



State of Illinois
Illinois Department of Natural Resources

Illinois Biodiversity Basics

a biodiversity education program of

Illinois Department of Natural Resources
Chicago Wilderness
World Wildlife Fund



Adapted from *Biodiversity Basics*, © 1999,
a publication of World Wildlife Fund's **Windows on the Wild**
biodiversity education program.





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About *Illinois Biodiversity Basics* Relevance of Biodiversity

Humans are part of an incredibly complex and interdependent web of life, and we're just beginning to understand our place in it. We're beginning to realize how dependent we are on biodiversity for most, if not all, our needs. We're also beginning to realize that a significant loss of biodiversity could seriously undermine our long-term economic, intellectual, physical and emotional well-being. Why haven't we been more aware of biodiversity and its importance before now? The answer may be partly due to our loss of intimacy with other living things. In many cases we've lost contact with the natural foundations on which our lives are built. Our ignorance of nature and the way it works may be catching up with us. The challenge now is to learn as much as we can to gain a new perspective on our place in the natural world, so that not only will we be better able to protect living things, but we'll also create a more sustainable and responsible society.

The diversity of life on earth shapes and nourishes every facet of our existence. But the connections between species are seldom obvious. Due to a variety of factors (see page 4), biodiversity is rapidly declining. To ensure the long-term health of the planet, an informed and motivated citizenry needs to be developed that understands what biodiversity is and why it's important. Citizens are needed who have the skills and confidence to rise to the challenge of protecting biodiversity and who feel empowered to do so. Education is one of the best tools for achieving this goal.

In education, biodiversity is an important topic that encompasses many disciplines and provides real-world contexts and issues that promote critical- and creative-thinking skills, citizenship skills and informed decision-making. Biodiversity also illustrates the complexity of environmental issues and the many perspectives and much uncertainty connected with them.

Overview

Illinois Biodiversity Basics, adapted from World Wildlife Fund's *Windows on the Wild: Biodiversity Basics*, is designed to provide ideas for integrating biodiversity into your teaching. The activities are **targeted to grades five through eight** but several may be adapted for use at other grade levels as well. The Illinois-specific activities are not meant to cover every aspect of biodiversity, but you should find plenty of information to introduce the topic and take students through levels of increasing complexity. The activities may be completed in any order and may be used singly or in units. Use as many as you have time for to supplement your teaching and bring biodiversity to life for students.

Goal and Outcomes

The goal in developing this booklet was to provide Illinois educators with a method to introduce students in grades five through eight to local biodiversity concepts, issues and conservation. Upon completing the entire unit students should: 1) possess a basic understanding of species, ecosystem and genetic diversity; 2) be able to explain the role biodiversity plays in ecosystem stability and health; 3) be able to report on the current status of biodiversity; and 4) know strategies to employ for biodiversity conservation and preservation.

Concepts and Principles

The conceptual framework for *Illinois Biodiversity Basics* was developed and organized around four major themes (pages 168-169):

- What is Biodiversity?**
- Why is Biodiversity Important?**
- What's the Status of Biodiversity?**
- How Can We Protect Biodiversity?**

The themes were chosen because they encompass the essential components of quality environmental education materials: awareness; knowledge; attitudes; skills; and participation. Standards-led learning objectives accompany each of these themes as does the exploration of clearly identified concepts (for a correlation of the activities to standards-based concepts see the Conceptual Framework and Correlation to *Illinois Biodiversity Basics* on page 168).

Illinois Biodiversity Basics is built on a set of underlying principles about education. The activities are based on many familiar strategies and approaches from constructivist learning to innovative assessment strategies, group-learning, problem-solving and interdisciplinary teaching.

Format

Illinois Biodiversity Basics was designed to give educators access to as much information as possible in an easy-to-use format. You'll find an overview of Illinois biodiversity (pages 4-5) followed by 12 field-tested, standards-led activities. While designed with specific learning standards in mind (standards-led), the activities also allow educators to help meet other learning standards. Each activity provides basic information and detailed procedures. The Appendices include supplemental material such as vocabulary definitions, scientific names for species used in the text, the conceptual framework and activity correlations to the Illinois Learning Standards and Benchmarks, subject areas and skills. Cross reference and planning charts provide an overview of all 12 activities "at-a-glance."

