

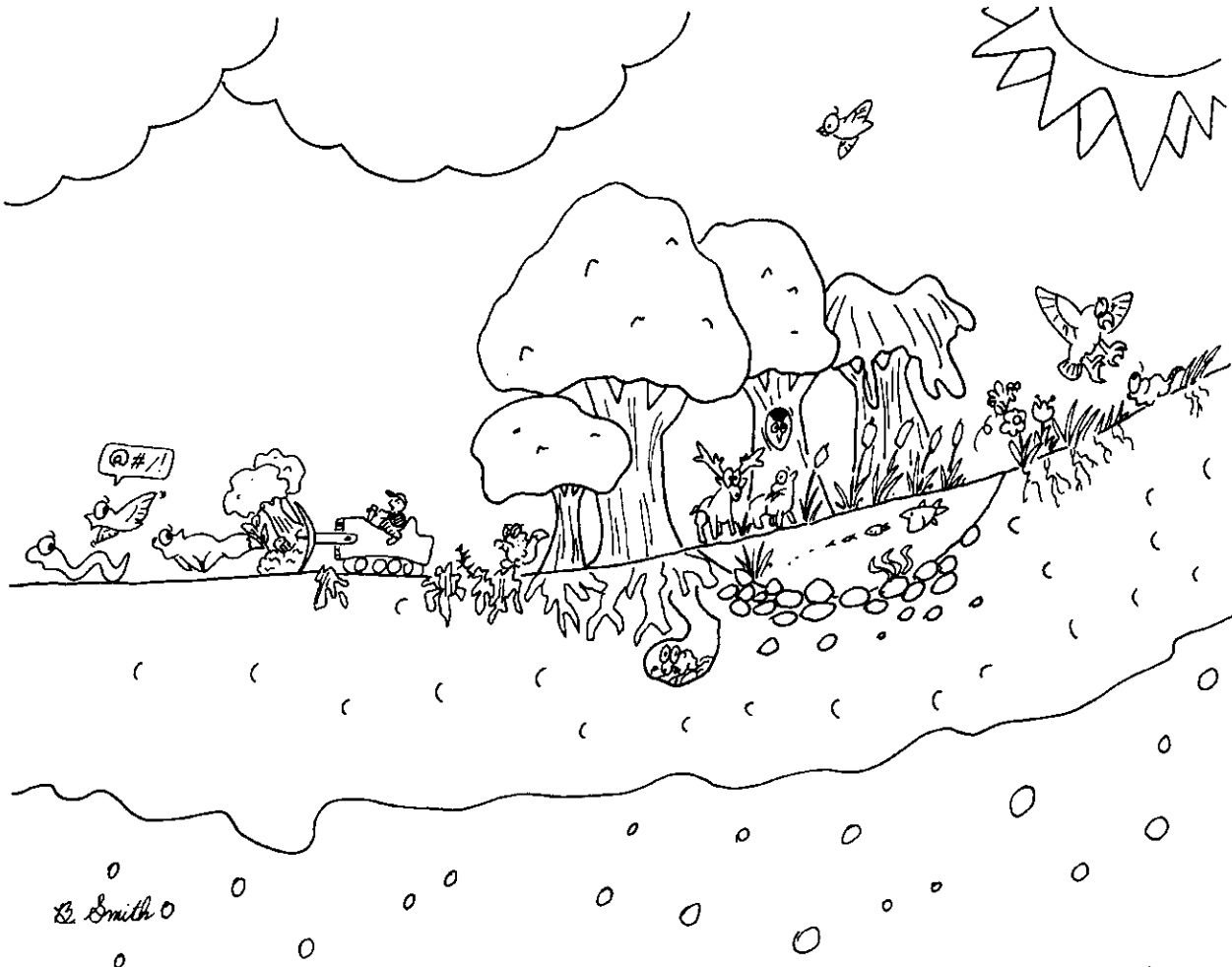


A PERSPECTIVE ON CONNECTIONS

The biotic community and its abiotic environment function as a system and the manner in which they occur sets the stage for a diverse world. Within an ecosystem each biological component fills a certain niche. That is, each species does a specific job unique to that species. For example, beavers fell trees, build dams and lodges, that, in the process, change water flow patterns; turkey vultures scavenge for carrion along roadsides which helps to manage road kills, and the milkweed leaves eaten by monarch caterpillars make those butterflies distasteful to predators. Animals and plants can be defined by their niche much the same way a person is defined by personality or profession.

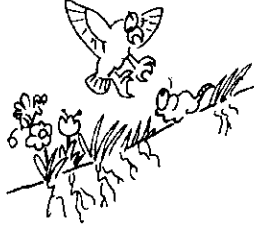
Food, water, shelter, and space are limited commodities which support a set number of organisms. Therefore, there is a certain amount of competition for these habitat resources. Failure to acquire these life needs may result in a species death or the inability to reproduce which is, in essence, a genetic death.

