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can be everywhere you look!

An Environmental
Resource Manual

By: Natural Innovations
Detroit Lakes, Minnesota

Table of Contents

Natural Innovations
Because one thing leads to another.

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www.NaturalInnovations.org

Cover Layout: Josh Anderson

Printed on recycled paper

Acknowledgement/Authors

This document would not have been possible without the wonderful support and guidance of many people and agencies who share a commitment to environmental education and creating environmental literacy among our youth and adults. It is with great respect, gratitude, and optimism for an environmentally literate future that we thank the following for their contributions to this project.

Sincerely,

Natural Innovations
Board of Directors

Principal Authors: This project was driven with care, compassion and dedication by Erika Johnson, Kelly Blackledge, Sandy Gunderson and Cyndi Anderson. Each in her various professional and volunteer contributions has spent hundreds of hours with a vision of making linkages and connections between classroom teachers and environmental agencies. Their time, effort and expertise were absolutely essential to creating this resource manual, as well as the networking and relationship building that occurred between educators and environmental agencies as a result of participating in this project.

Funding Sources: We are indebted to the Minnesota Pollution Control Agency for their grant funding, as well as to the Tamarac Interpretive Association, Breakfast Rotary in Detroit Lakes and Natural Innovations Board of Directors for their financial support of this project.

Educators: This project had broad-based support from administrators and educators from the very beginning to the final details of this resource manual. The following educators are leaders in environmental literacy, and through their work, we will make significant advances in teaching our children to be life-long stewards of the earth.

First we wish to thank Dave Stoltenberg (formerly of Frazee-Vergas Schools and now Principal in Juneau, Alaska) and Nancy Jacobson of Frazee-Vergas Schools for their tireless work in helping us understand the "language of educators" and facilitating how to make the connections necessary for environmental literacy. We also wish to thank Rhonda Fode of Detroit Lakes Public Schools for authoring the "Graduation Standards in a Nutshell" section of the manual.

In addition, the following administrators and educators have played an essential role in helping us in this environmental literacy project:

Kevin Ricke, Principal, Lake Park/Audubon High School
Sam Skaaland, Principal, Lake Park/Audubon Elementary
Deron Stender, Superintendent, Frazee-Vergas Public Schools
Nancy Jacobson, Frazee-Vergas Public Schools
Boyd Bradbury, Superintendent, Waubun-Ogema-White Earth Schools
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Carol Foltz, Holy Rosary School
Belinda Freeman, Teacher, Roosevelt Elementary School
Heidi Graham, Teacher, Frazee Elementary School
Shawna Mann, Teacher, Frazee Elementary School
Doug Schwarzrock, Teacher, Frazee High School
Mary Softing, Teacher, Lake Park/Audubon Schools
Reed Weisenburger, Lake Park/Audubon Schools
Morgan Olson, Teacher, Waubun-Ogema-White Earth Schools
Mark Eidenschink, Teacher, Waubun-Ogema-White Earth Schools

Environmental Agencies: Equally important partners in this project were the environmental agencies in our region. Each has unique skills, talents, expertise and opportunities for meaningful environmental literacy education. While no two agencies are the same, they do share a love of and commitment to the environment. They also share a desire to have an informed citizenry, beginning with youth through adults. A very special thank you to the following agencies and/or specific agency personnel who dedicated time, information and support for this project. We thank them for what they do for the environment every day and for being an important part of creating environmentally literate children and adults.

Charles Fritz, Director, International Waters Institute (IWI)
Joe Courneya, Red River Basin Education Director, International Waters Institute (IWI)
Moriya Rufer, Lakes Program Coordinator, RMB Environmental Laboratories
Patrick Petermann, Executive Director, Boys & Girls Club of Detroit Lakes
Sandy Gunderson, Becker County Environmental Services
Bob Merritt, Area Hydrologist, MN DNR Waters
Mandy LaZella Erickson, Fisheries Specialist, MN DNR-Detroit Lakes Fisheries
Donna Dustin, Fisheries Biologist, MN DNR Fisheries
Dave Friedl, MN DNR Fisheries
Howard Mooney, MN DNR Forestry
Kelly Blackledge, USFWS, Tamarac National Wildlife Refuge
Scott Kahan, USFWS, Detroit Lakes Wetland Management District
Mike Murphy, USFWS, Hamden Slough (Retired)
Brad Grant, Becker Soil and Water Conservation District
Tera Gutter, Pelican River Watershed District
Denise Baer, Pelican River Watershed District
Sally Hausken, Chairperson, Sucker Creek Preserve
Daniel Olson, Public Information Officer, Minnesota Pollution Control Agency
Sharon Smith, 4-H Program Coordinator, Becker County 4-H Extension Office

Coleman Nordhausen, Cormorant Sportsman Club
Janice Chilton & Ron Chilton, White Earth Land Recovery Project & Native Harvest
Jayde Carlson, Waste Management
Lon & Sallie Eikren, Owners, Becker Pet & Garden
John Store, Quality Bait & Tackle
Friends of the Detroit Lakes Wetlands Management District
Tamarac Interpretive Association, Friends of Tamarac National Wildlife Refuge
Mary Kulberg, Butterfly Enthusiast and Volunteer
Denise Stromme, Education Specialist, MN Pollution Control Agency
Su Beran, Education Specialist, MN Pollution Control Agency

It is our sincere hope that educators, environmental agencies and others will find this resource manual useful and that it will provide meaningful resources to help in our shared vision of environmental literacy.

Executive Summary

Natural Innovations had a vision of helping schools and environmental agencies understand each others role and needs better in the hopes of creating linkages which would results in more students having access to environmental education. They were successful in securing grant and other funding to aide in the development of this project.

