundings

Name: _____


Date: _____

Location: _____

Directions: While you are in this natural environment please sharpen your observation skills. Go slowly, open your eyes and your ears, close your mouth, do not touch anything you are unfamiliar with and please do not take any living souvenirs, like leaves or bugs.

Find a comfortable place to sit. Describe what you see, hear, and smell in this environment.

Observe something closely and draw a picture of it below.



Find 3 objects in your environment. Describe how they feel- their textures.

Does this environment look healthy to you? Explain why or why not?

Fill in the boxes below with some living and non-living things that you see.

Living	Non-Living

Look for a relationship between a living thing and a non-living thing. Describe it below.

What would you like to know about this environment? What are you curious about?

Tree Profile Sheet

Name: _____ Date: _____

Location: _____

Choose one tree in this forest that you find interesting and answer the questions below. View the tree from a distance. Describe the general shape and size below.

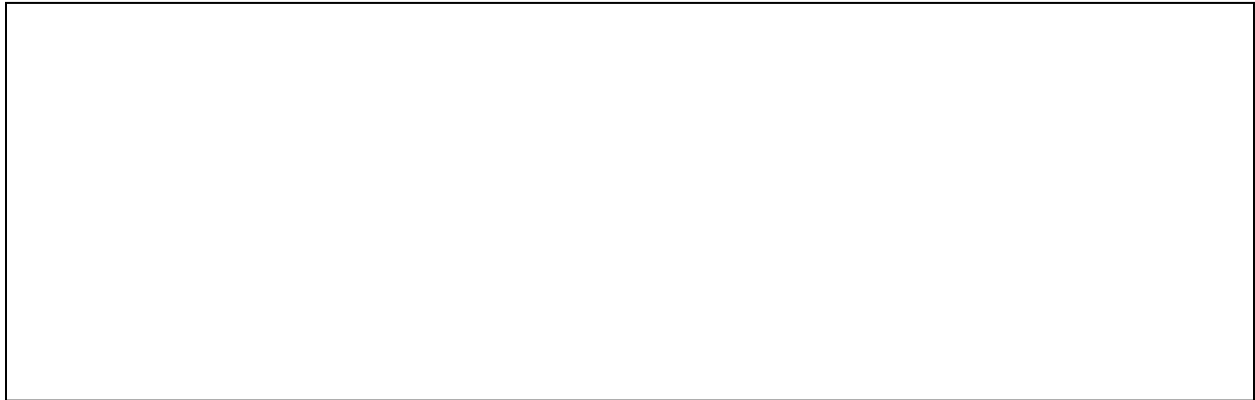
Describe the texture of its bark, leaves, and branches.

Describe the leaf and/or fruit of the tree. Find a leaf off the ground near the tree. Write down the properties that describe your leaf. Look at the edges of the leaf, are they smooth or pointy? Does this leaf remind you of anything?

Are there any animals or signs of animals near your tree? Look for holes, nests, or trails.

What unique features does your tree display? (scars or marks).

Draw a detailed sketch of your tree, its leaf, and its fruit in the space below.



How tall is your tree?

Can you estimate how tall it is? Your prediction: _____

Measure the height of the tree

Walk away from the tree until you can hold onto your ankles and look through your legs and see the top of the tree. Then turn around and measure the number of meters back to the tree.

Results: _____

How big is the trunk? Find the circumference of the trunk. Wrap a string around the bark, then measure the string.

Record Your Results: _____

How big are the leaves? Measure the length and width of your leaf.

Length: _____ Width: _____

How big is the stem of the leaf? Measure the length of the stem.

Length: _____

Does this tree look healthy to you? Explain why or why not.

What questions do you have about this tree?

