



REVIEWED & RECOMMENDED  
National 4-H Curriculum

Product Number 08411



# EXPLORING Your Environment

EARTH'S  
CAPACITY





## ACKNOWLEDGMENTS

### Authors

Katie Clarke, Extension Educator, University of Minnesota Extension; 4-H Youth Development  
Heidi Haugen, Extension Educator, University of Minnesota Extension; 4-H Youth Development  
Rebecca L. Meyer, Extension Educator, University of Minnesota Extension; 4-H Youth Development  
Barbara Piehl, Extension Educator, University of Minnesota Extension; 4-H Youth Development  
Nicole Pokorney, Extension Educator, University of Minnesota Extension; 4-H Youth Development

### Project Director

Kathleen Jamison, Ph.D., 4-H Curriculum and Learning, Cooperative Extension Service, 4-H Youth Development, Virginia Tech

### Project Advisor

Michael Bowers, National Program Leader-Ecology; National Institute of Food and Agriculture (NIFA) USDA

### Editor

Wendy Rubinyi, Instructional Design Specialist

### Research Assistant

Kelly Wilkens

### Layout and Design

TM Design, Inc., [www.tmdesigninc.com](http://www.tmdesigninc.com)

### 2008 Curriculum Team

#### Revision Author

Laurie W. DeMarco, Ph.D., Horticulture and Education Consultant, Salem, VA

#### Project Director

Kathleen Jamison, Ph.D., 4-H Curriculum and Learning, Cooperative Extension Service, 4-H Youth Development, Virginia Tech

#### Environmental Science Reviewer

Carol D. Hanley, Ed.D., Director of Education and Communications, Cooperative Extension Service, 4-H Youth Development, University of Kentucky  
Gregory Crosby, Ph.D., National Program Leader, Natural Resources and Environment, USDA, CSREES, Washington, D.C.

#### Technology Reviewers

Shaun Jason Adams, Project Associate, 4-H, Rockingham County Extension, Virginia Cooperative Extension, Virginia Tech  
Norm Lownds, Associate Professor, Curator, 4-H Children's Gardens, Michigan State University

#### Educational Reviewer

Cary Sneider, Ph.D., Associate Research Professor, Portland State University, Portland, Oregon.

#### Editor

Ann E. Hale, M.S.L.I.S., M.A.

# TOYOTA

Support for this publication was provided by Toyota. Toyota established operations in the United States in 1957 and is committed to being a good corporate citizen in the communities where it does business. The company believes in programs with long-term sustainable results, and supports numerous organizations across the country, focusing on education, the environment and safety.

## Noyce Foundation

Support for this publication was provided by the Noyce Foundation. The Noyce Foundation is dedicated to stimulating ideas and supporting initiatives designed to produce significant improvement in teaching and learning in mathematics, science and literacy for youth in grades K-12.



Copyright © 2010 Regents of the University of Minnesota. All rights reserved. Send copyright permission inquiries to: Copyright Coordinator, University of Minnesota Extension Service, 405 Coffey Hall, 1420 Eckles Avenue, St. Paul, MN 55108-6068. E-mail to [copyright@extension.umn.edu](mailto:copyright@extension.umn.edu) or fax to: (612) 625-2207. The information given in this publication is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no

endorsement by the University of Minnesota Extension Service is implied. The University of Minnesota Extension Service is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

