

# **Ecosystem Explorations**

**Sandia Mountain Natural History Center**

**New Mexico Museum of Natural History & Science**

# **Ecosystem Explorations**

**Third Edition, 2005**

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**Sandia Mountain Natural History Center**





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When one tugs at a single thing in nature,  
he finds it attached to the rest of the world.

John Muir



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## Introduction

Welcome to Ecosystem Explorations. This curriculum is intended to introduce your students to basic ecological concepts. Ecosystem Explorations will help your students understand their connection to the natural world. The curriculum is designed to work best when integrated with an outdoor field experience at the Sandia Mountain Natural History Center or another outdoor natural area.

### The Sandia Mountain Natural History Center

The Sandia Mountain Natural History Center (SMNHC) is an environmental education Center in Cedar Crest, New Mexico. The center offers many programs for school groups and others, some of which are free of charge. To learn more about the center go to the “About Us” file on this curriculum CD.

### Goals of Ecosystem Explorations

This guide contains lessons designed by our instructional team to assist you with incorporating the Sandia Mountain Natural History Center’s Ecology Field Program into your curriculum. We developed this guide in response to the many fifth-grade teachers who requested preparation and follow-up materials. An independent evaluation of the Ecology Field Program also revealed the need for a pre- and post-visit curriculum. Although it was initially written to serve teachers and students who visit the SMNHC, many teachers from non-local districts use it and take their students to an alternative local ecosystem. Students learn and retain more about ecology when learning about familiar local environments.

We anticipate that teachers who use Ecosystem Explorations will provide their students with:

- continuity and depth of instruction related to the Ecology Field Program at the Sandia Mountain Natural History Center,
- a greater opportunity for discovery during the Ecology Field Program because students will have the background necessary for in-depth exploration, and
- a means to connect ecological concepts learned at the Sandia Mountain Natural History Center (or other area) to their own community.



## Ecosystem Explorations



The lessons in Ecosystem Explorations focus on the concepts necessary for understanding ecosystems. These are grouped into two sections.

### Section One: Understanding Ecosystems

Section One contains seven lessons to prepare your students for the Ecology Field Program. This section presents ecology concepts that create a foundation for the lessons and activities that take place at the Sandia Mountain Natural History Center.

### Section Two: The Field Experience

This short section contains information to make the field trip go smoothly.

## Curriculum Components

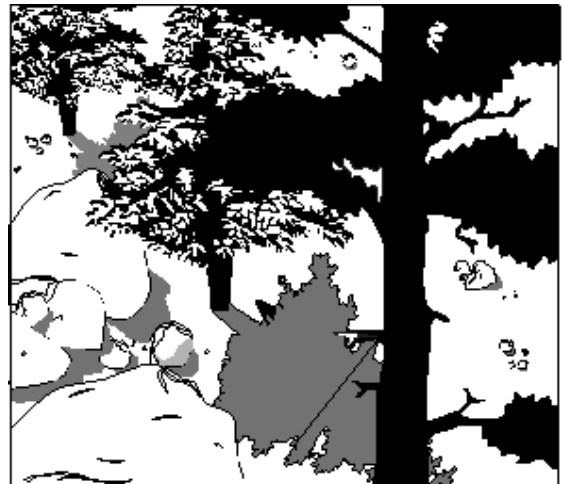
### Journals

Research on using writing to teach science indicates that using journals allows students to understand the material they study instead of relying on rote memorization of science concepts. In Ecosystem Explorations, the minds-on journal exercises complement the hands-on activities described in each lesson. The journal exercises provide students with an opportunity for reflection and synthesis, serve as an organizational tool for information, help develop good writing habits, and often provide assessment opportunities. Emphasizing journal use throughout the lessons will increase student success.

### Cooperative Learning

Many of the lessons in the Ecosystem Explorations incorporate cooperative learning principles. Research indicates that cooperative learning can increase academic achievement, especially among low achievers and minority students. Cooperative learning also improves working relationships among students, facilitates inclusion of students with limited English skills, and increases individual student's self respect and self-direction.

We incorporate cooperative learning techniques into these lessons for the following additional reasons. First, the overall theme of this education guide involves the study of ecosystems as interdependent parts. Cooperative learning structures reflect the interdependent nature of the academic content. Secondly, the lessons in this education guide and the field program help students understand the role of natural ecosystems in human lives. Understanding this concept involves examination of social questions, many of which have no single correct answer.



In the classroom, as in society, the only way to find workable solutions to complex problems is to work cooperatively. Thus, cooperative learning techniques build important life skills. Finally, cooperative learning techniques reflect the Character Counts principles as outlined in APS district goals.

The following hints from *Cooperative Learning* by S. Kagan will help you in managing the cooperative learning activities in *Ecosystem Explorations*.

1. Designate cooperative learning teams of four students at the beginning of *Ecosystem Explorations* and keep the same teams throughout the pre-visit lessons, field program, and post-visit lessons. For lessons that involve groups of two, divide each team of four into pairs.
2. Assign teams so that each team has a diversity of learners. Consider achievement levels, language skills, learning styles, gender, and ethnicity.
3. Emphasize to students that they may ask for and give assistance within their group instead of always asking the teacher for help.
4. Encourage team cooperation but also emphasize that each student is responsible for her or his own work.
5. Consider the possibility of assigning roles within teams. Examples include the materials monitor to gather materials for each lesson, a recorder to record ideas, a quiet captain to help keep students from getting too loud, and a time keeper to help the team stay on task and complete the assignments.
6. Establish and use a quiet signal to gain attention from the whole class when necessary.

### Lesson Components

Each lesson contains the following components:

- **Overview:** a general explanation of the lesson.
- **Concepts:** the overall principles students will learn as a result of doing the activities.
- **Time:** an estimate of the minimum time needed to complete the activities. Some activities are ongoing and need to be completed over the course of several days or several weeks.
- **Materials and Teacher Preparation:** lists of materials to gather and preparations to make before presenting the activity to students.
- **Background:** You may use this section to understand the content knowledge necessary to teach the lesson. Words essential for understanding the concepts presented in the lesson are bolded. Definitions to keywords are available in the glossary. Key words are provided to illustrate concepts and assist students with limited English skills.
- **Procedure and Closure:** These sections give instructions for presenting the lesson. Activities with teams use teams of four students unless otherwise noted. Answers to questions are in brackets when appropriate.



- **Adaptations for Students with Limited English Proficiency:** This section gives hints on teaching the lesson to students with Limited English Proficiency (LEP) skills.
- **Key words:** (bolded in the Background section) are listed here to target specific vocabulary for students with limited English proficiency.
- **Journal Exercise:** This section explains how the journal is used during the lesson.
- **Extensions:** ideas for further investigation of the lesson topic
- **Assessments:** suggestions for evaluating student performance and achievement.
- **On the Field Trip:** extensions that can be done during the field trip or outside in the schoolyard.
- **N.M. State Standards** (interdisciplinary): The N.M. State Standards for Excellence for fifth grade covered by each lesson are in a separate file on this curriculum CD.
- **Glossary:** a file containing definitions for all key words in English and Spanish.