The Environmental Literacy Program was designed to create a blueprint for all the collaborating agencies to help address the key issue of how to best help educators and equip students with the education and habits they need to understand and appreciate the natural and social world around them and instill in them the values, tools and resources to become life-long environmental stewards.

Our geographic area is fortunate to be the site of the convergence of three major ecosystems: the coniferous forest, the deciduous forest, and the tall grass prairie. Detroit Lakes and the surrounding area are located in what is called a "transition zone," where all three of these systems converge. We are rich in natural resources where students can see, study and learn about the natural and social systems around them. However, we lacked a formalized network of collaboration which would incorporate the shared interests of environmental education among the various community and education partners. This project was focused on creating a formalized network that would be able to maximize the resources available, reduce any potential of duplication, and have all resources working toward environmental literacy for all.

Natural Innovations believes that quality environmental education goes beyond learning facts about nature. Clearly, environmental concepts must be integrated throughout all program areas to be truly effective. This project focused on creating a stewardship ethic in the students of our communities through a collaborative approach to embedding the environmental literacy benchmarks into K-12 curriculum. While environmental education is evident in the K-12 curriculum, the content must leap from the pages of a book and into the ecosystems of the area. Minnesota's K-12 Graduation Standards are based, in part, on the philosophy of "real-world, hands-on" learning. While Becker County has an abundance of natural resources and the rare convergence of ecosystems, the opportunities to connect the students to those assets is full of gaps. By establishing linkages through the SEEK website, we hope we've taken an important step in the right direction.

"In the end, our society will be defined
not only by what we created,
but by what we refused to destroy."

- John Sawhill

About Natural Innovations

Natural Innovations is an all-volunteer, non-profit organization dedicated to developing environmental literacy in children and adults from our community and region, and in the tourists who visit our communities. The mission of Natural Innovations is to ***inspire, model and teach people to become life-long stewards of the earth***. We do this by providing hands-on environmental learning for all ages through specific programming, education and experiential learning opportunities.

As part of this mission, Natural Innovations works with environmental-related organizations to create seamless access to education, resources, grant funding and collaboration with an eye to eliminate any potential duplication of service. These efforts are central to building the capacity of Natural Innovations to serve our communities and region, as well as the capacity of environmental professional organizations to meet their educational and other goals.

Natural Innovations is a growing organization. Our work is guided by our love of the natural environment, concern for our social environment, and a profound desire to share educational messages with people of all ages about its preservation and stewardship creating environmental literacy among all people. We are also working diligently to respond to the requests of the professional environmental community for Natural Innovations to serve as a catalyst for change, providing networking, coordination and facilitation of collaboration among the partner agencies and creating operating efficiencies across the disciplines through this collaborative.

Natural Innovations has successfully found ways to reach nontraditional audiences with messages of environmental issues through local radio stations of a variety of musical formats. The organization has also gained commitment from the local newspaper to incorporate regular articles entitled *Naturally Speaking*, which features a variety of environmental messages. These articles coincide with regular Speaker Forums offered free to the public. Recent topics include sustainable agriculture, land use and planning, local impacts of bird migration and navigation, and local air quality monitoring. Natural Innovations was also successful in bringing together partners and necessary funding to assist with the removal of invasive buckthorn at the nearby Pelican Rapids school forest.

In addition to our environmental-related focus, we see our work as contributing to the economy of our area through enhanced tourist connections and the preservation of the assets which provide such an important economic base to our communities.

Natural Innovations Inc. was incorporated as a 501 (c) 3 organization under the Internal Revenue Service Code and the State of Minnesota in July of 2004.

Framework of Expectations

Throughout the development of this project, we have talked about establishing linkages and connections between educators and environmental organizations. Over the past two years, we have tried many different paths to achieve this goal. What became very clear through this work is something which has been coined "Framework of Expectations." Here's what we mean by that statement.

One of the key reasons there seems to be a "disconnect" between educators and environmental organizations is that each comes with a set of expectations and frequently those expectations are not consistent with one another. Often times, educators said when they contact an environmental organization, they are interested in what the organization has to offer. Conversely, environmental organizations report that they would be far more likely to be able to accommodate the requests of educators if they were more specific about what they wanted. Environmental organizations consistently responded that they were less likely to try to meet the request of an educator who requested a program on "whatever you have."

Recognizing this reality, Natural Innovations designed an Environmental Education Request Form that looks to respond to the types of questions for which the environmental organizations would like answers. This also provides the environmental organization with guidance on how to tailor the presentation related to grade level, vocabulary, concepts and systems to better meet the teacher's needs. With a little more detail on the initial end of the educator, the environmental organization can provide a more meaningful learning experience.

The form also addresses issues like facilities, etc. For instance, it is important to know if a classroom coming to an environmental organization location needs restroom facilities, picnic tables, if there are garbage receptacles available, etc. What may seem like common sense types of questions are actually frequently not addressed up front, and leaving things to chance can result in a less than positive experience for those involved.

A key to successful environmental education is preparation and understanding the expectations of both entities. We are confident something as simple as the form seen on pages 9-10 can go a long way in helping to reduce this gap. This is particularly true for educators currently engaged in environmental education who take advantage of the outdoor classrooms and resources of the environmental organizations and the general community.

There was an additional key gap in environmental education which became clear during this project. Significant differences exist between educators – some are engaged in environmental education and advocate for the use of outdoor classrooms as valuable learning sites for their students – and others do not. Not only can this vary from school to school, it often is varied within the same school. We found that there is no uniformity among educators who access the outdoor classrooms and those who are not as comfortable outside the classrooms. It is these inconsistencies, in part, that prompted Natural Innovations to look at gathering information on the tools and resources in the community related to environmental education and then to promote them via a web site.

