

# Preface

**F***undamentals of Physical Geography*, now in its second edition, was written to provide students from any academic major with a basic knowledge of Earth's natural features and the processes that affect them. The book also considers human impacts on the environment and how environmental processes affect people. The essential content of introductory physical geography is presented in a clear, condensed style and is an excellent format for courses that follow either the semester or quarter system.

Earth is a complex system driven by interactions among many factors that include climate, weather and the atmosphere, organisms and their communities, water, landforms, and soils. Physical geography concerns understanding Earth as an integrated system, how it functions, and how it varies over space and time. This knowledge is crucial for making informed decisions about the use and preservation of Earth's natural environments and resources. Our interactions with the environment can benefit or endanger our own living conditions as well those of future generations. The more we know about the Earth system and how it operates, the more effective we can be in working toward preservation, stewardship, and sustainability. At the college level, physical geography is an ideal science course for students who would like to make informed decisions that consider environmental limits and possibilities as well as people's wants and needs.

Recognition of geography's importance to society as a major field of inquiry has grown along with environmental awareness. Geographic knowledge, skills, and techniques are increasingly valued in the workplace. Physical geographers use the latest technological advances to observe, study, map, and measure features and processes and their interactions as parts of the Earth system. They work on modeling environmental responses and interactions. Physical geographers analyze digital images from satellites and aircraft and employ mapmaking techniques (cartography), geographic information science (GIS), global positioning systems (GPS), and other tools for environmental analysis and problem solving.

*Fundamentals of Physical Geography's* focus on relevance is supported by explanations of geographic tools and methods. Practical applications that use geographic data, maps, and satellite images, and numerous landscape photographs that illustrate important themes and examples are provided in the textbook. Related activities along with the text material encourage spatial thinking and give students opportunities to really apply the geographic knowledge they are acquiring.

## Features

### Comprehensive View of the Earth System

*Fundamentals of Physical Geography*, Second Edition, introduces all major aspects of the Earth system, identifying physical phenomena and natural processes and stressing their characteristics, relationships, interactions, and distributions. The text covers a wide range of topics, including weather, climate, the atmosphere, water, the solid Earth, landforms, and our planet's living environments. With only 17 chapters, this textbook provides beginning geography students with a thorough introduction to the essential content of physical geography.

### Engaging Graphics

Because studying geography is enhanced with visual aids, the text includes a wide array of illustrations and photographs that help the concepts come alive. Locator maps accompany selected photographs to provide a spatial context and help students identify the feature's location on Earth. Clear and simple diagrams illuminate important concepts, and environmental system illustrations provide a broad view of the features, inputs, and outputs of certain environmental systems, such as storms, glaciers, rivers, the flow of underground water, or the moving of continents by plate tectonics.

### Clear Explanations

The text uses a clear narrative style to explain the processes, physical features, and events that occur within, on, or above Earth's surface. The writing style, examples, and illustrations facilitate rapid comprehension, making the study of physical geography meaningful and enjoyable.

### Introduction to the Geographer's Tools

Digital technologies have revolutionized our abilities to study Earth's natural processes and environments. A full chapter is devoted to maps, digital imagery, and other data used by geographers. Illustrations throughout include maps and images with descriptions and assessments of the environmental attributes shown in the scenes. There are also introductory discussions of many techniques that geographers use for displaying

and analyzing environmental features and processes, including remote sensing, geographic information systems, cartography, and global positioning systems.

## Focus on Student Interaction

The text encourages students to think, conceptualize, hypothesize, and interact with the subject matter of physical geography. Activities at the end of each chapter can be completed either individually or as a group and were designed to engage students and promote active learning. Review questions reinforce concepts and prepare students for exams; practical application assignments require active solutions, such as sketching a diagram, performing calculations, or exploring geographic features using Google Earth. Questions following many figure captions prompt students to either think beyond or use the map, graph, diagram, or image and give further consideration to the aspect presented. Detailed learning objectives at the beginning of the chapters provide a means for assessing comprehension of the material.

## Three Unique Perspectives

Feature boxes appear in the chapters to illustrate three major scientific perspectives of physical geography. Through a **spatial perspective**, physical geography focuses on understanding and explaining the locations and distributions of natural phenomena. Our discipline also uses a **physical science perspective**, which applies the knowledge and methods of the natural and physical sciences using the scientific method and systems analysis. Through an **environmental perspective**, physical geographers consider impacts, influences, and interactions between human and natural components of the environment, that is, how the environment influences human life and how humans affect the environment.

## Map Interpretation Series

Developing map interpretation skills is a priority in physical geography, and this text includes activities based on full-color maps, generally printed at their original scale. These activities help students develop valuable map-reading skills and reinforce the topical material presented. The map interpretation features can be incorporated into lab activities and they can help link lectures to the textbook and to practical applications. These include end of chapter topographic map and image examples and the weather map interpretation.

## New in This Edition

Revising *Fundamentals of Physical Geography* for a second edition involved thoughtful consideration of the input from many reviewers and adopters. Not only is our planet ever-changing, but so are the many ways that we observe, measure, and analyze Earth's characteristics and environments and the processes that affect them. New scientific findings and new

ways of communicating those findings are continually being developed, and we work to incorporate those that are appropriate for an introductory text.