ISBN: 978-1-936582-01-3

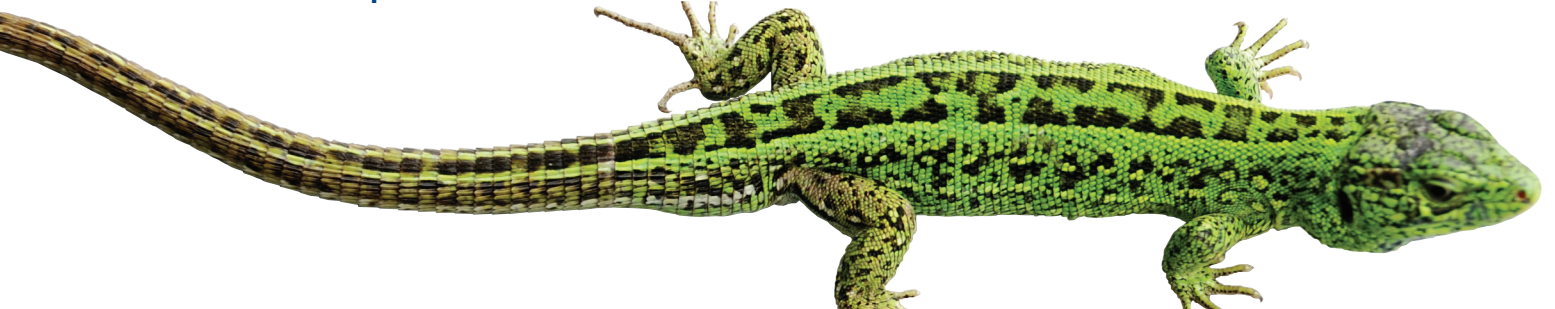
For ordering information contact National 4-H Council Supply Service at: (301) 961-2934.

The 4-H Name & Emblem is protected under 18 USC 707. Support for this publication does not imply endorsement by 4-H of any firm, product, or service.



# TABLE OF CONTENTS

<b>How This Book Works</b>	2
<b>Exploring Your Environment: Earth's Capacity Planning Guide</b>	3
<b>Stewardship and Sustainability</b>	
1. Dream Steward	6
2. Abundance and Scarcity	10
<b>Land Use</b>	
3. My Land Use	14
<b>Populations, Health, and Quality of Life</b>	
4. Our Carrying Capacity	18
5. Butterflies I See	22
6. Aliens in the New World	26
<b>Climate Change</b>	
7. Investigating My Climate	30
8. Responding to Global Climate Change	34
<b>Life Cycle Analysis</b>	
9. Take In the Trash	38
<b>Ecological Footprints</b>	
10. My Ecological Footprint	42
<b>Living a Sustainable Life</b>	
11. My Promise to the Earth	46
12. Community Action Leadership Challenge	50
<b>Words to Explore</b>	58



# WELCOME TO EXPLORING YOUR ENVIRONMENT: EARTH'S CAPACITY HOW THIS BOOK WORKS

Have you ever wondered...

How does water pollution affect wildlife?

What alien species live in your neighborhood?

How can you decrease your use of energy?

The activities in *Exploring Your Environment: Earth's Capacity* will help you answer some of these questions and many more! Each section of your project book focuses on an environmental question or issue and provides activities that will help explain how **Earth's Capacity** works. You will jump right into real-world issues that affect your life through investigations and explorations of the natural world. Use your Field Notes to write questions, keep track of data or make a drawing of what you observe.

## Your Project Facilitator

You will have lots of help as you learn about the environment! Your *Exploring Your Environment: Earth's Capacity* Project Facilitator is an important part of your overall environmental learning experience. The choice of a facilitator is yours. This person may be your project leader or advisor, teacher, family member, neighbor, friend or anyone who has the interest to work with you on these activities. Involve your facilitator as you set your goals. Discuss the questions that come up during and after the activities. When possible, find someone with experience or training in environmental science to work as an advisor to you and your facilitator.

Let your facilitator know there are additional resources that can enhance your experiences as you work through the book. There is a facilitator guide that:

- Correlates each activity to the National Science Standards
- Identifies Life Skills built in each activity
- Includes the Science, Engineering and Technology abilities that are addressed through each activity
- Provides helpful facilitator tips for each lesson

In addition, have your facilitator check out the **Exploring your Environment website** for additional resources, such as the Experiential Learning Model, Facilitation Tips, and Professional Development information. The website can be accessed at this URL: [www.4-H.org/curriculum/environment](http://www.4-H.org/curriculum/environment)