Natural Innovations maintains that one of the best ways to integrate environmental education is to experience the environment – whether that means immersing students in the local natural areas or searching for bugs on the playground. The point is the learning that takes place outside. Teachers who embrace outdoor classrooms also are more apt to realize that the lessons being taught are not limited to science. There are history, social studies, math and other graduation standards that can readily be addressed through the experiences of the outdoor classroom.

Another challenge for educators is the issue of ever shrinking budgets. Even teachers who are actively engaged in outdoor learning experiences are finding it harder and harder to have the financial resources for transportation and other opportunities for students. Again, the approach used by Natural Innovations to try to address this issue was our efforts to link educators to community resources available to them.

It is a hope of this program that by creating an easy way in which to access environmental education resources online, and through the building of enhanced relationships with environmental organizations, we may see more educators venturing outside the walls of their classrooms to utilize the outdoor classroom which is so abundantly available. We believe this is fundamentally important to creating life-long stewards of the earth.

Environmental Education Program Request Form

Environmental-Related
Agency:_____

Requesting Organization Information

□ Classroom
□ Field
□ Both

1. First Choice Date: _____ Second Choice Date: _____
2. Name of Group: _____
3. Contact Person: _____ Daytime Telephone: _____
4. Mailing Address: _____
(Include city and zip code)
5. Email Address: _____
6. Number of Children in Group: _____ Grade Level:_____
7. Number of Adults in Group: _____ # of teachers/other adults:_____
8. Arrival Time: _____ Departure Time: _____
9. Program Start Time Request: _____ Length of Program Request:_____
10. Requesting Guided Program:_____ Requesting Self-Guided Program:_____
11. Where will you arrive/do you have parking needs? _____
12. Special Needs (physically challenged): _____
13. Will your group be bringing a sack lunch? Yes No (If yes, need to provide own disposal of waste)
14. Cost of program? _____
15. Indoor or Outdoor activity request? _____

Program Topic Request	**Start Time(s)**	**Staff/Volunteer Assigned**
Theme: *Please include information regarding the school subject to which this program relates. The more information you can provide the more helpful it will be to the speaker.*		
Benchmarks, vocabulary, concepts, etc.		
Other Activities: □ Will students complete pre-work □ Will students complete post-work		
Site Limitations: □ No restroom facilities □ No garbage disposal □ No picnic tables □ Is there a rainy day back-up plan: □ Other:		

Request taken by: _____ Date Request Received: _____

Request confirmed by: _____ Date Request Confirmed:_____

Appropriate Information Sent: _____ Date Information Sent: _____

Another component of the "Framework of Expectations" is a desire to transition environmental education to a consistent teaching goal of educating about systems rather than simply teaching an environmental topic. By teaching natural and social systems and how they interact, we increase the likelihood that environmental literacy will be an outcome of the learning. Here are examples of what we mean for each of the topics taught K-9:

A Teaching by Systems Approach

<table>
<tr><th>Teaching by Topic</th><th>Teaching by Systems</th></tr>
<tr><td>Kindergarten:</td><td rowspan="30">PreK – Second Grade

Single system examples

• If bees were removed from an ecosystem, all the flowering plants that depend on them for pollination (the bees' function within this system) are affected.
• Objects in natural systems have observable properties, e.g. size, weight, color, shape or existence in different states.

• Similarities and differences of the properties of the parts of natural systems form the basis of the taxonomic system of classification used to characterize species and their relationships to other groups of organisms.

• Family is a social system that we are all aware of. For younger students, identifying the members of the family, and the roles they play help them to see similarities and differences in a personal way.

Interactions

• Individual humans make decisions that are often very dependent on the social systems of which they are a part, like family. These decisions affect other individuals in the system.</td></tr>
<tr><td>Seasonal changes/weather</td></tr>
<tr><td>Living/nonliving</td></tr>
<tr><td>Five senses</td></tr>
<tr><td>Use a simple tool (magnifying glass)</td></tr>
<tr><td></td></tr>
<tr><td>First Grade:</td></tr>
<tr><td>Magnets</td></tr>
<tr><td>Simple tools</td></tr>
<tr><td>Physical properties</td></tr>
<tr><td>Weather and seasonal cycles</td></tr>
<tr><td>Position changes in sun and moon</td></tr>
<tr><td>Observe and describe plant and animal growth and change</td></tr>
<tr><td>Heredity (match adults and plants)</td></tr>
<tr><td>Basic needs (air, water, food) plants and animals</td></tr>
<tr><td>Major body parts</td></tr>
<tr><td>Diseases caused by germs</td></tr>
<tr><td></td></tr>
<tr><td>Second Grade:</td></tr>
<tr><td>Natural World
• Questions
• Observations
• Inquiry
• Gathering Data</td></tr>
<tr><td>Matter: classify</td></tr>
<tr><td>Earth materials:
• Rocks, soil, water, air</td></tr>
<tr><td>Life:
• Interdependence
• Different environments
• Changes-dinosaurs-present day endangered</td></tr>
</table>

<table>
<tr><td>Basic needs</td><td rowspan="2">• Groups utilize the environment for air, water, food, energy, space and a place to put their wastes.

• Humans can make changes in the biotic factors influencing a garden, influencing the plants that grow there.

• Fishermen use their knowledge of light, temperature and oxygen preferences (abiotic factors) of fish to locate them for angling.</td></tr>
<tr><td>Scientific view in exploring environment</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Third Grade:</td><td>Third – Fifth Grade</td></tr>
<tr><td>Energy
Sound
Light
Heat</td><td rowspan="11">Single system examples

• The structure of an ecosystem is based on its interacting biotic and abiotic parts. Producer, consumer, and decomposer are dependent upon green plants that, in turn, are dependent upon certain abiotic factors. Changes in an ecosystem’s structure influences its other parts.

• Wildlife species will migrate, adapt or die if their existing habitat no longer meets their survival needs.