## New and Revised Text

As authors, we seek to include coverage of physical geographic topics that will spark student interest. This involves relating recent environmental concerns, findings, and natural disasters, examining the conditions that led to those events, and explaining their relation to physical geography. Some examples of recent natural disasters include deadly outbreaks of tornadoes; terrible wildfires in Colorado, California, and Texas; and serious drought or flooding in many areas. The devastating earthquake-generated tsunamis in Japan and South Asia, as well as hurricane and storm damage in the United States, continue to be discussed in terms of human impacts and how to avoid, or at least minimize, such tragic events in the future. Throughout the text, we cover the hazards as well as the beauty of Earth's natural processes.

We continue to take an Earth systems approach, which is reinforced throughout the text with examples and illustrations at a variety of spatial and temporal scales. The concept of scale in atmospheric processes has been given a stronger emphasis than in the first edition. More attention is given to unusual weather conditions, and sections on the greenhouse effect and global climate change have been expanded. We have enhanced discussions of the potential and predicted impacts of global warming on multiple aspects of the Earth system, including glaciers and sea level.

Many other sections contain new or expanded material. These include examples of human interactions with the environment (Chapter 1); a new topographic map interpretation exercise and an example of mapping with lasers, called lidar (Chapter 2); using solar energy (Chapter 3); the urban heat island (Chapter 4); upper air circulation (Chapter 5); tornado chasers (Chapter 6); introduced exotic species, such as Burmese pythons (Chapter 9); measurement of seismic waves (Chapter 10); a new topographic map interpretation exercise on volcanic landforms (Chapter 11); sensitive soils and the interplay of people and slope processes (Chapter 12); the nature of springs (Chapter 13); flood hazards (Chapter 14); differences between humid- and arid-region streams (Chapter 15); recent dramatic changes in glaciers (Chapter 16); and tsunamis and changes in global sea level (Chapter 17).

## Enhanced Illustration Program

Topics that were revised or expanded required including many new figures and updating others, including photographs, satellite images, and maps, often with detailed invitations for interpretation by students. This edition has many new or improved graphs, maps, and diagrams, and about 150 new photographs. Three new activities in the **Map Interpretation** series deal with reading topographic maps (Chapter 2), a comparative analysis of weather maps and corresponding satellite images (Chapter 4), and volcanic terrain (Chapter 11).

## New Features

### Understanding Map Content

Thematic maps have the ability to present a great deal of geographic data in graphic form. The goal of the **Understanding Map Content** is to help students understand the information, geographic/spatial representations, and data presented in thematic maps. Students are encouraged to answer questions based on map content. This opportunity for practice will increase students' appreciation for the amount of useful information contained in a thematic map and enhance their ability to analyze and comprehend the geographic data and spatial relationships presented within thematic maps. These activities encourage true map understanding and illustrate the usefulness of map interpretation skills not only for studying geography but also throughout our daily lives.

### Thinking Geographically

Most chapters dealing with Earth surface processes and landforms include map activities in the **Map Interpretation** series. These continue in this edition with full-size topographic map excerpts presented at the end of the chapters on volcanoes, solutional topography (karst), rivers, desert landforms, glaciers, and coasts. These chapters also include new landscape image interpretation activities in the **Thinking Geographically** series. Students are asked to interpret a landscape image, which features a scene related to the chapter content. These offer practice in looking closely at and visually evaluating a landscape to recognize the geographic features present, interpret their significance, assess how they may be related, and think about how the landforms and landscapes developed.

## Fundamentals of Physical Geography—Four Major Objectives

### To Meet the Academic Needs of the Student

In content and style, *Fundamentals of Physical Geography*, Second Edition, was written specifically to meet the needs of students, the end users of this textbook. Students can use the knowledge and understanding obtained through the text and its activities to help them make informed decisions involving the environment at the local, regional, and global scale. The book also considers the needs of beginning students or those with little or no background in the study of physical geography or other Earth sciences. Examples from throughout the world illustrate important concepts and help students bridge the gap between theory and practical application.

### To Integrate the Illustrations with the Written Text

The photographs, maps, aerial and satellite images, scientific visualizations, block diagrams, graphs, and line drawings clearly illustrate important concepts in physical geography. Text discussions are strongly linked to the illustrations, encouraging students to examine them in graphic form and visualize physical processes and phenomena. Some examples of topics that are clearly explained by integrating visuals and text include map and image interpretation (Chapter 2), the seasons and Earth's energy budget (Chapter 3), wind systems (Chapter 4), storms (Chapter 6), soils (Chapter 9), plate tectonics (Chapter 10), river systems (Chapter 14), glaciers (Chapter 16), and coastal processes (Chapter 17).

