# Section One: Understanding Ecosystems

Ecosystems are the collection of interdependent living (biotic) and nonliving (abiotic) parts of an environment. Our Earth includes a variety of ecosystems, from forests to deserts to oceans to prairies. Each of these ecosystems operates on the same basic principles. This section introduces students to the basic ecological principles necessary to understand ecosystems in general and New Mexico ecosystems in particular.

This section contains six lessons to be done prior to participating in the Ecology Field Program at the Sandia Mountain Natural History Center or other outdoor location.

# Ecosystem Explorations Journal

**Overview**

Students will learn about the importance of journals in science by creating individual journals and practicing different journaling methods and recording techniques that they will subsequently use with each lesson in Ecosystem Explorations.

**Concepts**

1. Scientific observations, both written and illustrated, provide information from which patterns, connections, and trends can be learned over time.
2. Personal observations and reflections enable an individual to better remember events and to personalize those events.
3. Students will develop the lifelong habit of maintaining a journal.

**Time:** 1 hour

- Introduction: 5 minutes
- Constructing the journal: 25 minutes
- Using the journal: 20 minutes
  (Choose one of three activities and do others on different days.)
- Closure: 10 minutes

**Materials**

For each student:

- one piece of 12" x18" construction paper
- 15 pieces of white paper, 8½" x 11"
- two brads or yarn to bind journal
- assorted markers and crayons for decorating journals
- Close Observation Data Sheet included with this activity

For the whole class:

- single hole punches or staplers

**Teacher Preparation**

1. Gather materials necessary to make journals.
2. Hole punch journal paper.
3. Prepare one journal following the instructions in the procedure to be used as a model.

**Background**

Students will create their own personalized journal to use in each lesson of Ecosystem Explorations. Students will use the Ecosystem Explorations Journal for many different types of expression, including record keeping, organization, reflection, and scientific observation. Record keeping is an important component of scientific inquiry. Similar to the way scientists keep careful records of their studies, students will record various ecological ideas in their journals. These data help students recognize patterns, connections and trends. The journal is also a place to organize the material they gather and produce in following lessons.

A scientific journal is different than a personal journal in that the information that is included should strive to be objective and accurate. The students record their observations, data, and analysis and reflect on the significance of these data. A personal journal, on the other hand, includes interpretations and reflections on the emotional impact and philosophical significance of experiences, which encourages students to construct their own meanings from their experiences. This guide will give students the opportunity to experience both scientific and personal journaling methods.

Quotes, both in English and Spanish, that reveal many different styles of journaling have been included for you to use with students. There will be opportunities at both the Sandia Mountain Natural History Center and during each lesson in Ecosystem Explorations for students to record what they are learning and experiencing in their journals.

**Procedure**

Introduction:

1. Read and post a quote that engages your students.
2. Brainstorm with your students why it is important to write down observations, thoughts, and feelings and to make sketches of what they see.
3. Tell students that, like many scientists, they will be keeping an Ecosystem

Explorations Journal, which they will use to keep track of what they are learning, their observations, their thoughts, and their reactions to the upcoming lessons.

**Constructing the Journal**

4. Model for the students how to make a journal, using the directions below.
   a. Fold a piece of 12" x 18" construction paper widthwise to form a cover.
   b. Attach about 15 blank pages to the top inside of the back cover. Suggested methods of attaching pages include:
      - punching holes and brads or yarn to attach the pages to the top inside of the cover so pages can flip upwards (preferable so pages can be easily added)
      - stapling pages to the top of the inside of the cover in the same manner as above.
5. Pass out materials and have students make their own journals. Have students decorate the covers to personalize their journals.
6. Pick one of the three journaling options (A, B, or C). Each of the following options illustrates one method of journaling. The journal activities in the lessons in this guide will utilize these methods. To make each subsequent lesson flow smoothly, we suggest students practice each of the following journaling options at least once. To be most effective, we suggest using only one of the following options per practice session. Students can practice the other options in short, 20 minute practice sessions prior to continuing with the other lessons.
7. As an alternative to making their journal students can designate one notebook or other bound collection of papers as their journal and do the journaling activities in this.

**Option A: Webbing (Organizing Information)**

Model webbing on the chalkboard and then have students do the activity in their journals. Webbing diagrams can be used for many purposes such as recording scientific observations and recording personal experiences.

1. Place the word “nature” in the middle of the board / paper. Draw a circle around the word.
2. Brainstorm with students about what things, thoughts, or feelings this word brings to mind.
3. Write down a few of the students’ responses around the word “nature” on the chalkboard.
4. Connect the ideas back to the word “nature” with a line.
5. When students understand the concept of webbing have them continue webbing in their own journals.

### Option B: Description and Illustration (Close Observation)

Model the following process on the chalkboard, then have the students continue the activity in their journals.