• Humans migrate in response to population pressure, e.g. settlement of the New World and the Irish response to the potato famine. Humans migrate in response to cultural pressures such as war or persecution. Humans migrate in the desire to better their lives or obtain advantages for themselves and their children.

• Bats vocalize ultrasonic sound waves that bounce off objects and return to the bats’ ears. This feedback is used by bats to locate food and navigate in their environment.</td></tr>
<tr><td>Weather
Clouds
Instruments
Conditions</td></tr>
<tr><td>Solar System
Planets
Seasons
Stars
Sun
Day/Night</td></tr>
<tr><td>Habitats (plants/animals)
Structure
Survival
Interaction
Interdependence
Growth
Changes in environment
Reproduction</td></tr>
<tr><td>Heredity - Characteristics
Inherited
Acquired
Similarities
Differences</td></tr>
<tr><td>Health – choices about health by consumers</td></tr>
<tr><td></td></tr>
<tr><td>Fourth Grade:</td></tr>
<tr><td>Living Things</td></tr>
</table>

• Cells • Classifying Organisms • Changes in Ecosystems Animals as living things • Classify animals • Body systems Earth & Beyond • Stars—Telescope Water and weather • Water cycle Matter • Physical & chemical changes Energy • Heat-electricity-magnets	• Social structure is any reoccurring **pattern** of social behavior. Individuals create and participate in a variety of social structures such as family, education, government, and religion. **Interactions** • **Cycles** in natural systems affect the activities of social systems. The seasons are **cycles**. During winter, shipping on Lake Superior stops until the ice breaks up in the spring • People can **change** the composition of plants and animals in an area by changing the biotic or abiotic factors (e.g. overgrazing, building dams, irrigation • **Communication** occurs between people and natural systems. Animals, plants, and the overall environment cannot **communicate** the way humans do, so people have to pay close attention in order to discover what the natural systems need. By monitoring the types of aquatic insects in a stream, a biologist learns about water quality. Some species will be absent in polluted water.
Fifth Grade:	
Scientific Method: duckweed exp.	
Careers in science	
Simple machines	
Force and motion	
Plant and animal diversity	
Plant and animal adaptations	
Food webs; food chains	
Biological population changes over time	
Structure and functions of earth systems	
Interaction of lithosphere; biosphere, hydrosphere; space	
Sixth Grade:	**Sixth – Eighth Grade**
Scientific inquiry – method	**System Interaction Examples** • **Artifacts** produced by societies can have profound effects on both social and natural systems. The invention of agriculture and agricultural tools enabled human populations to spread over a wide territory, to live in stable, permanent communities and to produce enough surplus to support a more complex way of life, including cities. At the same time,
Scientific personal opinion-facts/theories	
SI units (length, time, mass, volume, temp)	
Explain data/findings (tables, graphs, models and demonstrations)	
Science vs. technology (influence & influence by society)	
Motion (position, speed & acceleration)	
Forces of nature (currents and magnets/ positive and negative charges)	
Matter (elements, atoms, molecules, states of matter)	

• Volume, mass, density • Melting, boiling point, solubility Chemical Reactions • Chemical vs. physical change • Mixture/pure substance Energy transformation • Heat/chemical/mechanical and electric energy • Convection/conduction/radiation • Visible light • Light vs. heat • Waves (speed, frequency, wavelengths) Vibrations (waves)	it allowed humans to change the landscape in major ways, turning natural ecosystems into human-managed systems. Some **waste artifacts** created by social systems can disrupt the normal function of natural systems, i.e. chlorofluorocarbon **waste** from refrigeration and air conditioners get into the atmosphere and reduce the amount of ozone that protects us from ultraviolet radiation. • **Changes** in natural system **boundaries** can affect social systems. If the earth's atmosphere is indeed warming, climatological **boundaries** to snowfall will have a major effect on the ecreational **patterns** of people in Minnesota, and therefore on the economy in the areas of the state dependent on heavy snowfall to bring in tourists such as snowmobilers and skiers.
Seventh Grade: Ecology • Abiotic/biotic • Population/density • Human effect on environment • Ecosystem • Limiting factors • Extinction/fossil record • Diversity of species/adaptations • Food chain/web/pyramid • Nitrogen/water/carbon cycle • Symbiotic relationships • Dichotomous Keys Cells • Animal/plant (parts and function) • Mitosis/Meiosis • Convert energy from food Heredity • Genes/chromosomes • Traits • How traits are inherited (Punnett	• The consumption lifestyle of a **population** is important to understand. How much food and water does one person need vs. how much water does one person use? Can the earth provide for all of us if the **population** keeps growing? If it cannot, who will be provided for and who will not? • Social systems are influenced by the **biomes** in which they are located. **Biomes** influence the economic systems of the humans that inhabit them; people who live near forests are often part of the wood industries; people who live in the Red River Valley of Minnesota are agricultural, growing sugar beets, wheat and sunflowers—crops that can thrive in a dryer prairie area. • Sportsmen's groups (**informal**) lobbied their legislators (law making **formal**)

squares)	to have a national tax on the sale of sporting goods (Pittman Robertson Act) to generate money for fish and wildlife habitat management that would supplement federal budget allocations for this purpose. • Urban sprawl, energy production and agriculture needed to produce food and fiber required by human **communities** have impacts on natural systems. All of the aforementioned require space and reduce the capacity of an area to support the plants and animals that occupied the former **habitat**.
Kingdoms • Eubacteria archaebacteria/fungi/ plants/animals • Reproduction (asexual & sexual) • Photosynthesis/respiration • Single vs. multicellular • Organisms body plan helps in environment • Identify organisms & kingdom to which it belongs	
Body Systems • Muscular, skeletal, integumentary, cardio, digestion, respiration, reproduction, excretion, etc. • Disease & infection (genetics/ environment) • Risks with natural chemical and biological hazards	
• Inquiry (scientific method)Physical, mathematical, conceptual models Theories vs. fact • Charge with new findings (technology/culture)	
Eighth Grade:	
Geology • Minerals • Rocks/cycle • Earth layers & composition • Plate tectonics • Fossil record • Earthquakes/volcanoes • Erosion/depositing/weathering • Sea-floor spreading	
Astronomy • Size, distance, galaxy vs. universe • Stars • Sun • Motion/phases of earth & moon • Planets	