# EXPLORING YOUR ENVIRONMENT: EARTH'S CAPACITY PLANNING GUIDE

## My Plans

- Choose a Project Facilitator
- Complete all four steps of the *Exploring Your Environment: Earth's Capacity* Planning Guide
- Keep the *Exploring Your Environment: Earth's Capacity* Field Notes throughout the project
- Go to 4-H *Exploring Your Environment* online [www.4-H.org/curriculum/environment](http://www.4-H.org/curriculum/environment) for additional resources and information

My Name \_\_\_\_\_ My Project Facilitator \_\_\_\_\_

Facilitator's Phone Number \_\_\_\_\_ Facilitator's E-mail Address \_\_\_\_\_

I plan to complete my *Exploring Your Environment: Earth's Capacity* project book by \_\_\_\_\_.

## 1. Complete the *Exploring Your Environment: Earth's Capacity* Activities

Ask your Project Facilitator to date and initial this log as you complete the activities.

### REQUIRED ACTIVITIES

Activity Name	Date Completed	Facilitator's Initials
1. Dream Steward		
2. Abundance and Scarcity		
3. My Land Use		
4. Our Carrying Capacity		
5. Butterflies I See		
6. Aliens in the New World		
7. Investigating My Climate		
8. Responding to Climate Change		
9. Take In the Trash		
10. My Ecological Footprint		
11. My Promise to the Earth		
12. Community Action Leadership Challenge		
13. Field Notes		

## 2. Leadership Experiences

Participate in at least two of these experiences. Put a check mark by the ones you plan to do.

Experience	Plan to Do	Date completed
Give a demonstration on an environmental topic		
Teach someone something about the environment		
Encourage a friend to be a part of this project		
Attend an environmental workshop		
Give a speech on an environmental subject		
Tour a nature center		
Exhibit an environmental project		
My own activities:		

## 3. Exploring Your Environment: Earth's Capacity Project Highlights

A Field Note area can be found in each activity. Record your observations and ideas in your Field Notes when you learn something which is personally exciting and challenging in *Exploring Your Environment: Earth's Capacity*. Describe what you learned.

## 4. Exploring Your Environment: Earth's Capacity Project Review

Once you have completed the activities in this book, arrange to talk with your Project Facilitator about what you have learned. You will want to have your planning guide and Field Notes up-to-date to help you with this discussion.





---

---

---

---

---

---

---

---

---

---

# STATION CURTAIN



**Materials:**

- Book – “The Lorax” by Dr. Seuss
- Book – “The Curious Garden” by Peter Brown
- 2-3 environmental stewardship stories (found via the internet or the local library)

**GET GROUNDED: INTRODUCTION**

**Stewardship** is defined as the “careful and responsible management of something entrusted to one’s care.” **Environmental Stewardship** is when individuals (and communities) take on roles to care for the Earth and its resources. Environmental stewardship is an action that fosters **sustainability**, including planting with native species, shopping locally, and walking, biking or using mass transit. Ultimately, adopted stewardship practices are intended to preserve/maintain healthy, functioning ecosystems for present and future generations.

**DIG IN!:** ACTIVITY

Find a learning partner (youth or adult) and read at least two folktales/stories. You can choose one or two from the materials list, or use other stories on environmental stewardship that you may have found at your library, online, or from your facilitator.