1. Explain to the class that scientists often use journals to write down detailed observations of the natural world.
2. Establish a set of items that students must record every time they make close observations so that they will be able to make comparisons between observations. These items may include the location, time, and date, the current weather conditions, and a description or the name of what is being observed. A sample "Close Observation Data Sheet" has been included for you to copy for your students if you would like.
3. Choose a natural object that is large enough for the whole class to see (for example: a classroom animal, a pine cone, a plant, etc.).
4. Tell students that they should use their senses during their observations.
5. Have the class brainstorm a description of what the object looks like. List the characteristics or write them as sentences on the board.
6. Make the distinction between actual observations and what students imagine is happening. For example, "The crow flew from one tree to another tree" is an observation, while "The crow is happy to be flying in the sun," is not. Students may use their imagination when doing observations, but they should understand the difference between observable facts and what they imagine to be happening.
7. Be sure to include any changes that occur while observing.
8. After looking closely, have students do an illustration of the natural object in their own journals.
9. If time permits, go outside and assign each team to different natural objects or pass out natural objects to teams. Have students repeat the observation process on their own.

### Option C: Reflection

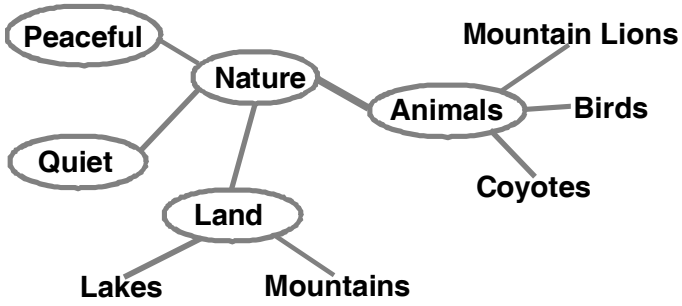
Model the reflection process on the chalkboard while students are doing the activity in their journals. Reflection can be used for both scientific and personal purposes. Scientific reflection attempts to pull together bits of information to form a bigger picture. Scientific reflection can be done after an activity so that students can write down in their own words what they learned, and how the new information relates to what they already know. Personal reflection can help students relate new experiences to their own lives or provide an opportunity for students to record their thoughts and feelings about their experiences.

1. Share a favorite quote with the students. (Examples included).
2. Have students write down thoughts, feelings, and reactions to the quote.

   What does it make you think of?

   Does it bring up any experiences in your own life?

3. Record these ideas on the chalkboard and have the students record them in their journals.




**Closure**

Have students share their journal entries in pairs. What similarities do they notice? What differences do they notice? Remind students that the journals are a place where they can personalize their experiences during Ecosystem Explorations. Like scientists, they will participate in activities, keep track of their observations, and reflect on the significance of what they learned. Also, as they will be looking back on their journal entries, remind them that the journal entries need to be understandable weeks later. The journal will serve as an ongoing record for students to see what they have learned during Ecosystem Explorations.

**Adaptations for Students with Limited English Proficiency**

Allow students to choose the language that they will use when performing their journaling activities. When sharing in small groups allow students to share in either their first or second language.

**Key words**: journal: el diario; scientist: un científico o una científica; webbing: un red o enredado; observation: una observación; reflection: una reflexión.

**Assessment**

The journal will provide a means for ongoing evaluation during Ecosystem Explorations. Students should date each journal entry to keep track of their progress.

**Extensions**

Have students perform an ongoing observation at home or in a different environment. Have students choose a natural object that is stationary, such as a plant or a rock, in the schoolyard or at home to observe over time. Have students observe their object at different times of the day and as the seasons change. Their observations can include what kind of habitat their natural object is in, how their natural object might be used as food or shelter by other animals, etc. Have students record their observations in their journals.

Alternatively have students do two close observation sheets, in two differing areas and discuss why the areas might be different. For example, north and south facing areas, amount of moisture, type of soil.

### On the Field Trip

Have all the students bring their journals. Include two blank Close Observation Data Sheets in case there is an opportunity to complete them during the field trip.

## Quotes About Nature

The quotes on the following pages have been provided as examples of different methods of writing about the environment. Suggestions for their use have been included in this lesson, but they may also be included throughout the other lessons in Ecosystem Explorations.

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The frog does not drink up the pond in which he lives.

Indian proverb

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The mockingbird, the mockingbird,
in the morning he speaks,
in the morning he sings.
For the sake of the people in the
morning
he speaks.
In the morning he sings.

Acoma Pueblo

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Mad coyote
Madly sings,
Then roars the west wind!

Tewa

---

The deer, the deer, he went,
Here are his tracks over mother earth,
Tramping, tramping, through the deep forest.

Cochiti Pueblo

The horned lizard that I noticed was unlike his cousins that lived east of the area. It had an array of white spots on its back. I was eating my lunch and watching my subject at the same time. The lizard remained motionless, on a rock, in the shade of a bush for 15 minutes. Then it climbed a rock. I did not see the insect, but I noted a tail movement and a lunge forward and the lizard had a meal.