Weather • Oceans (currents) • Winds • Coriolis effect • Atmosphere • Radiation/conduction/convection • Water systems • Moons (tides) • Seasons/climate • Collect and use data to predict weather	
Credibility & validity of sources	
Inquiry (Scientific method/research)	
Identify/research environmental issue & impact (Becker County)	
Relate personal experience to science and cite examples of what is learned (science & technology)	
Physical, mathematical & conceptual models	
Ninth Grade:	**Ninth – Twelfth Grade (adult)**
Chemistry • History & nature of science – problem solving technology • Properties of matter – phases/phase change/temperature • Structure of matter – water cycle, atoms/periodic table/interaction of matter • Chemical reactions-physical & chemical reactions, compounds, acid/bases • Energy transformations – sources of energy, renewable resources, energy flow between systems • Water watch – water quality testing • Watersheds & interactions	**System Interaction Examples** • Sparrows and starlings were introduced to this country as biological control agents as people in Europe had observed that they were competitors. However, they expanded into new habitats in America, displacing native species through competition for food, shelter, and places to raise their young. In the example above, the social system predicted how the natural system would **probably** respond, but other variables in the natural system were not thoroughly understood. • Natural systems are affected by the demands of social systems for **energy**. Electrical generating plants often use water from rivers or lakes to cool equipment. The waste heat from the plant is transferred to the water that is returned to the aquatic ecosystem from which it
Biology Scientific method • Experimental design • Inquiry • Science history	
Cells	

• Cell structure/function • Energy (photo/resp) • Diversity/specialization • Communication • Enzymes • Reproduction/division (mitosis-meiosis) • Life cycle • Homeostasis	was drawn. Under some conditions, the increase in temperature of the water in the natural ecosystem can have a negative effect on the organisms living there. • The actions of a social system can result in creating **chaos** in natural systems, other social systems, and its own social system. The practice of cities dumping raw sewage into river systems reduced the dissolved oxygen content of the water below four parts per million. This threw the aquatic system into chaos, killing all species that could not survive at that level of oxygen. • Conservation groups use the knowledge about the **synergistic** relationship between bacteria and ruminants and introduce deer herds to certain foods prior to starvation periods in winter. This helps guarantee that adequate populations of bacteria are present in the deer's stomachs when their normal diet needs to be supplemented. • Conservation is a major enterprise in Minnesota. Multiple agencies have been created and citizen groups have been formed that have overlapping (**redundant**) or shared environmental concerns. Reduction of the activities of some agencies working on soil conservation does not mean that soil conservation efforts will end. • Synthetic chemicals invented by social technologies are not always recyclable by natural processes nor in a timely fashion. Many of these compounds (**products**) are harmful to the environment and people.
Heredity • DNA/chromosomes • Genes/traits • Mendel stuff • Mutations/disorders • Variation • Population dynamics • DNA • (replication, transcription, translation)	
Classification • Diversity • Evolutionary relationships • Taxonomy • Dichotomous keys/ID • KPCOFGS	
Evolution • Natural selection • Variation • Gene flow • Darwinian history (Lamarck, etc.) • Mutations/recombination • Explanation for diversity • Fossil record/genome • Radioactive dating • Human theories	
Kingdoms • Archaebacteria • Eubacteria • Protest • Fungi • Plants • Animals Stimulus response Development & specialization Evolutionary lines	

Human body • Systems/interactions • Homeostasis	
Ecology • Communities/populations • Energy Flow Food Web Carrying capacities Trophic levels • Ecosystems diversity Biomes Biotic/abiotic factors Species interaction • Volatility Climate changes Human impact Population changes • Environmental quality Water quality Soil quality Natural cycles	

SEEK (www.mnseek.net)
….And You Will Find
…Environmental Education Resources

SEEK (Sharing Environmental Education Knowledge) is Minnesota's interactive directory of environmental education resources provided by the Minnesota Pollution Control Agency.

The culmination of the work of the Natural Innovations project is posted to the SEEK web site. When you visit this web site you will find the environmental agency, grade level, graduation standards and environmental literacy benchmarks consistent with the topic/systems learning project.

To locate the Natural Innovations specific environmental education topics go to:

www.mnseek.net

Click on "Browse Resources"

Type in "Natural Innovations" and click on "exact phrase"

It is really that simple! And while you are there, why not look at what is available in other areas to give you some additional ideas for your environmental education programming? For example, clicking on "Northwest Region" will expand the resources available throughout Northwest Minnesota.

Overview of Becker County Environmental Education Program Offerings:

On page 20 there is a grid of environmental programming available through the Natural Innovations query. This grid provides you with a broad overview of the topics and grade levels for which environmental agencies have submitted data. This gives an excellent starting point for developing your environmental education strategies, both in and out of the classroom.

On pages 22 – 24 are samples of the data that is available for the environmental education opportunities.