- Book – “The Lorax” by Dr. Seuss
- Book – “The Curious Garden” by Peter Brown

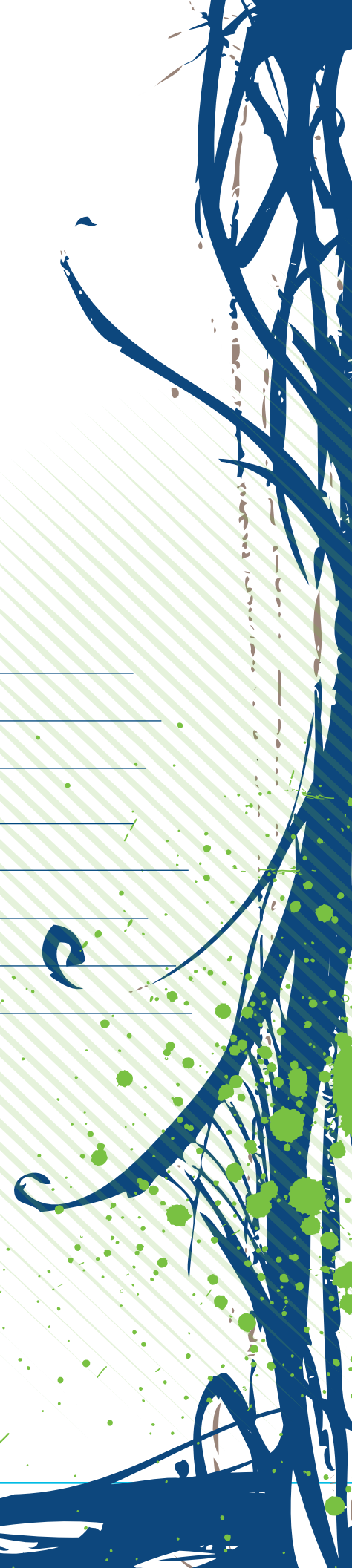




## THINK ABOUT IT: REFLECTION

With your learning partner, discuss and answer the following:

1. What were the key points of the story?
2. What surprised you?
3. What did you learn about yourself from the story?
4. What kinds of qualities do you think are needed in a good earth steward?
5. Are these qualities revealed within the characters?



---

---

---

---

---

---

---

---

## IMPORTANT FACT

Stewardship practices are based on sound science about how our environments form and function. For example, in Yellowstone National Park during the early 20th century, the management practice adopted was to prevent and suppress forest fires. This practice led to devastating forest fires years later due to fuel build up in the forest that created more intense fires.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

**DIG IN  
DEEPER:**  
EXTENSION ACTIVITIES

Research local, national and global organizations that are devoted to environmental stewardship activities. How are these organizations similar? How are they different from one another? What impacts are occurring because of these organizations' efforts? What role does science play in making decisions? How could you take part in supporting their stewardship goals?



## NATURAL CONNECTIONS TO EARTH'S CAPACITY

Good stewardship is based on sound science about how our environments form and function. While stewardship decisions and practices are based on the best science available at the time, we are always learning new and better management practices.





Handwriting practice lines consisting of ten horizontal blue lines.

# STATION CURTAIN



# ABUNDANCE AND SCARCITY

## Materials:

- Exploring Your Environment: Earth's Capacity

## GET GROUNDED: INTRODUCTION

**Natural Capital** describes natural **ecosystems** and resources that provide valuable inputs and services for economic production. For example, a forest of trees is renewable, providing new trees and resources for the future, and a wetland can act as a filter to clean pollution from lakes and streams. Natural capital are natural resources, lands, and ecosystems that are considered essential to long-term sustainability because they provide functions and services to the economy to humans and to other living beings on our Earth.

## DIG IN!:: ACTIVITY

1. With your partner, think about where you live. Take some time to brainstorm and think about the following:
  - What is there a lot of in your environment?
  - What is there not much of in your environment?
  - What is just about right?

These are considered to be part of your environment's natural capital – the resources that you consider to be of value in your natural world.

Find a way to record your thoughts. You might choose to create a chart in your Field Notes, or use the chart on page 13. Identify the best recording method for you!

2. Next to each resource you listed, record the following:
  - What Ecosystem Services do these things provide? Look at Supporting, Provisioning, Regulating, and Cultural Services. Be as specific as you can.
  - Place a dollar value on each of those resources. What do you think that they are worth to you? What are they worth to others?
3. Next, on your own, fill in the spaces of your chart with the following:
  - If you could pick two resources in your natural environment that you would like to have more of, what would they be?
  - If you could pick two resources to reduce, or get rid of, what would those be?
4. Then with your partner, share your answers with each other. What does this tell you about the balance of natural capital in your natural environment? Does this seem like a suitable mix to you?