Illinois Biodiversity Basics and Windows on the Wild

Illinois Biodiversity Basics is adapted from World Wildlife Fund's (WWF) publication, *Windows on the Wild: Biodiversity Basics*. * Through the cooperative efforts of WWF, the Illinois Department of Natural Resources and Chicago Wilderness, Illinois has become the first state to publish its own version of this curriculum guide to exploring the web of life.

Windows on the Wild

If you are interested in teaching more about biodiversity, you may want to obtain a copy of the educator and student guides for *Windows on the Wild: Biodiversity Basics* and/or other materials from WWF. The core of the *Windows on the Wild (WOW)* program is a series of middle school modules on key topics related to biodiversity, including *Biodiversity Basics*, *Wildlife for Sale*, *Marine Biodiversity* and *Building Better Communities*. Each module contains background information, resource ideas and unit plans for the educator, as well as creative and challenging interdisciplinary activities for students. *WOW* curriculum materials are designed to help students explore the social, scientific, economic and ethical issues surrounding biodiversity and to give them the knowledge and skills they need to build a more sustainable future. Working with partners around the world, WWF developed a Biodiversity Education Framework to help guide people in life-long learning about biodiversity, sustainability and conservation.

Windows on the Wild: Biodiversity Basics is available for purchase from Acorn Naturalists at www.acornnaturalists.com or 800-422-8886.

This project was funded through a grant program supported by the USDA Forest Service Northeastern Area, State and Private Forestry, and the U.S. Fish and Wildlife Service, in support of Chicago Wilderness. USFWS and USFS grants of federal monies are administered by the Illinois Conservation Foundation.



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Illinois Biodiversity Basics

Illinois Department of Natural Resources, Chicago Wilderness, World Wildlife Fund



Biodiversity Background

What is Biodiversity?

Biodiversity is the variety of life on earth. There are three levels of biodiversity: species diversity; ecosystem diversity; and genetic diversity. *Species diversity* includes all living things from the tiniest bacterium to the large white-tailed deer and white oak tree. As of 2002, about 1.7 million species had been identified worldwide. It has been estimated that the number of species on earth is somewhere between 10 million and 300 million. Biodiversity also includes *ecosystem diversity*, the habitats that house all life forms and the interconnections that tie living things together. Ecosystem diversity includes the prairies, marshes, swamps, deciduous forests and all other environments where species live. Ecosystems not only provide habitat for species but also perform functions such as flood control and water purification. Biodiversity includes the variety within species, which is determined by the genes. *Genetic diversity* makes every living thing unique. Each species is like a book of genetic information, containing billions of genetic letters that give it a particular code of life. Its traits are the result of coded messages in the genes that are passed from one generation to the next. When a species becomes extinct, all the information is lost. Genetic diversity is a safeguard against future problems, such as disease or natural disasters.



Why is Biodiversity Important?

Biodiversity is important for many reasons. It helps maintain the atmosphere, keeps the soil fertile, purifies water and provides other functions that enable life to exist on this planet. It provides a variety of resources and products for humans, including many foods and medical products, and is the potential source for many more. Species variety may provide the ability to avert major disasters, such as crop failures from drought and disease. Biodiversity provides products that help to boost the economy. The natural world also offers us a place to relax and reflect. Many people believe that biodiversity is important not just because it is valuable, but simply because it exists.

What is the Status of Biodiversity?

According to the world's leading scientific and environmental experts, loss of biodiversity is one of the most urgent environmental problems facing the planet. As human populations grow, they exert increasing pressure on natural resources—pressure that is endangering species and ecosystems around the world. Habitat loss, introduced species, pollution, population growth and over-consumption are the main threats to biodiversity. The extinction of any species brings the irreversible loss of unique genetic codes and the potential loss of medicines, foods, products and jobs. At the same time, degradation of natural systems threatens the very services, such as water purification and nutrient recycling, that support all life on earth.

Illinois: Biodiversity and the Natural Divisions

Some people believe that Illinois is a state with little more diversity than corn and soybeans. However, Illinois actually has a surprising variety of organisms and habitats. Nearly 54,000 species have been identified in Illinois so far, not including bacteria. It is believed that millions of bacterial species may exist. The rich diversity of life in Illinois is due to the variety of habitat types provided by 14 natural divisions.

The natural divisions concept is a classification system of natural environments and biotic communities based on the bedrock, glacial history, topography, soils and distribution of organisms. Each natural division contains its own similar landscapes, climate, soils and bedrock and supports similar vegetation and wildlife. In general,

the more natural divisions, the more species diversity. Some species live in only one or a few of the natural divisions while others are more generalized in their needs and can survive in many different habitats.