### To Communicate the Nature of Geography

The nature of physical geography and its three major scientific perspectives (spatial, physical, and environmental) are discussed in Chapter 1. In subsequent chapters, all three perspectives are stressed. For example, location is a dominant topic in Chapter 2 and remains an important theme throughout the text. Spatial distributions are emphasized as the elements of weather and climate are discussed in Chapters 4 through 6. The changing Earth system is a central focus in the text and featured in Chapters 1, 8, 16, and 17. Characteristics of climate regions and their associated environments are presented in Chapters 7 and 8. Spatial interactions are demonstrated in discussions of weather systems (Chapter 6), soils (Chapter 9), and volcanic and tectonic activity (Chapter 11). Karst (Chapter 13), arid (Chapter 15), glacial (Chapter 16), and coastal (Chapter 17) landforms covary with specific environmental variables, such as soluble rock (karst), past or present climates (karst, arid, glacial), or the interface of land, sea, and air (coastal). Feature boxes in every chapter present interesting and important examples of each perspective.

### To Fulfill the Major Requirements of Introductory Physical Science Courses

*Fundamentals of Physical Geography*, Second Edition, offers a full chapter on the scientific tools and methodologies of physical geography. Earth as a system and the natural processes affecting physical phenomena beneath, at, and above Earth's surface are examined in detail. Use of the scientific method and scientific explanations are stressed. End-of-chapter questions include interpreting graphs of environmental data (or graphing data for study), quantitative analysis, classification, calculating environmental variables, and hands-on map interpretation. Models and systems are frequently cited in discussions of important concepts, and scientific classification is presented in several

chapters. Some of these topics include air masses, tornadoes, and hurricanes (Chapter 6); climates (Chapters 7 and 8); biogeography and soils (Chapter 9); water resources (Chapter 13); rivers (Chapter 14); and coasts (Chapter 17).

Physical geography plays a central role in understanding environmental aspects and issues, human–environment interactions, and approaches to environmental problem solving. The students in this course include the professional geographers of tomorrow. Spreading the message about the importance, relevance, and career potential of geography in today’s world is essential to the strength of geography at educational levels from pre-collegiate through university. *Fundamentals of Physical Geography*, Second Edition, seeks to reinforce that message.

## Ancillaries

Instructors and students alike will greatly benefit from the comprehensive ancillary package that accompanies this text.

### Instructor Resources

**Global Geoscience Watch** Updated several times a day, the Global Geoscience Watch is an ideal one-stop site for classroom discussion and research projects for all things geoscience. Broken into the four key course areas (Geography, Geology, Meteorology, and Oceanography), instructors can easily get to the most relevant content available for their courses. Instructors and their students will have access to the latest *information* from trusted academic sources, news outlets, and magazines. You will also receive access to statistics, primary sources, case studies, podcasts, and much more.

**Geology CourseMate** Cengage Learning’s Geology CourseMate brings course concepts to life with interactive learning, study, and exam preparation tools that support the printed textbook. Watch student comprehension grow as your class uses the text-specific flashcards, videos, animations, quizzes, and other interactive tools to enhance their learning. CourseMate goes beyond the book to deliver what your students need. Learn more at [cengage.com/coursemate](http://cengage.com/coursemate).

**Cengage Learning Testing Powered by Cognero™** A flexible, online system that allows you to:

- author, edit, and manage test bank content from multiple Cengage Learning solutions
- create multiple test versions in an instant
- deliver tests from your LMS, your classroom or wherever you want

#### Start Right Away!

Cengage Learning Testing Powered by Cognero™ works on any operating system or browser.

- No special installs or downloads needed
- Create tests from school, home, the coffee shop—anywhere with Internet access

### What Will You Find?

- Simplicity at every step. A desktop-inspired interface features drop-down menus and familiar, intuitive tools that take you through content creation and management with ease.
- Full-featured test generator. Create ideal assessments with your choice of 15 question types (including true/false, multiple choice, opinion scale/likert, and essay). Multi-language support, an equation editor and unlimited metadata help ensure your tests are complete and compliant.
- Cross-compatible capability. Import and export content into other systems.

**Instructor Companion Website** Everything you need for your course in one place! This collection of book-specific lecture and class tools is available online via [www.cengage.com/login](http://www.cengage.com/login). Access and download PowerPoint presentations, images, instructor’s manual, videos, and more.

### Student Resources

**Global Geoscience Watch** Use Global Geoscience Watch to stay current in your course. Updated several times a day, this resource gives you access to the latest information from trusted academic sources, news outlets, and magazines. You will also receive access to statistics, primary sources, case studies, podcasts, and much more. The Global Geoscience Watch is an ideal one-stop site for all your research needs.

**Geology CourseMate** Make the most of your study time by accessing everything you need to succeed in one place. Read your textbook; take notes; review flashcards; watch videos, animations, and active figures; and take practice quizzes—online with CourseMate. Log in or purchase access at [www.cengagebrain.com](http://www.cengagebrain.com).

**Online Lab Manual** The lessons contained in the Lab Manual are designed to build and heighten understanding of the text chapters. Use these lessons to see how the textbook content can be applied to the everyday problems in the world around you. Lab Manual lessons help build valuable skills such as map reading, map and graph interpretation, three-dimensional thinking, problem solving, and predictive modeling.

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