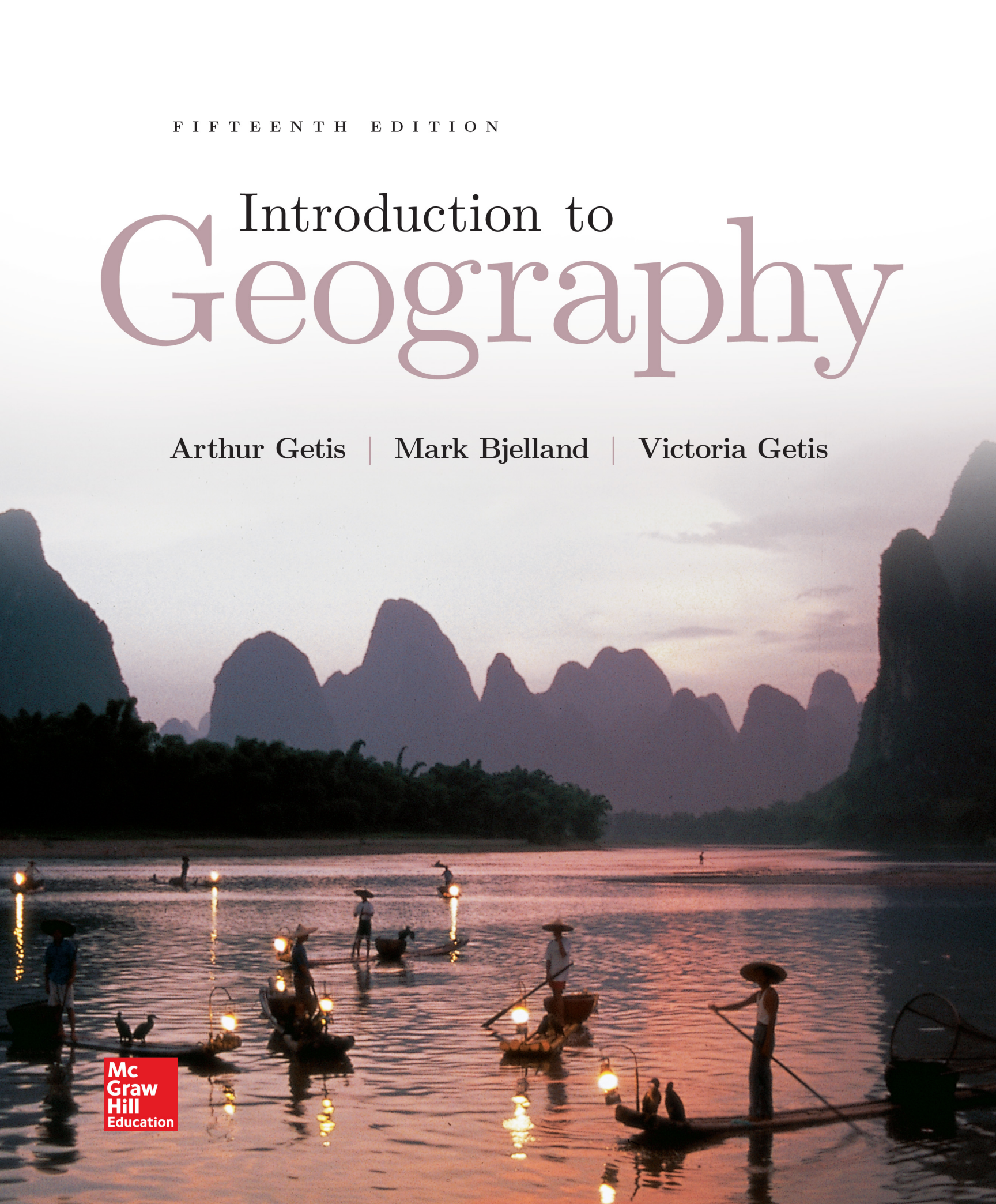
FIFTEENTH EDITION

Introduction to Geography

Arthur Getis | Mark Bjelland | Victoria Getis



Mc Graw Hill Education

FIFTEENTH EDITION

Introduction to Geography

Arthur Getis
San Diego State University

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Calvin College

Victoria Getis
Northwestern University

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INTRODUCTION TO GEOGRAPHY, FIFTEENTH EDITION

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Arthur Getis received his B.S. and M.S. degrees from The Pennsylvania State University and his Ph.D. from the University of Washington. He is coauthor of several geography textbooks as well as several books dealing with the analysis of spatial data. Together with Judith Getis, he was among the original unit authors of the High School Geography Project sponsored by the National Science Foundation and the Association of American Geographers (AAG). He has published widely in the areas of infectious diseases, spatial analysis, and geographic information systems. He is honorary editor of the *Journal of Geographical Systems*, and he serves on the executive committee of the *Geographical Analysis* journal and on the editorial board of the *Annals of Regional Science*. He has had administrative appointments at Rutgers University, the University of Illinois, and San Diego State University (SDSU), where he held the Birch Endowed Chair of Geographical Studies. In 2002, he received the AAG Distinguished Scholarship Award. Professor Getis is a member and an elected fellow of the University Consortium of Geographical Information Sciences, the Western Regional Science Association, and the Regional Science Association International. Currently he is Distinguished Professor of Geography Emeritus at SDSU.