Illinois' natural divisions include the Wisconsin Driftless, Rock River Hill Country, Grand Prairie, Northeastern Morainal, Illinois and Mississippi Rivers Sand Areas, Wabash Border, Southern Till Plain, Shawnee Hills, Coastal Plain, Lower Mississippi River Bottomlands, Ozark, Middle Mississippi Border, Western Forest-Prairie and Upper Mississippi and Illinois River Bottomlands. The largest natural division in Illinois is the Grand Prairie Division. Each of these areas contains unique habitats and species. Because they are so diverse, the biodiversity in Illinois is very diverse. For more information about Illinois' natural divisions, and to see a map of them, visit <http://dnr.state.il.us/education/biodiversity> on the Internet or obtain an *Illinois' Natural Divisions* poster from the Illinois Department of Natural Resources (see the "Resources" section, page 178).

People and Biodiversity

The people of Illinois make a significant impact on the landscape and its diversity. Clearing forests, plowing prairies, draining wetlands, developing urban areas, building roads and conducting other human activities have drastically reduced the diversity of habitats in Illinois and the overall biodiversity of the state. When people alter habitats they kill and/or force out the organisms that live in them, upset ecological relationships and reduce the ecosystem's ability to perform services like flood control, water purification and nutrient recycling. Some of the habitats that originally occurred in our state can only be found in nature preserves, state parks, conservation areas and other protected sites that shelter the state's biological diversity. However, we can help protect biodiversity, a task that involves all of us. All species are significant, many in unknown but, perhaps, vitally important ways. We must value biodiversity and try to preserve it.

How Can We Protect Biodiversity?

One of the greatest challenges we face in protecting biodiversity is how to balance the needs of the present without jeopardizing those of the future. There is no one way to address this challenge, partially because there is no single reason why we are losing biodiversity. There are several goals, however, which can be attained by people working together. One proposal is to maintain a state of relative equilibrium with our environment, called sustainability. A society that reaches sustainability is one that is able to persist for many generations without producing significant amounts of pollution, depleting natural resources and causing a decline in biodiversity. Many different points of view need to be taken into consideration before sustainability can be achieved. Land-use planning is needed so that space may continue to exist for species and ecosystems. Restoration of habitats is an important goal. Research must be done rapidly to find out as much as possible about what species exist, how they depend on their habitats and how habitats can be managed to ensure healthy populations. Legal protection is necessary for some species. Stewardship of natural resources should be considered when corporations make business decisions. Captive breeding can be used to increase the population of some species. Gene banks are being developed to store seeds and plant parts to preserve biodiversity for future generations. Citizens can take action in their own communities to solve biodiversity problems. Educating people about the problem will lead to better understanding and solutions. Ensuring the survival of species, genes and ecosystems will require a combination of approaches, and the collective thinking of people from all disciplines and backgrounds. It will mean fostering compassion for other species, educating ourselves about the connections among all elements of biodiversity and coming to terms with the consequences of our behavior for other people and other species.

Want to learn more about biodiversity? For additional information and materials about biodiversity contact the organizations responsible for bringing you this book. See the "Resources" section of the guide.



Biodiversity of Illinois CD-ROM Series

You will find frequent reference made in this guide to the *Biodiversity of Illinois* CD-ROM series from the Illinois Department of Natural Resources (IDNR). The three CD-ROMs in the series are Illinois-specific, supplemental and searchable. The field guide design offers full-color images, life history information, sounds, tracks, Illinois range, status, habitat descriptions and images and more. Information from the CD-ROMs can be printed. The CD-ROMs run on both Windows® and Macintosh® operating systems and are networkable on an in-school network.

Teachers in Illinois may obtain a set of the *Biodiversity of Illinois* CD-ROMs by written request on school letterhead. Send the request to the following address.

Illinois Department of Natural Resources
Division of Education
One Natural Resources Way
Springfield, IL 62702-1271
217-524-4126
dnr.teachkids@illinois.gov

Biodiversity of Illinois ***Volume I: Aquatic Habitats***

Nine Illinois aquatic habitats and 400 Illinois species are featured in the CD-ROM.

Biodiversity of Illinois ***Volume II: Woodland Habitats***

Learn about more than 400 Illinois woodland species and four Illinois woodland habitats on this CD-ROM.

Biodiversity of Illinois ***Volume III: Prairie and Edge Habitats***

The final CD-ROM in the series contains information about more than 500 Illinois species and seven prairie and edge habitats.