Forest Data Sheet

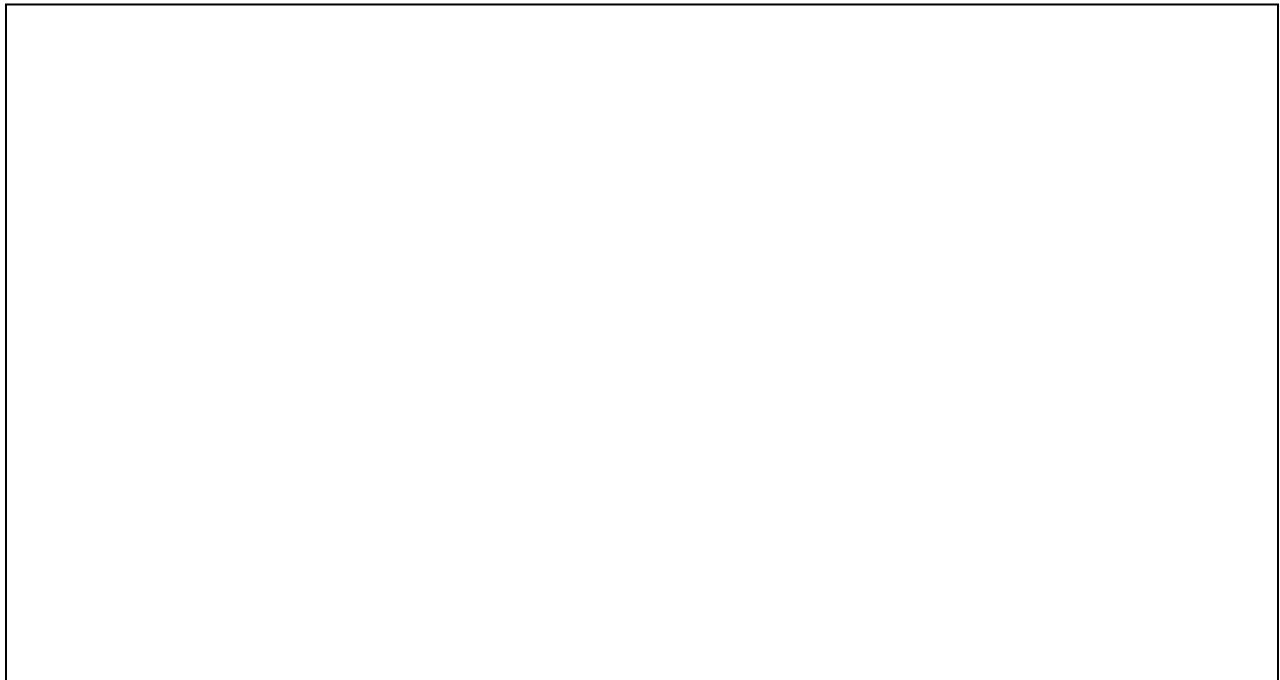
Name: _____ Date: _____

Location: _____

Directions: While you are in this urban forest please sharpen your observation skills. Go slowly, open your eyes and your ears, close your mouth, do not touch anything you are unfamiliar with and please do not take any living souvenirs, like leaves or bugs.

Describe what it feels like to be in the forest. How is this different from a tree-lined city street?

Draw a detailed picture of the forest in the space below. Label the 5 different layers.



In the chart below, list the animals you see. What layer do you think they live in?

Animals	Forest Layer

List two ways that humans have changed or impacted this forest.

