Temperate Forest Management Unit
Lowell Area Schools
Wittenbach Agriscience Center
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Focus group: high school students (particularly “At-Risk” or “alternative” students)
Time frame: 2 block periods per week for 2 months (16 class periods)
Goals of the unit:
- To provide the district with a brochure which indicates species diversity
- To encourage the development of stewardship in the alternative students
- To provide natural resources education
- To properly manage the area, per the Land Conservancy

Background Information:
The land adjacent to the school site is land conserved by the land conservancy of West Michigan. A family of sportsmen managed this land for two generations. This 61-acre plot boasts a stream containing native trout, a wetland, a prairie, a pine plantation and several fruiting (non-native) shrubs to bring in woodcock and other fowl.

This land is used by the school system and community as a preserve and as part of this study, we would like to organize and print a detailed brochure for the public which highlights some of the unusual plants (jack-in-the-pulpit, nodding trillium, etc.) and animals in the area.

All students in the district use this property as well as a neighboring 80 acres for the study of Agriscience (natural resources, forestry, etc.) as well as Ecology and Environmental studies. The 3-classroom facility was provided for the community to develop stewardship of the area in an experiential way, which is the focus of this unit.

Topics of Study:
- Natural Resources Management
- Ecological diversity
- Sustainable Forestry
- Preservation
Materials:
- Natural Resource Professional (Mr. Tom Nederveld, Kent County Conservation District)
- "A Sand County Almanac" by Aldo Leopold
- America’s Forests”, a video by Doug MacCleary
- Student journal
- Various keys and nature guides
- Biltmore sticks

Students will discuss various vocabulary related to forestry (silviculture, natural resources). We will take a broad look at public opinion of natural resources and the differences in preservation and management. This broad look will be taking a public survey via the Lowell ledger, our town newspaper. Using the research of the town’s people’s opinions, detailed observations (including a species’ diversity study and list) of our own natural area, research information of different options of management, students will start making a plan of HOW best to manage this area.

Some key questions to focus on:
WHAT are different types of management?”
WHAT are the differences between renewable and nonrenewable resources?
WHY might resource consumption be a problem?
WHAT is the difference between preservation and stewardship?
WHAT values do forests provide for our society?
WHAT organisms does this forest provide habitat for?
WHAT endangered species might live here?

The students will then present their plan of management and species diversity list to the Land Conservancy of West Michigan as well as the Natural Resource Professional. Using the feedback from all parties, students will make adjustments to their plan. HOW
does this fit in with the needs of the community? HOW does Economics affect Ecology?

Students will next make an artistic representation of species diversity list for both flora and fauna in the area by artistically deriving a map for the community which highlights various organisms and where they are located along the hiking paths in the preserve area. Using the management plan final draft, students will hire professional foresters and oversee the cutting of the trees. Is clear-cutting the right thing to do? How did the original planting affect the growth of the trees and habitat of organisms in the area? Finally, students will write an article for the Lowell Ledger responding to the survey and highlighting the habitat work, the economic gains for the school and the reasoning behind their management practices.

Assessment Tools:
- Diversity map (Is it complete? Is it accurate? Is it neat and clear?)
- Journals (self evaluative, but did the students complete them on a regular basis?)
- Article for the ledger (Does the article highlight the important points of the study? Does it present information that is clear to the public?)
- Management plan (Does this plan take into account the Ecology of the area? Were decisions supported with sound, factual science and agriscience?)

Michigan Essential Goals and Objectives for Science Education:
- Constructing #15, 20, 21
- Reflecting #11, 13, 15
- Using (Cells)# 6, 7, 9, 10
- Using (Living Things) # 12, 13,
• Using (Evolution) #5
• Using (Ecosystems) # 13, 14, 15, 16, 17, 18
• Using (Earth and Space) # 14
• Using (Hydrosphere) # 10
**Temperate Forest Management Vocabulary**

**A**

Abiotic-Nonliving components of the environment  
Adaptive Management-Driving forest management with the scientific research. This requires excellent monitoring, and feedback loops to quickly put new knowledge into practice on the ground.  
Agroforestry-The combined production of both crops and trees to maximize water efficiency.

**B**

Best Management Practices (BMP)-A forestry practice or combination of practices, determined by a state to be the most effective means of preventing or reducing the amount of no point source pollution in order to protect streams and water quality.  
Biological Diversity-The variety and complexity of species that are present and that interact in an ecosystem, plus the relative abundance of each.  
Biota-All living animals and plants.

