

Educational Connections

Berlin School Forests Curriculum Key Concepts

Following the completion of the Berlin Community School Forest Hands-On Learning Project WEEB grant in 2004, the Berlin Area School District administration and teaching staff adopted the Learning, Experiences, and Activities in Forest (LEAF) conceptual framework as our school forest curriculum framework. **The LEAF concepts/sub-concepts are the key concepts for our school forest program which all school forest curriculum development centered around. (SEE LEAF Conceptual Guide to K-12 Forestry Education in Wisconsin)**

The teaching staff identified activities and/or outdoor experiences which are taught at their specific grade curriculum that would successfully teach students the sixty identified LEAF sub-concepts. Additional lessons and activities were then added to fulfill all LEAF sub-concepts including classroom activities and field extensions from the LEAF lesson guides and other outdoor education guides. The district staff followed the suggested scope and sequence outlined in the LEAF conceptual guide, aligned lessons with the state standards, and created a new mandatory school forest curriculum to be taught at a school forest location with classroom activities as pre/post school forest visit enhancements.

In addition, two graduate level LEAF courses were taught in Berlin, training about 40 K-8 staff members in using the LEAF activity guides appropriate to their teaching level; thus, updating the school forest activities and outdoor experiences taught in their curriculum.

The final result is a forestry based school forest curriculum including classroom and outdoor field experiences at the Berlin School Forests. The curriculum does expand into many other environmental topics such as waters, soil, and air quality; however, it uses forestry as a central theme. The district's goal is to produce environmentally literate students in all aspects with a strong backbone in forestry and its impact in Wisconsin.

Berlin School Forest K-12 Forestry Curriculum Scope and Sequence of LEAF Concepts

LEAF CONCEPTS	GRADE LEVEL
1. Forests are ecosystems characterized by a dominance of tree cover and include other organisms (e.g., other plants, animals).	K, 1, 2, 4, 5, 7, 8, 9-12
2. Forest differ in composition (species within a forest) and structure (layers in a forest). These are both affected by biotic (e.g., animals, plants) and abiotic (e.g., soil, moisture, sunlight, climate) factors	K, 1, 2, 3, 4, 5, 7, 9-12
3. Forests are renewable resources. They can be used and regenerated at regular intervals. The complexity of the forest ecosystem and intensity of disturbance affects the rate of renewal.	K, 1, 2, 3, 4, 5, 7, 9-12
4. Different forest biomes exist around the world. Some examples include tropical forests, temperate forests, and boreal forests. Most Wisconsin forests are temperate forests but some boreal forests exist in the extreme northern region.	5, 6, 7, 9-12
5. Different forest types exist within a biome. Forest types are defined by their dominant vegetation. Some of the forest types in Wisconsin include coniferous, deciduous, and deciduous and coniferous mixes.	5, 6, 7, 9-12
6. Trees are perennial plants (live more than one growing season) with a well-defined woody stem, crown, and roots.	K, 1, 2, 5, 6, 7, 9-12
7. Trees compete for nutrients, sunlight, space, and water.	K, 1, 3, 4, 5, 6,7, 9-12
8. Trees have a life cycle that includes germination, growth, maturity, reproduction, decline, and death.	1 Intro., 3, 5, 6, 7, 9-12
9. As part of the forest community, trees have various roles (e.g., providing habitat, holding soil). The presence of trees alters the surrounding environment.	5 Intro, 6, 7 Intro, 8, 9-12
10. Ecosystems are self-sustaining and self-regulating communities. They vary according to their structure, function, and pattern of change.	9-12
11. Ecosystem structure consists of different types of organisms (i.e., producers, consumers, decomposers) interacting with one another and their environment. Humans are part of ecosystems.	1 Intro, 2, 3, 4, 5, 6, 8, 9-12
12. Ecosystems functions include the fixation of energy through the process of photosynthesis, the flow of energy through food chains and food webs, and the cycling of matter.	3 Intro, 4 Intro, 5, 6, 7 Intro, 8, 9-12
13. Ecosystems change through long-term evolution or through a relatively short-term process called succession, in which one plant community gradually supplants another.	6, 9-12
14. Ecosystems are dynamic and altered by disturbance. Disturbance plays an ongoing role in ecosystem structure and function.	5, 6, 7 Intro, 9-12
15. Forest ecosystems are interconnected with other terrestrial (e.g., prairies) and aquatic (e.g., wetlands) ecosystems.	5 Intro, 6, 7 Intro
16. Biodiversity encompasses the variety and variability of all life on earth. It is generally categorized into three levels: ecological diversity, species diversity, and genetic diversity.	5, 6 Intro, 7 Intro