## THINK ABOUT IT: REFLECTION

- How did you and your partner's natural capital answers differ? How were they the same?
- How did you place a value on the resources listed in your natural capital chart in your Field Notes on page 13?
- Have you asked yourself these kinds of questions before? If so, when?
- What new questions do you have about your environment?
- In what other areas of your life do abundance and scarcity play an important role?



---

---

---

---

---

---

---

---

---

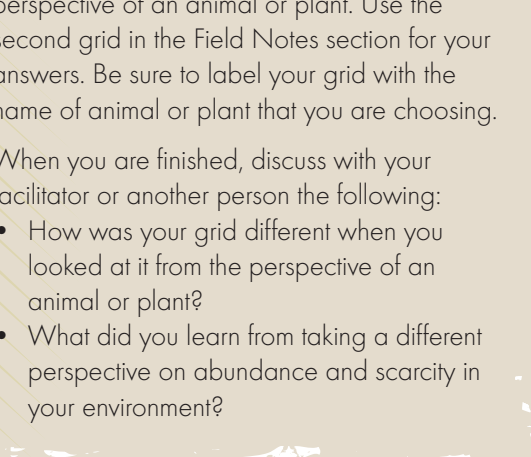
---

## IMPORTANT FACT

We have thought for a long time that our resources were nearly unlimited. Now we are rethinking how we use various competing resources. Resources are not as “abundant” as they seemed in the past.

[illegible]

**DIG IN**  
**DEEPER:**  
EXTENSION ACTIVITIES

A faint, stylized illustration of a person's head and shoulders in profile, facing right. Inside the head is a thought bubble containing a 3x3 grid. The grid has a blue background with yellow diagonal lines. The text of the slide is overlaid on this background.

Look at abundance and scarcity from the perspective of an animal or plant. Use the second grid in the Field Notes section for your answers. Be sure to label your grid with the name of animal or plant that you are choosing.

When you are finished, discuss with your facilitator or another person the following:


- How was your grid different when you looked at it from the perspective of an animal or plant?
- What did you learn from taking a different perspective on abundance and scarcity in your environment?

- How was your grid different when you looked at it from the perspective of an animal or plant?
- What did you learn from taking a different perspective on abundance and scarcity in your environment?

A stylized globe icon in the top left corner, showing green landmasses and blue oceans with a thick black outline.

## NATURAL CONNECTIONS TO EARTH'S CAPACITY

For ecosystems to work properly, and provide a flow of services, they must function as whole systems. This means that the structure and diversity of the whole system contains all the important components of natural capital needed. Resources need to be able to renew themselves within that system. If they are overharvested (if we use too much of them), this will damage their capacity to renew themselves, and the services they provide to that ecosystem are placed at risk. If the damage is too great, the ecosystem itself could change into a completely different one, one that may provide very different—and possibly much fewer or less useful—services.



## NATURAL CONNECTIONS TO EARTH'S CAPACITY

For ecosystems to work properly, and provide a flow of services, they must function as whole systems. This means that the structure and diversity of the whole system contains all the important components of natural capital needed. Resources need to be able to renew themselves within that system. If they are overharvested (if we use too much of them), this will damage their capacity to renew themselves, and the services they provide to that ecosystem are placed at risk. If the damage is too great, the ecosystem itself could change into a completely different one, one that may provide very different—and possibly much fewer or less useful—services.

## MY ENVIRONMENT HAS:

A Lot of This	A Little of This	Just the Right Amount of This	What I Would Boost & Reduce
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	<b>Boost</b> 1.
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	2.
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	<b>Reduce</b> 1.
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	2.
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	

## ENVIRONMENT HAS: (FROM THE PERSPECTIVE OF: \_\_\_\_\_)

A Lot of This	A Little of This	Just the Right Amount of This	What I Would Boost & Reduce
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	<b>Boost</b> 1.
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	2.
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	<b>Reduce</b> 1.
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	2.
Resource: Service Provided: Value:	Resource: Service Provided: Value:	Resource: Service Provided: Value:	

STATION