Overview of Environmental Literacy Programs in Becker County & Identification of Gaps													
EE Program	**K**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
5th Grade Conservation Tour						X							
Air Quality							X	X	X	X	X	X	X
Animal Adaptations: Beavers and their habitats				X	X	X							
Aquatic Habitat for the Classroom			X	X	X	X							
Aquatic Insects and Water Quality Presentation				X	X	X	X	X	X	X	X	X	X
Area II Envirothon										X	X	X	X
Bird Nest Boxes				X	X	X							
Bird Seed Math				X									
Burn Barrels: The Good (or not so good), the Bad, and the Ugly!								X	X	X	X	X	X
Chemicals: Household Hazardous Products				X	X	X	X	X					
Composting				X	X	X							
Dunton Locks County Park - Fishing Rods				X	X	X	X	X	X	X	X	X	X
Exploring Your Environment						X	X	X	X	X	X	X	X
Forest Management / Health of a Forest										X	X	X	X
Lake Water Quality and Watershed Activities				X	X	X	X	X	X	X	X	X	X
Mammal Mysteries				X	X	X	X						
Mapping your Community with GIS - GIS/GPS								X	X	X	X	X	X
Migrate Through the Refuge						X	X	X					
Natural Innovations	X	X	X	X	X	X	X	X	X	X	X	X	X
Plants and their importance for fisheries habitat										X	X	X	X
Prairie Trunk - Detroit Lakes				X	X	X	X						
Recycling / Waste Reduction			X	X	X	X							
Seasons of the Forest	X												
Shore Land Management: Erosion								X	X	X	X	X	X
Shoreland Management: Natural Shoreline								X	X	X			
Sucker Creek Preserve Tour	X	X	X	X	X	X	X	X	X	X	X	X	X
Sucker Creek Preserve Tour - Middle School								X	X	X			
Sucker Creek Water Processes and Geology											X	X	X
Sustainable Communities: Maple Syruping								X	X	X			
Sustainable Communities: Wild Rice, Three Sisters Garden, Natural Medicines/Healing				X	X	X	X	X	X	X			
Transfer Station Tour			X	X	X								
Tree Identification				X	X	X	X	X	X	X			
Trees at Tamarac: Planing, Growth & Wildlife Uses		X	X										
Walleye Hatchery and Spawn-Take Site	X	X	X	X	X	X	X	X	X	X	X	X	X
Water Quality and Mapping								X	X	X			
Water Quality Elementary	X	X	X	X	X	X	X						
Water Quality H.S.										X	X	X	X
Water Quality - Collection and Analysis								X	X	X			
Water Quality - Run Off				X	X	X	X	X	X	X			
Water Quality - Septic Systems										X	X	X	X
Watersheds - Mapping								X	X	X			
Watersheds: Water Quality, Sampling				X	X	X	X	X	X	X	X	X	X
Waterwatch								X	X	X	X	X	X
Wetlands Trunk - Detroit Lakes				X	X	X	X						
Where's Woody - waterfowl migration study	X	X	X	X	X	X	X	X	X	X	X	X	X
Winter Survival					X								
Wolves: A Pack of Investigations						X							

Frequency Environmental Literacy Benchmarks are Addressed in the 50 Community Resources

BENCHMARKS	Number of Community Resources									
	2	4	6	8	10	12	14	16	18	20
Grades preK – 2										
Social systems and natural systems are made of parts.	■	■	■							
Social systems and natural systems may not continue to function if some of their parts are missing.	■	■								
When the parts of social systems and natural systems are put together, they can do things they couldn't do by themselves	■	■	■							
Grades 3 – 5										
In social and natural systems that consist of many parts, the parts usually influence one another.	■	■	■	■	■	■	■	■	■	■
Social and natural systems may not function as well if parts are missing, damaged, mismatched or misconnected.	■	■	■	■	■	■	■			
Grades 6 – 8										
Social and natural systems can include processes as well as things.	■	■	■							
The output from a social or natural system can become the input to other parts of social and natural systems.	■	■	■	■						
Social and natural systems are connected to each other and to other larger or smaller systems.	■	■	■	■	■	■	■	■		
Grades 9 – 12 (adult)										
The interaction of social and natural systems can create properties that are different from either individual system.	■	■	■	■						
Interaction between social and natural systems is defined by their boundaries, relation to other systems, and expected inputs and outputs.	■	■	■	■	■					
Feedback of output from some parts of a managed social or natural system can be used to bring it closer to desired results.	■	■	■	■	■					
It is not always possible to predict accurately the result of changing some part or connection between social and natural systems.	■	■	■	■						

Bird Seed Math | Becker Pet & Garden Lon & Sallie Eikren

Resource type: Speaker - Field Trip/Tour
Topics: Birds - Economics - Mathematics

Owners of Becker Pet & Garden in Detroit Lakes offer an in classroom presentation on backyard bird feeding, a few of the species that prefer sunflower and thistle seeds, how to weigh seeds, and make a bird seed mix. This hands-on activity has the students weighing and measuring seeds. Recycled milk jugs are used for holding the mixed seed. Students label the jugs and they are sold in the store. This activity is geared for 3rd grade and takes about one hour. When students visit Becker Pet & Garden "Candy Store" it also provides opportunities for teaching math skills including counting coins, how to pay, etc.

Contact Lon or Sallie Eikren at Becker Pet & Garden at 218-847-8265.

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ENVIRONMENTAL LITERACY SCOPE AND SEQUENCE
SYSTEM CONCEPT(S) TO BE ADDRESSED:
Products
Niche
Function
Innovation & Invention

SYSTEM BENCHMARK(S) TO BE ADDRESSED FOR GRADES 3-5:
B-1 In social and natural systems that consist of many parts, the parts usually influence one another.
B- 2 Social and natural systems may not function as well if parts are missing, damaged, mismatched, or misconnected.

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MINNESOTA ACADEMIC STANDARDS
MINNESOTA SCIENCE STANDARD(S) TO BE ADDRESSED:
Grade 3 - IV. Life Science, B. Diversity of Organisms. The Students will recognize that plants and animals have different structures that serve various functions.