From *Basic Projects in Wildlife Watching* by Sam Fadala

"Lesson 1"
The desert is powerless
when thunder shakes the hot air
and unfamiliar raindrops slide
on rocks, sand, mesquite,
when unfamiliar raindrops overwhelm
her, distort her face.
But after the storm she breathes deeply,
caressed by a fresh sweet calm.
My Mother smiles rainbows.
When I feel shaken, powerless
to stop by bruising sadness,
I hear My Mother whisper:
Mi'ja
don't fear your hot tears,
cry away the storm, then listen,
listen

Pat More

In the ants' house the dew is a flood.

Persian proverb

Any fool can destroy trees. They cannot run away.

John Muir

What connects the crab to the lobster and the orchid to the primrose and all four of them to me? and me to you?

Gregory Bateson

I need to keep a field journal—the words and music—because it keeps alive the delight in discovery. I need to keep my own notes, my own sketches, and my own observations along with digging out facts.

From *The Naturalist's Path* by Cathy Johnson

Very early in the morning of today, I did get out of my bed and I did get dressed in a quick way. Then I climbed out the window of the house we live in. The sun was up, and the birds were singing. I went my way. As I did go, I did have hearing of many voices—they were the voices of the earth, glad for the spring . . .I too did feel glad feels, from my toes to my curls.

From *The Singing Creek Where the Willows Grow* by Opal Whitely.
From her diary when she was aged 6–9
and living in a logging community in Oregon in the 1920s.

To me a lush carpet of pine needles or spongy grass is more welcome than the most luxurious Persian rug.

Helen Keller

It is our task in our time and in our generation, to hand down undiminished to those who come after us, as was handed down to us by those who went before, the national wealth and beauty which is ours.

John F. Kennedy

It will talk as long as it wants, this rain. As long as it talks, I am going to listen.

Thomas Merton

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

John Muir

What is a weed? A plant who virtues have not yet been discovered.

Ralph Waldo Emerson

For in the true nature of things, if we rightly consider, every green tree is far more glorious than if it were made of gold and silver.

Dr. Martin Luther King, Jr.

Earth and sky, woods and fields, lakes and rivers, the mountain and the sea, are excellent schoolmasters, and teach some of us more than we can ever learn from books.

Sir John Lubbock

## Algunos Poemas Acerca de la Naturaleza

**Oda al Aire**
Andando en un camino
Encontré el aire,
lo saludé y le dije
con respeto:
. . . ven conmigo
nos queda mucho
que bailar y cantar
camos
a lo largo del mar
a lo alto de los montes,
vamos
donde esté floreciendo
la nueva primavera
y en un golpe de viento
y canto
repartamos las flores
el aroma, los furtos,
el aire
de mañana . . .

por Pablo Neruda

Yo soy un río
voy bajando por
las piedras anchas.
Voy bajando por
las rocas duras
por el sendero
dibujado por el viento

por Javier Heraud

**Refran**
Quien a buen árbol se arrima, buena sombra le cobija.

tradicional

**Mariposa**
Mariposa
de primores
un moñito
de colores.
por Ernesto Galarza

**Nada Mas**
Con esta moneda
me voy a comprar
un ramo de cielo
y un metro de mar
un pico de estrella
un sol de verdad
un kilo de viento
y nada más.
por María Elena Walsh

**Verde Marzo**
Verde, verde
bajo el sol
Verde la hoja
del caracol.
Verde la hoja
roja la flor,
que vista zumbando
el picaflor.
Verde la hoja
alta la flor
amarilla sonrisa
del girasol.
La mariposa
de flor en flor
verde el campo
bajo el sol.
por Alma Flor Ada

**Día del Sol**
Día del sol:
hay una mariposa
en cada flor.
por José Juan Tablada

**El Árbol**
Si un árbol del bosque
queremos cortar,
otro árbol pequeño
se debe plantar.
tradicional

**Oda a la Claridad**
La tempestad dejó
sobre la hierba
hilos de pino, agujas,
y el sol en la cola del viento.
Un azul dirigido
llena el mundo.

O día pleno,
O fruto
del espacio
mi cuerpo es una copa
en que la luz y el aire
caen como casadas . . .
por Pablo Neruda

# Close Observation Data Sheet

## Who, When, Where

Name _____

Date _____ Time of Day _____

Description of Location

Description of Weather

Sketch

Observation

List in detail the characteristics of what you are observing and any changes that may take place.

Questions

Write one or more questions about what you are observing.

# Hoja de Observaciónes

## Quien, Cuando, Donde

Nombre _____

Fecha _____ Hora del día _____

Descripción de la localidad

Descripción del tiempo

Bosquejo/dibujo

Observaciónes

Lista con detalles las características de lo que observas y de cualquier cambio que se opere.

Preguntas

Escribe una pregunta sobre lo que observas.