17. There is biodiversity within a forest. Forests contain many communities that support diverse populations of organisms. Different forests have different levels of biodiversity.	5, 6 (Camp DNR), 8, 9-12
18. Regions of Wisconsin differ in climate and the results of glaciation. These variations lead to different forest communities with differing species and therefore contribute to biodiversity.	4
19. Wisconsin's forests provided basic resources for Native Americans and early European settlers.	2 Intro, 3 Intro, 4
20. As Europeans settled Wisconsin, forests provided jobs for a growing immigrant work force, resources for building the nation, and dollars for a new state economy.	3 Intro, 4
21. Early logging, the resultant cutover, attempts to change land use, and the reforestation of preexisting forest lands were events that lead to modern forestry.	4
22. The lumber era shaped Wisconsin's economic, cultural, social, and environmental landscapes. Influences of this time period are still visible in Wisconsin today.	4, 9-12
23. Humans value forests for their aesthetic, cultural, ecological, economic, educational, and recreational benefit	K, 1, 2, 3, 4, 5, 6 (Camp: Koch), 7, 8, 9-12
24. Individuals may place different emphases on forest values for a variety of reasons that may include wealth, health, religion, ecology, and culture.	5Intro, 6 (Camp: Koch), 7 Intro, 8
25. Forests impact air, and water quality, prevent soil erosion, and provide habitat for wildlife.	1, 2, 4, 5, 6, 7 Intro
26. Wisconsin's forest have multiple economic values, including forest products, recreation, tourism, and jobs. Forests provide a variety of raw materials for many industries.	4, 6, 7, 8, 9-12
27. Forests can shape the economic, social, and cultural composition of local communities.	4, 6, 7, 9-12
28. Humans depend of forests for products and services that they use everyday.	1, 2, 3, 4, 5, 6, 7, 8, 9-12
29. Our worldwide economic system is based on resources – both natural and human. Wisconsin forests are part of this system. Changes in the use of Wisconsin forests affect forests worldwide.	1 Intro, 3 Intro, 4Intro, 5Intro, 9-12
30. As the human population continues to grow, demands of forest resources will increase. Maintaining forest ecosystems through sustainable forestry will help perpetuate ecological systems and ensure the delivery of goods and services to society over time.	5 Intro, 6 Intro, 8, 9-12
31. Wisconsin's forests are under both private (e.g., industrial, non-industrial private forests) and public (e.g., county, state, national forests ownership).	9-12
32. Forests are large ecosystems that can cross over property lines.	5
33. The scale of forest ownership can vary from hundreds of thousands of acres in a national forest to an individual tree in an urban forest.	9-12
34. Forest management is the use of techniques (e.g., planting, harvest) to promote, conserve, or alter forests to meet desired outcomes.	1 Intro, 2 Intro, 3 Intro, 4 Intro, 7 Intro, 9-12

35. Management can lead to changes in composition, structure, and growth of forests.	7 Intro, 9-12
36. Forests can be managed for ecological (e.g., water resources, wilderness, wildlife), economic (e.g. forest products, recreation), and social (e.g. aesthetic appreciation, recreation) outcomes. Some of the outcomes are interrelated and fall into more than one category.	7 Intro, 8, 9-12
37. As global demand for forest resources increases, more pressure is placed on existing forests. Forest management and advances in research and technological systems can help to ensure forest resources remain abundant.	9-12
38. The public trust determines that governments have a role in conserving, maintaining, and sustaining forest resources by enacting laws, establishing agencies, creating public lands, and providing management incentives for private landowners.	7 Intro, 9-12
39. A variety of agencies, companies, and individuals manage forests. Forest resource professionals in each of these areas have a responsibility to meet individual and societal needs through forest management and/or education.	9-12
40. Organizations, communities, and individuals play a part in forest management efforts by volunteering, raising and allocating funds, and participating in management activities.	2 Intro, 3 Intro, 4 Intro, 8, 9-12
41. Forests can be managed for single or multiple uses. These uses may require different management methods.	9-12
42. There are environmental (e.g., forest composition, topography, endangered species), social (e.g., laws, knowledge, recreation, aesthetics), and economic (e.g. cost, return) factors that can influence management decisions.	7 Intro, 9-12
43. The type and intensity of forest management is dependent on forest type, forest ownership, parcel size, and location.	9-12
44. Management starts with planning, setting goals, and making implementation choices (e.g., planting, harvesting, conducting prescribed burns).	9-12
45. Forests can be managed sustainably. Sustainable management of forests includes maintaining forest health, productivity, diversity, and integrity for the long run in the context of human activity and use.	9-12
46. Management may have positive and negative social, economic, or ecological effects.	9-12
47. People’s perceptions of forest management decisions may differ when their beliefs, values, and knowledge (level of and consequence of choice) differ. Issues can arise from these differences. Management decisions can be affected by many factors (e.g., politics, science, emotion, economics); sometimes these factors are not weighted equally.	7 Intro
48. The use of some management techniques (e.g., fire, clearcutting) can be controversial because they have visual impact, and their current and past use is sometimes misunderstood.	9-12
49. Managing forests for multiple use can meet the needs of many users.	9-12