MINNESOTA MATH STANDARD(S) TO BE ADDRESSED:
3.1.2.4 Solve real-world and mathematical problems involving multiplication and division, including both "how many in each group" and "how many groups" division problems.
3.3.3.3 Make change up to one dollar in several different ways, including with as few coins as possible.

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NI3 - Posted by Natural Innovations

Recycling/Waste Reduction | Becker County Environmental Services

Resource type: Speaker - Learning Kit
Topics: Pollution Prevention - Recycling - Waste Prevention

Waste Reduction presentation will include: discussion on what is 'recycling' and what items are 'recyclable' in our county. There will be a hands-on classroom activity sorting 'real' (clean) garbage. The class will see, touch and discuss items that are made with recycled content, ways in which we can reuse an item and and ways in which we can identify how and where recycled items can be found. Classroom discussion will be encouraged on ways to REUSE items, options to manage waste (RECYCLE), and how purchase products with less waste(REDUCE). Topic areas may include school, home, and vacation recycling.
Contact: Becker County Environmental Services, Sandy Gunderson 218-846-7200.

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ENVIRONMENTAL LITERACY SCOPE AND SEQUENCE
SYSTEM CONCEPT(S) TO BE ADDRESSED:
Products
Waste
Inputs and Outputs
Rate

SYSTEM BENCHMARK(S) TO BE ADDRESSED FOR GRADES 3-5
B-1 In social and natural systems that consist of many parts, the parts usually influence one another.
B- 2 Social and natural systems may not function as well if parts are missing, damaged, mismatched, or misconnected.
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MINNESOTA ACADEMIC STANDARDS
MINNESOTA SCIENCE STANDARD(S) TO BE ADDRESSED:
2.I.B.2- The student will recognize and describe patterns in data.
3.I.A.1- The student will explore the use of science as a tool that can help investigate and answer questions about the environment.
3.I.B.2- The student will participate in a scientific investigation using appropriate tools.
4.I.A.1- The student will explore the uses and effects of science in our interaction with the natural world.
4.I.A.2- The student will discuss the responsible use of science.
4.I.A.3- The student will recognize the impact of scientific and technological activities on the natural world.
4.III.A.1- The student will identify and investigate environmental issues and potential solutions.
5.I.A.1- The student will know that current scientific knowledge and understanding guide scientific investigation.

5.I.A.2- The student will recognize that clear communication of methods, findings, and critical review is an essential part of doing science.

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NI2
NI3
NI4
NI5
Posted by Natural Innovations

Web Site: http://www.co.becker.mn.us/dept/environmental_services

Watersheds-Mapping | Pelican River Watershed District

Resource type: Guide - Research - Resource Person - Speaker
Topics: Environmental Studies - Lake - Pollution - Water

Students will be able to:
-Read a map of a watershed and contour maps of areas lakes
-Read topography
-Differentiate maps that show vegetation (forest vs. farmland)
They will understand:
-How H2O gets into our watershed
-How the affects of runoff lends to poor water quality by using a map of point vs non-point sources
-Human impact on water quality
-Changing landforms over time
Contact: Pelican River Watershed District (218)846-0436
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ENVIRONMENTAL LITERACY SCOPE AND SEQUENCE
SYSTEM CONCEPT(S) TO BE ADDRESSED:
Abiotic factors
Accumulation
Cause and effect
Probability
SYSTEM BENCHMARK(S) TO BE ADDRESSED FOR GRADES 6-8
C-3 Social and natural systems are connected to each other and to other larger or smaller systems.
FOR GRADES 9-12 (adult)
D-2 Interaction between social and natural systems is defined by their boundaries, relation to other systems, and expected inputs and outputs.
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MINNESOTA ACADEMIC STANDARDS
MINNESOTA SCIENCE STANDARD(S) TO BE ADDRESSED:
7.IV.C.3 - The student will define an ecosystem as all populations living together and the physical factors with which they interact.
7.IV.C.4 - The student will explain the factors that affect the number and types of organisms an ecosystem can support, including available resources, abiotic and biotic factors and disease.
8.I.B.2 - The student will describe how scientists can conduct investigations in a simple system and make generalizations to more complex systems.
8.I.D.2 - The student will cite examples of how science and technology contributed to changes in agriculture, manufacturing, sanitation, medicine, warfare, transportation, information processing or communication.

9-12.I.B.6 - The student will give examples of how different domains of science use different bodies of scientific knowledge and employ different methods to investigate questions.
9-12.I.C.4 - The student will know that technological changes and scientific advances are often accompanied by social, political, environmental and economic changes.

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NI7
NI8
NI9
Posted by Natural Innovations

Web Site: http://www.prwd.org

Graduation Standards in a Nutshell

The state of Minnesota's goal for education is that all students that graduate from Minnesota schools have certain skills and knowledge that is rigorous and uniform across the entire state. A student that graduates from Detroit Lakes will have had experiences and had to prove knowledge equal to or greater than a student in any other school in the state. This is an educational attempt to raise the bar of education in our youth. The state of Minnesota responded to this mission by creating a set of standards for all schools to use in developing a strong curriculum and creating assessments for students to perform in order to graduate. These have become known as Minnesota Graduation Standards.

When looking at the big picture of the standards, a group of people studying best practices in education decided that the graduation standards should be broken apart at each level of education. Therefore, teachers, and in turn students, could be making progress towards achieving the standards all the way up through the grades. Now, there are standards for kindergartners that build and build into graduation standards for students in high school. These standards have been written at a high rigor for each grade level.