Biotic organisms exhibit various relationships and connections. The basic way all living things are connected is through food. All living things must eat or produce



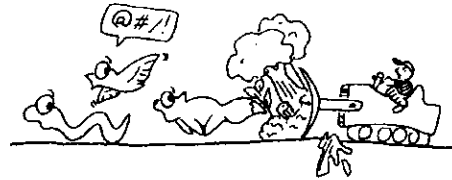
A Perspective on Connections

food. Some organisms are the eaters and others are the eaten. Predator/prey relationships are a study in balance. Besides food connections, two species can be a part of a symbiotic relationship where the organisms exist closely and one or both benefits from the association. Mutualistic relationships exist when benefits are gained by all species involved. Saprophytic relationships occur when one participant benefits with no cost to the other and parasites benefit while harming their host. Other creatures or plants may live on another organism as an epiphyte, while still others rely on organisms for transporting them from one place to another (barnacles on a whale).



Abiotic factors also create and/or affect natural connections. The amount of rainfall, the intensity of wind and sunlight, air and water temperature — all have effects on organisms that inhabit the earth's ecosystems. Many of these natural phenomena affect only local and regional systems although substantial alterations of the system may ripple out to encompass larger areas including watersheds and drainage basin systems.

Humans are intricately woven into these systems and human behaviors can affect the environment on a global scale. Scientists cite deforestation as a reason for increased levels of carbon dioxide in the atmosphere, and forest fragmentation from development is a reason why brown headed cowbirds can penetrate into the forest deeper and lay their eggs in the nests of migrant songbirds, thus decreasing their number of offspring.



All of these interrelationships make up the dynamic systems that support and determine life on the planet. Nothing works in isolation.

LESSON 10

A Perspective on Connections

GOAL To discover how connections between natural and human communities are portrayed in natural history literature and how these connections apply to the study of the watershed.



TIME

- (3) 45-minute periods
- independent reading time

OBJECTIVES Students will:

- ✓ read natural history literature to identify biotic and abiotic interdependencies
- ✓ identify and describe connections within an ecosystem
- ✓ identify which of these connections relate to the human community
- ✓ relate how these connections further the understanding of “watershed”

SKILLS identify, analyze, compare, synthesize, justify

VOCABULARY abiotic
biotic
interdependency
niche

PRIOR KNOWLEDGE Students should have background in:

- the workings of the water cycle
- the basics of a watershed system
- an understanding of biotic and abiotic relationships


MATERIALS

- Sample Literary excerpt (Figure 10A)
- Literary excerpts (Figures 10D - 10G) or a book selected from the Reference section of this lesson.

PREPARATION

1. Make one copy of Figure 10A for each student.
 2. Choose an additional literary excerpt from the samples (Figures 10D through 10G and make one copy of that selection for each student).
- Option: Choose a book from the Reference section for this lesson for the students to read.

**CORE CURRICULUM
CONTENT STANDARDS**

- Cross Content Workplace Readiness 3 (8-10,12) 4 (2,10)
- Language Arts 3.1 (14,15) 3.2 (8-11) 3.4 (17,19,21,22,24,28,30,31,32)
- Math 4.1 (12)
- Science 5.1 (4-7,9) 5.6 (11,17) 5.12 (7,8)
- Social Studies 6.2 (10,11) 6.9 (6-8)



**PROCEDURE****Period 1**

1. Review the definitions of biotic and abiotic.
2. Read Figure 10A (or the first chapter of the selected book) as a class with the intent of identifying biotic and abiotic factors.
3. Discuss with the students what natural history connections are and compile a list of those connections in the selection. (See Figure 10B)
4. Demonstrate how these connections and interdependencies can be illustrated through a flow chart, web map, or Venn diagram. (Figure 10C)
5. Distribute the second selection to each student.
6. Have each student read the excerpt (as homework or independent reading time). Ask them to create a list of the biotic and abiotic connections they identify.

Period 2

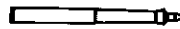
1. Divide the class into smaller groups.
2. Have each group come up with their "Top 10" connections based on their individual lists. In addition, have them create a visual form that represents the connections (using a flow chart, web map, etc.)
3. Have each group present their information to the class along with their justification of the connections and how these biotic and abiotic factors relate to the watershed.

Period 3

1. Display each group's visual form on a bulletin board. Using push pins and string expand the connections between charts.
2. Discuss the points where people fit into these connections. Mark each strand that involves humans with colored tape or ribbon.
3. Discuss how these connections fit in with the concept of "watershed" [*everything lives in a watershed, specific actions have direct / indirect consequences on other aspects of the environment*]

**FURTHER DISCUSSION**

1. How did the author use language to persuade the reader of his / her position?
2. What point was the author trying to make?
3. Why do people write about nature?
4. What impact can people have on individuals and society by writing about nature?

**ASSESSMENT**

Provide the students with an outdoor experience on the school grounds or during a field trip. Have the students write a literary piece based on their impressions of the habitat. Have them focus on the biotic and abiotic factors and their connections with the watershed.