Some forest uses are not compatible, so conflict may arise.	
50. Science and technology contribute to the understanding of forests, the impacts of human actions on these systems, and how they can be sustained.	9-12
51. Increased demand on forest resources leads to the need for increases and improvements in management (e.g., harvest techniques, genetics), technological systems (e.g., GIS, tools), and wood utilization. Without advances in these areas, sustainability of forests is more difficult	5 Intro, 6 (Camp: DNR) , 9-12
52. Forest research and management involves professionals with backgrounds in many fields, including biology, wildlife, soils, water, land management, urban planning, engineering, sociology, geography, technology, environmental education, chemistry, and forestry.	4 Intro, 6 (Camp: DNR), 7, 9-12
53. All citizens have a responsibility to be stewards of the environment, from which human life is sustained. This includes making informed decisions about forest resources.	K, 1, 2, 3, 4, 5, 6, 7, 8, 9-12
54. A citizen, acting individually or as part of a group, can make lifestyle decisions and take a variety of actions to ensure the sustainable use of our forests. Strategies for taking action can include education, persuasion, consumerism, apolitical, legal, and eco-management.	2 Intro, 4 Intro, 5 Intro, 6, 7, 8
55. Forest-related decisions can be affected by politics, science, emotion, and economics. The current and future relationship between the quality of human life and the quality of forests will be determined by theses decisions.	9-12
56. Management of sustainable forests will continue to take creativity, innovation, and collaborative thinking by individuals, organizations, governments, and industry.	6 Intro, 9-12
57. Challenges related to forestry will change over time. As new challenges arise, forestry professionals will need to respond. Examples of current challenges include fragmentation, non-native species, and threatened and endangered species.	6 Intro, 9-12
58. Individuals, organizations, and governments base decisions and actions on underlying beliefs and values. As the human population continues to grow, values and needs will change and affect the decisions made about forest resources use.	9-12
59. The role that public and private lands play in meeting human needs will change over time in order to maintain the quality of life.	9-12
60. Choices humans make today directly affect our ability to sustain forest ecosystems essential to meeting future needs.	1 Intro, 2 Intro, 4 Intro, 5, 6, 7, 8, 9-12

Staff Development

A continual series of professional development opportunities will be provided for district staff including some mandatory and some voluntary participation. A rough timeline of the workshops and topics to be covered is:

Topic	Date	Location	Presenter	Participation
Green and Healthy Schools Program	Fall 2007	BHS Auditorium Fall Inservice	Pat Arndt	Mandatory
High Ropes Challenge Course	Fall 2007 After School Hours	Pine Bluff Forest Vertical Venture	Vertical Venture Staff	Voluntary
Forestry Tools with optional field experience	Fall 2007 Late Start Winter 2008	BHS Auditorium Hunter Street Pine Plantation	Pat Arndt	Mandatory Voluntary
Lifetime Outdoor Recreation/Wellness Snowshoeing/Cross-country skiing	Winter 2008 After School Hours	Seward Memorial School Forest	Michelle Walker Pat Arndt	Voluntary
WKCE Test Analysis for EE	Yearly – Spring 2008+	Clay Lamberton Poy Sippi Middle School High School	Penny Gillespie – Director of Instruction	Mandatory
School Forest Plants field experience	Spring 2008 Summer 2008	Pine Bluff Forest	Pat Arndt	Voluntary
Organic Gardening Cooperative	Spring 2008	Native Roots Educational Gardens	Paula Hanson Pat Arndt	Voluntary
Archery/Bow Hunting	Fall 2008	Seward Memorial Forest	Al Bednarek	Voluntary
School Forest Wildlife with optional animal tracking field experience	Winter 2009 Late Start	BHS Auditorium Pine Bluff Forest	Pat Arndt	Mandatory Voluntary
Waters and Water Chemistry/ABI field experience	Spring 2009	Native Roots Educational Gardens	Tim Cox Pat Arndt	Voluntary
School Forest Curriculum Updates	Fall 2010	To be Arranged	Penny Gillespie Pat Arndt	Mandatory