**C**

Cambium-A single layer of cells between the woody part of the tree and the bark. Division of these cells results in diameter growth of the tree through the formation of wood cells (xylem) and inner bark (phloem).  
Canopy- The forest cover of leaves, branches, and foliage formed by tree crowns. There may be several canopy layers.

**D**

DBH- The diameter of a tree as measured at breast height. Standard dbh is measured at 4.5 feet above the ground.  
Deciduous- the term applied to trees, commonly broadleaf, that usually shed their leaves annually. It is an adaptation to prevent excessive water loss by transpiration when water is scarce. Also known commercially as "hardwoods."
E
Eco- this prefix comes from the Greek “Oikios” which mean house.
Ecological Succession- The changes, over time, in the structure and the
function of an ecosystem. When no previous vegetation exists on a site,
the process is called primary succession. When a site supported
vegetation previously but was disturbed, the process is called secondary
succession.
Endangered Species- Species that are likely to become extinct.
Exotic Species- A species that is not native to the ecosystem; also know
as invader species.

F
Feller-Buncher- a machine which fells using a mechanical shear or a disc
saw as an attachment. A feller-Buncher may accumulate several trees
before creating just the right size bunch for a grapple skidder to take to
the landing. A mechanical delimber or a whole tree chipper might be
waiting at the landing to further process the tree.
Forestry- The art, science, and practice of managing forest landscapes to
provide a sustained production of a variety of goods and services for
society.

G
Guiding Principles- The “core values” which ensure the rightness of
your direction. While only a vision can give you direction, values ensure
that you are the right plan.
Gymnosperm- any class of seed plants, mostly trees such as conifers,
that produce naked seeds not enclosed fruit.

H
Habitat- The area that provides an organism with adequate food, water,
shelter, and living space, and/or the conditions of that environment
including the soil, vegetation, water and food.
Hardwood- A deciduous or broadleaf tree; also applies to the wood
from such trees.
K
Keystone species - Species that play roles affecting many other organisms in the ecosystem.

M
Multiple-use Management - The practice of managing forest resources for a variety of simultaneous uses and benefits including water, forage, wildlife habitat, wood, recreation, wilderness, and minerals.

N
Niche – The place and function of a species in an ecosystem.
Nonrenewable Resource – A resource that is in limited supply and doesn’t have the capacity to be replaced through natural processes, at least not for many thousands of years. Fossil Fuels are a nonrenewable resource.

O
Old Growth – To most older people “old growth” means big trees. The U.S. forest Service definition is “a forest with trees 200 years or older, snags (standing dead trees), and down woody debris on the forest floor”

P
Phloem – A layer of plant tissue just inside the bark that transports food (dissolved Nutrients) from the leaves to the stem and roots.
Photosynthesis – Complex Process that takes place in cells of green plants. Radiant energy from the sun is used to combine carbon dioxide (CO2) and water (H2O) to produce oxygen (O) and carbohydrates (such as glucose) and other nutrient molecules.

Q
Quarter Saw- To saw a log into quarters lengthwise and then into boards in order to show the wood grain to advantage.

R
Renewable resources- a resource that has the capacity to be replaced through natural processes. Trees are a renewable resource.
S
Sapwood- The younger wood nearer to the surface of the tree, which does not have the natural extractives (chemicals) to prevent decay.
Silviculture- The art and science of growing and tending a forest (managing stands of trees to achieve desired outcomes relative to species composition and stand structure).
Softwood- A coniferous tree. The term softwood is commonly used but not strictly accurate; the wood of many conifers is harder than that of some so-called hardwood trees.
Stewardship – The concept of responsible care taking; the concept is based on the premise that we do not own resources, but are managers of resources and are responsible to future generations for their condition.
Stoma – A small opening found in the epidermal layer of plants, allowing access for carbon dioxide and the release of water. Stomata are surrounded by guard cells that control the opening size.

T
Transpiration – The process by which the plants absorb water from their roots, move it up through the plant (via the xylem), pass it through pores (stomata) in the leaves and other plant parts, and then evaporate it into the atmosphere as water vapor.

U
Under story – The layer formed by the crowns of smaller tree in forest.
Uneven-aged Stand Management – The Practice of managing a forest for various age classes by periodically selecting and harvesting individual trees of groups of trees.

W
Wilderness Area- An area established by the federal government to be managed and preserved in an essentially untouched condition.

XYZ
Xylem – The principal strengthening and water-conduction woody tissues of stems, leaves, and roots.