Water Observation

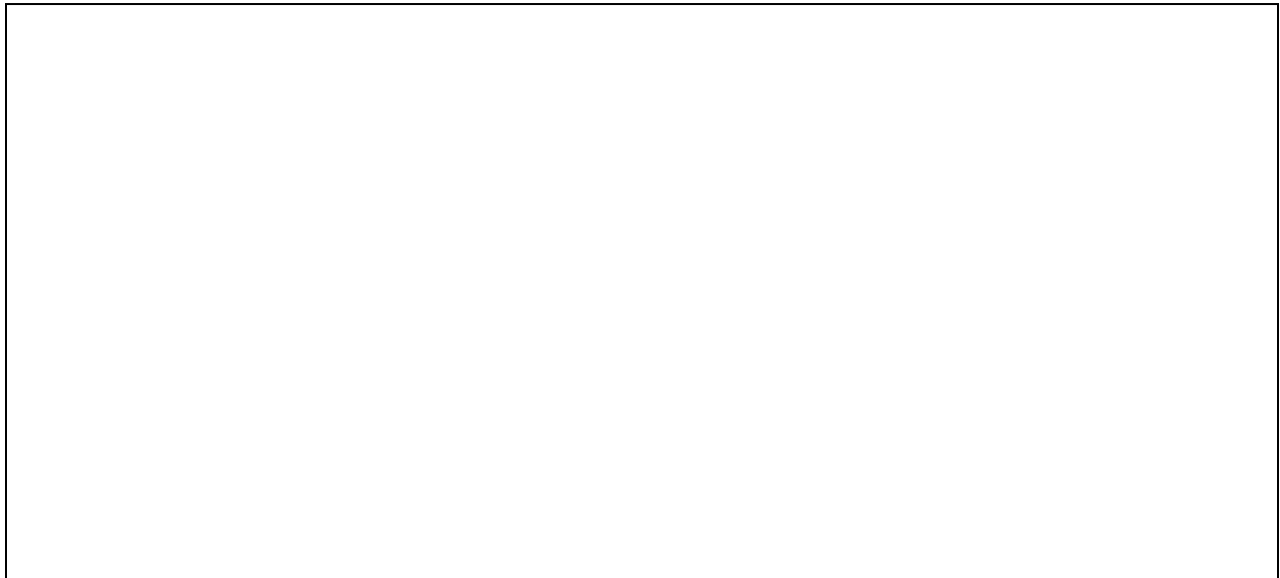
Name: _____ Date: _____

Location: _____

Directions: While you are in this natural environment please sharpen your observation skills. Go slowly, open your eyes and your ears, close your mouth, do not touch anything you are unfamiliar with and please do not take any living souvenirs, like snails or fish.

Look closely at your body of water. Describe what you see, hear, and feel. Is the water moving? What color is the water? What type of water body is this?


Draw a picture of your water body and the environment that surrounds it in the space provided below.



About how many animals do you see in or around this body of water? _____

How many different types of animals do you see in or around this body of water?

Draw or describe one of the animals in the space below.



List two ways that humans have changed or impacted this body of water.

What questions do you have about this body of water?

Section V. Watershed Resources

Websites

A Hudson River Portfolio: <http://www2.nypl.org/home/Hudson>

Center for Watershed Protection: <http://www.cwp.org/>

City Parks Foundation: <http://www.cityparksfoundation.org/>

eNature.com: <http://www.enature.com/localguide>

EPA: Surf Your Watershed: <http://www.epa.gov/surf/>

Give Water a Hand: <http://www.uwex.edu/erc/gwah/index.html>

Ground Water: <http://www.groundwater.org/>

Metro Forest Council: <http://www.metroforestcouncil.org>

NYC Department of Environmental Protection: <http://www.ci.nyc.ny.us/html/dep/home.html>

NYC OASIS: <http://www.oasisnyc.net/>

NYC Soil and Water Conservation District: <http://www.nycswcd.net/>

New York/New Jersey Harbor Estuary Program: <http://www.harborestuary.org/>

Oysters are Cool: <http://www.wsg.washington.edu/oysterstew/cool/oystercool.html>

The River Project: <http://www.riverproject.org/>

Trees New York: <http://www.treesny.com>

Children's Books:

Asch, Frank, Water, Harcourt, New York, 1995 (Grades K-3)

Caduto, Michael J. and Joseph Bruchac, Keepers of the Earth, Fulcrum Publishing, Golden, CO, 1988.

Cherry, Lynne, A River Ran Wild, Harcourt Brace and Co. New York

Cole, Joanna, The Magic School Bus at the Waterworks, Scholastic Inc. New York. 1986

Dorris, Arthur, Follow the Water from Brook to Ocean, Ill. Bruce Degan, Scholastic, New York, 1996

- Geisel, Theoder Seuss, The Lorax, Random House. New York, New York, 1971.
- Hooper, Meredith, River Story, Ill. Bee Willey, Candlewick, Cambridge, 2000
- MacDonald, Fiona, Water, Ill. Peter Bull, Sarah John & Carolyn Scrace, Franklin Watts, New York, 2000
- McKinney, Barbara Shaw, A Drop Around The World, Ill, Michael Mayday, Dawn Pub., Nevada City, 1998 (Grades 3-5)
- Parker, Steve, Eyewitness Books: Fish, Knopf, New York, 1988, 2002
- Pfeffer, Wendy, What's it Like to be a fish? , Ill. Holly Keller, Harper Trophy, New York, 2000

Teachers' Books:

- La Rocco, Barbara. Going Coastal – A Guide to the Waterfront, Going Costal Inc. New York. 2003
- Outwater, Nancy. Water. Basic Books. NY. 1996.
- Silverstein A, Silverstein B., A World in a Drop of Water: Exploring With a Microscope
- Stanne, Stephen, et al., The Hudson: An Illustrated Guide to the Living River, Clearwater, Inc. c/o Rutgers University Press, New Brunswick, 1996
- Walden, John. Heartbeats in the Muck