A staff development goal is to increase the number of Berlin teachers involved in the Wisconsin Association for Environmental Education (WAEЕ); thus, increasing participation in staff development opportunities in EE such as the WAEЕ Fall Conference and Winter Workshop. A second goal would be the creation of an EE contact in each school that would help distribute EE related information, staff development opportunities, and serve as a liaison between the school forest coordinator and each school building.

Assessment

The on-going success of the Berlin School Forests program will be assessed in a variety of ways including:

1. Annual surveys of teachers and administrators to determine student usage, facility needs/improvements, educational resource needs, and perceived value of the school forest education experience.
2. Evaluation of all staff development activities by participating staff and administrators to determine educational success and future staff development needs.
3. Student surveys of environmental knowledge (one class/year) which will be delivered during a school forest education program.
4. Identification of WKCE test questions which include environmental education topics or themes, and analysis of Berlin Area School District student scores on those questions to determine weak or excluded areas in the curriculum.
5. Increased usage of the Berlin School Forests properties by the school district, other school districts, and the community each year.
6. Self-supporting financial funding through Vertical Venture Ropes Courses profits, timber harvest/sales, community donations, and grants.

**Berlin School Forests
Resource List**



Waters

- D-nets for aquatic insect collecting/trays (4)**
- Secchi Disk to determine water turbidity (2)**
- Water Sampler for collection at variable depths (2)**
- Phytoplankton Sampler for collecting aquatic microorganisms.**
- LaMotte Water Pollution Chemical Test Kit**
- Dissolved Oxygen Meter (1)**

Soils

- Soil Profile Probes (2)**
- Reotemp Soil Thermometer (1)**
- Green Lake County Soil Survey**
- LaMotte Soils Macronutrients Chemical Test Kit**
- Soil Profile Pit**

Wildlife

- Snake Hook/Restraining Tubes/Bagger (1)**
- Sherman Small Mammal Live Traps (10)**
- Small Animal Box Trap (1)**
- Butterfly Nets (5)**
- Nasco Tracks – complete set of all tracks,
positive/negatives of WI common species**
- Animal Traps- variety of kill and foothold**
- Radio Telemetry Receiver/Antenna/Transmitter (1)**

Forestry

Biltmore Sticks for tree measurement (14)
Scribner Rule/Doyle Rule: Tree Scale Stick (1)
Tree Bore to age softwood trees (1)
Diameter Tape (12)
Tangent Height Gauge (12)
Panama Angle Gauge (12)
Haga Altimeter (1)
Malleable Clasp Cant Hook (1)
Clinometer to determine tree height (1)
Cruise-Alls to determine “in” trees (3)
Prism Guages to determine “in” trees (15)
Densimeter to measure forest overstory density (1)

Fire Management

Water Packs (3)
Swatters (4)
Fire Rakes (4)
Sling Psychrometer to determine % humidity (1)
Turbometer to determine wind speed (1)
Drip Torch

Orienteering

Classroom Set of Compasses
Teacher Overhead Projector Teaching Compass
5 Permanent Orienteering Courses
(Seward Forest – 3, Hunter St. Forest-2)
Orienteering Hanging Markers (10) – temporary courses

General Supplies

Chaining Pins (40)

Tape Measures, 300 feet, (4)

Audubon Field Guides

Insects and Spiders

Reptiles and Amphibians

Birds

Mammals

Mushrooms

Butterflies

Trees

Hand Lenses/Large Pocket Magnifier (12)

White Boards (25)

Rulers (24)

2-Way Radios

Clipboards (30)

Metersticks (24)

Teaching Photographic Tank (1)

Pine Bluff Forest Storage Shed

Paper Towels

Toilet Paper

Kleenex Tissues

Garbage Bags

Hand Sanitizer

First Aid Bag with District Health Concerns List

Broom/Dust Pan (Confidential Info.)

Recycling Bins

Insect Repellent

Plastic Cups

Ink Pens

Orange Vests – Optional Use during Hunting Seasons