For example, when students graduate from high school, they must be able to demonstrate that they have mastery of the following science standard: the student will predict and analyze how a change in an ecosystem, resulting from natural causes, changes in climate, human activity or introduction of invasive species, can affect both the number of organisms in a population and the biodiversity of species in the ecosystem. The aforementioned standard is 9-12.IV.C.4 (Grades 9-12, Interdependence of Life, statement number 4). When the district approves curriculum, this specific standard must be taught and assessed. Seventh graders have a related benchmark that states, "The student will recognize that an organism's body plan and its ability to regulate its internal environment enable it to make or find food, grow, and reproduce in a constantly changing environment." Third graders' benchmark reads, "The student will know that organisms interact with one another in various ways besides providing food." Kindergartners start with, "The student will compare and contrast living and nonliving things." Beginning at the earliest aspect of education, kindergarten, progressing up through each grade level, the student will learn necessary skills to be successful at reaching the highest standard for graduation.

In summation, the Minnesota Graduation Standards are simply a guideline for our education system. The standards are intended to drive curriculum development in the school district, to guide instruction by the teachers, and to be assessed on students' achievements towards well-educated Minnesota graduates. If school districts and teachers can develop units, projects, and/or field experiences that provide quality educational opportunities that are in direct relationship with the standards for students, then the end result is Minnesota graduates that are highly prepared and trained for making the world a better place. Teachers are looking for help in the process of providing appropriate resources and quality field experiences that correlate with the standards. In order to make learning and assessment authentic, it would be to everyone's advantage to have the schools team up with community resources to provide a quality, standards-based education for all Minnesota students.

The Systems of Environmental Literacy

The following information is taken directly from the Environmental Literacy Scope and Sequence. The entire document can be downloaded from the www.mnseek.net website.

"System is an idea that helps us think about parts and wholes. It draws attention to the interactions of the parts of something with one another and the relation of the parts to the whole. The idea also emphasizes effects—what influences the behavior of something and what, in turn, that thing accomplished.

AAAS

Why Systems?

Traditional environmental education accepted as a basic concept that everything was connected. This is the underlying idea behind most environmental education efforts. However, we never really examined that whole idea in terms of what it meant, exactly, and how it should be taught clearly and understandably. The concept of systems allows us to explore what that interconnectedness is and how it works.

A system is a collection of interrelated parts consisting of objects, materials, phenomena, processes, ideas, principles, rules, organizations or people that interact to form a distinguishable whole. It consists of parts that work together in ways that cannot be understood only by studying the parts alone. Systems are characterized by what arises from the interactions of the parts; and these interactions are often as much a part of the study as the parts themselves.

Using this systems school of thought, the Minnesota Scope and Sequence Development Team created the *Environmental Literacy Scope and Sequence.* The team was made up of experienced practicing environmental education professionals and representatives of preK through adult education, state agencies, higher education, and the environmental learning centers. Because the Scope and Sequence is based on both state and national standards, it enables environmental education deliverers to build, adapt or integrate curriculum and assessments that are most appropriate for their particular grade level or audience. The *Environmental Literacy Scope and Sequence* is designed to help create opportunities for mainstreaming environmental education in a way that has not been possible before.

Scope: The vision of what the students should have achieved at the end of their entire school experience.

Sequence: A series of age-appropriate achievements that students succeed at during their school experience in order to master the Scope.

The *Environmental Literacy Scope and Sequence* consists of:

1. Environmental Literacy Benchmarks

   The Benchmarks help define the scope of knowledge students need to understand in order to become environmentally literate. These benchmarks are sequenced so that new knowledge is constructed on prior knowledge. Successful environmental education programs will build upon these benchmarks, utilizing the social and natural systems identified in their communities.

2. Key Systems Concepts and Supporting Concepts

   Key Systems Concepts and Supporting Concepts of natural and social systems. The five Key Systems concepts, which assist in understanding the application of each Benchmark to environmental lessons are to be used as a guide to formulate questions about the social and natural systems being examined. The Supporting Concepts provide further detail and clarification for the Key System Concepts.

These two pieces together provide the framework for developing successful environmental education in working toward environmentally literate individuals and societies.

Key Systems Concepts and Supporting Concepts				
Parts & Objects	Interactions and relationships	Subsystems	Inputs & Outputs	Change Over Time
Abiotic factors Biotic factors Group Ideas and concepts Individual Member Properties Similarities and differences	Cause and effect Change and constancy Chaos Communication Cycles Ecosystem Feedback Formal and nonformal Function Ideal and real Migration Patterns Predation Population Probability Reciprocity Structure Synergy Trophic level	Biome Boundary Communication Community Economics Ecosystem Family and kinship Habitat Language Niche Politics Religion Scale Stratification	Artifact Communication Energy and energy flow Innovation and invention Instruction Products Resources Technology Waste	Accumulation Climate Cycles Diversity Evolution Extinction Geomorphism Ideas and concepts Innovation and invention Knowledge Migration Mutation Population Probability Rate Redundancy Scale Species Threshold

CONCLUSION

The time has never been more important for us to accelerate our efforts to create an environmentally literate citizenry. We are confident that by starting with children we can in fact grow an environmental literate society. But in order to accomplish this all-important fete, it takes a community-wide effort. Both educators and environmental organizations play an absolutely critical role in achieving this goal.

To maximize the access, resources and potential of both educators and environmental agencies requires, on a most basic level, communication. When both entities understand the needs, expectations and resources of the other – magic can happen!

We also acknowledge that there will always be some gaps due to budget constraints, personal interests, commitment to collaboration and other factors. This resource manual is one step in the efforts of many to advance the concept of environmental literacy. We hope that you can find something in it that is useful for you and that it will stimulate thought, discussion and communication with potential partners in environmental education.

As this grant program draws to a close, Natural Innovations see this not as an end but as a wonderful beginning. We hope you will join us in our quest for environmental literacy in our communities across Minnesota, across the United States and across the World. Let us make a commitment, together – today, that now is the time we begin to make a difference!

Thank you for your work and commitment to environmental literacy. If we all SEEK together….we will find ways to grow generations of environmentally literate children and adults!