EXTENSION

Have the students select one part of a connection and write this on a card (e.g., sun, tree, soil, fire, caterpillar, etc.). Designate a student (or the teacher) to pass the ball of string from student to student as they create connections. Have each student read aloud his / her connection, identify another student whose element card connects with theirs and pass the yarn to that student. Continue until all students are connected.

EMPOWERMENT CHALLENGE

Do a schoolyard inventory of the natural and built environment. Have the students identify and list what they find and begin making connections to how these work within the watershed.



LESSON 10 A Perspective on Connections (continued)**LESSONS FROM OTHER SOURCES**

Aquatic Project WILD - Blue Ribbon Niche

Bridges to the Natural World - The Eco-Connection

Project Learning Tree - Field Forest, and Stream

Project WET - Dust Bowls and Failed Levees

Project WILD - Carrying Capacity
Sourcebook for Watershed Education - Teaching Flood Literature, Journal Writing: Henry David Thoreau, 1817-1862, Literature and Journal Writing Activity

WOW! The Wonders of Wetlands - Marsh Market

REFERENCES

Control of Nature - John McPhee

Encounters with the Archdruid - John McPhee

Fields of Sun and Grass: An Artist's Journal of the New Jersey Meadowlands - John Quinn

Ishmael - Daniel Quinn

An Island Out of Time - Tom Horton

The Kingbird Highway - Kenn Kaufman

Last of the Curlews - Fred Beston

Life and Death of a Salt Marsh - John and Mildred Teal

The Meadowlands: Wilderness Adventures at the Edge of a City - Robert Sullivan

A Naturalist Along the Jersey Shore - Joanna Burger

Never Cry Wolf - Farley Mowatt

The Night Country - Loren Eiseley

Noah's Garden - Sara Stein

The Outermost House - Henry Beston

The Pine Barrens - John McPhee

A Sand County Almanac - Aldo Leopold

The Sea Around Us - Rachel Carson

Silent Spring - Rachel Carson

Wanderings - Ken Weber

Wild America - Roger Tory Peterson and James Fisher

Wildlife in America - Peter Matthiessen

The Wind Masters - Peter Dunne

NOTES

Figure 10A

The Pine Barrens

"Fire in the pines is never spontaneous, and lightning sets only about one per cent. There is an area in the northeastern part of the woods where most of the lightning fires begin, probably because there is a concentration of iron deposits there. It is supposed that the Chatsworth Fire started when a cigarette was tossed away by one of a group of woodcutters who were clearing the cedar swamp where the fire began. Carelessness is the cause of many fires, but not to the overwhelming extent that one might imagine. A remarkably common cause of fire in the pines is arson. Standing in all that dry sand, the forests glisten with oils and resins that – to some people – seem to beg for flame. Oak leaves in forests that are damp and rich are different from Pine Barrens oak leaves, which have so much protective oil concentrated within them that they appear to be made of shining green leather. The ground soaks up rainfall so efficiently that the litter on its surface is, more often than not, as dry as paper. In the sand soil, there are no earthworms and few bacteria to consume the litter, and it piles up three and four inches deep....

"Of all the natural phenomena of the Pine Barrens, the most startling one is the speed with which the vegetation comes back from fire. There has been so much fire in the pines for so many centuries that, through the resulting processes of natural selection, the species that grow there are not only highly flammable but are able to tolerate fire and come back quickly. There are only three kinds of pines in the United States that respond to fires by putting forth sprouts. Two of these – the pitch pine and the short-leaf pine predominate in the Pine Barrens. (The other, the Chihuahua Pine, grows in New Mexico.) The sprouts develop from dormant buds in the trunks and larger limbs, and soon after the fire dies down, out they come. All over the woods are pine trees with splendid green crowns and trunks that are still black from old fires. Oaks that are burned usually die at the top, but they re-shoot from the roots....

"It is because of fire that pines are predominant in the Pine Barrens. There is thought to be a progression in the development of any forest from pioneer species to climax trees. Most ecologists agree that if fire were kept out of the Pine Barrens altogether, the woods would eventually be dominated by a climax of black oaks, white oaks, chestnut oaks, scarlet oaks, and a lesser portion of hickories and red maples. In some areas, oaks dominate now. Fire, however, has generally stopped the march of natural progression, and the resulting situation is one that might be called biological inertia – apparently endless cycles of fire and sprouting. Fire favors the pine trees because they have thick bark that provides insulation from high temperatures, and also because burned ground is just about perfect for pine seedbeds. Oaks lose vigor when they are repeatedly burned".

Excerpt from *The Pine Barrens*. Copyright © 1967 by John McPhee.
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Figure 10B (Teacher's Version)

Underlined words and phrases give examples of biotic and abiotic connections.
Words or phrases in italics give examples of human connections through behavior.

The Pine Barrens

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Figure 10C - SAMPLE STORY MAP
The Pine Barrens