Mark Bjelland earned his B.S. degree from the University of Minnesota and an M.S. degree from the University of Washington. He worked for six years as an environmental consultant on projects dealing with environmental justice, pollution cleanup, urban redevelopment, and water resources. He then earned a Ph.D. in geography from the University of Minnesota, writing his dissertation on abandoned, contaminated industrial lands in the U.S. and Canadian cities. He taught geography for 15 years at Gustavus Adolphus College before taking his current position as professor of geography in the Department of Geology, Geography, and Environmental Studies at Calvin College. He has led geography field courses to the Midwest, western Canada, Pacific Northwest, Hawaii, and Great Britain. He has been granted two Fulbright awards to study urban environmental planning in Germany and Great Britain. His research has been published in the *Research Journal of the Water Pollution Control Federation,* the *Journal of Environmental Engineering, The Geographical Review, The Professional Geographer, Urban Geography,* and a number of book chapters.

Victoria Getis received her A.B. degree from Oberlin College and her M.A. and Ph.D. degrees from the University of Michigan. She has been a contributor to *Introduction to Geography* since its 10th edition. She is also the author of *The Juvenile Court and the Progressives* and the coauthor of *Muddy Boots and Ragged Aprons: Images of Working Class Detroit, 1900–1930.* She is currently coauthoring a textbook on America in the 1960s. Victoria is the Manager of Faculty Support Services at Northwestern University; formerly, she was the Director of the Digital Union at Ohio State University.

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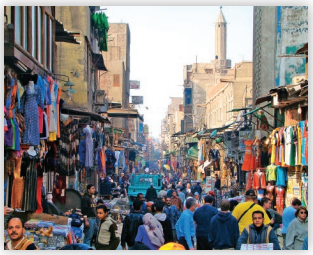

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PREFACE

"If you build it, they will come" was the message that inspired the character played by Kevin Costner in the movie *Field of Dreams* to create a baseball field in his Iowa cornfield. A similar hope encouraged us when we first began to think about writing *Introduction to Geography* in 1975. At that time, very few departments of geography in the United States and Canada offered a general introductory course for students—that is, one that sought to acquaint students with the breadth of the entire field. Instead, most departments offered separate courses in physical and human or cultural geography. Recognizing that most students will have only a single college course and textbook in geography, we wanted to develop a book that covers all of the systematic topics that geographers study. Our hope, of course, was that the book would so persuasively identify and satisfy a disciplinary instructional need that more departments would begin to offer a general introductory course to the discipline, a dream that has been realized.

Approach

Our purpose is to convey concisely and clearly the nature of the field of geography, its intellectual challenges, and the logical interconnections of its parts. Even if students take no further work in geography, we are satisfied that they will have come into contact with the richness and breadth of our discipline and have at their command new insights and understandings for their present and future roles as informed adults. Other students may have the opportunity and interest to pursue further work in geography. For them, we believe, this text will make apparent the content and scope of the subfields of geography, emphasize its unifying themes, and provide the foundation for further work in their areas of interest.

A useful textbook must be flexible enough in its organization to permit an instructor to adapt it to the time and subject matter constraints of a particular course. Although designed with a one-quarter or one-semester course in mind, this text may be used in a full-year introduction to geography when employed as a point of departure for special topics and amplifications introduced by the instructor or when supplemented by additional readings and class projects.

Moreover, the chapters are reasonably self-contained and need not be assigned in the sequence presented here. The chapters may be rearranged to suit the emphases and sequences preferred by the instructor or found to be of greatest interest to the students. The format of the course should properly reflect the joint contribution of instructor and book, rather than be dictated by the book alone.

New to this Edition

Although we have retained the framework of presentation introduced in the previous edition of this book, we have revised, added, and deleted material for a variety of reasons.

- Current events always mandate an updating of facts and analyses and may suggest discussion of additional topics. Examples include a new chapter opening vignettes on the 2015 earthquake in Nepal and toxic algal blooms in the Great Lakes.
- In every new edition, both changes in spatially variable patterns of demographic parameters and changes in the populations of countries and major urban areas require updating. Maps and tables depicting demographic variables and the populations of the world's largest countries and metropolitan regions were updated based on the most recent data available from the United Nations and Population Reference Bureau in 2016.
- Every table and figure in the book has been reviewed for accuracy and currency and has been replaced, updated, or otherwise revised where necessary.
- As always, we rely on reviewers of the previous edition to offer suggestions and to call our attention to new emphases or research findings in the different topical areas of geography. Our effort to incorporate their ideas is reflected not only in the brief text modifications or additions that occur in nearly every chapter but also in more significant alterations.
- The economic geography chapters (Chapter 9 and Chapter 10) give less attention to centrally planned economies due to their decreased importance today.
- The presentation of urban structure models in Chapter 11 has been revised so that models are presented in the order in which they were developed. This allows the student to see how cities changed over the past century and how, in turn, scholars have developed new models to understand them.

New Figures and Tables

To reflect the most recent data, many figures have been revised or newly drawn for the 14th edition of *Introduction to Geography.* They include:

- Maps representing population distribution in California in 2015 using different cartographic techniques (Chapter 2)
- New photos illustrating place name changes that reflect indigenous toponyms (Chapter 6)
- New photos illustrating urban abandonment, gentrification, Chicago's role as a railroad hub, homelessness, European cities, Canadian cities, slums, and cities of the developing world (Chapter 11)
- All maps, graphs, charts, and tables related to population that required updating (Chapter 5)
- Graph of the distribution of the world's population by latitude using 2010 data (Chapter 5)
- New map of Internet users around the world (Chapter 6)
- Updated map of gender-related development index rankings (Chapter 6)
- Substantially updated map of refugee movements, reflecting the effects of the Syrian civil war (Chapter 7)

- Figures depicting membership in the European Union and NATO were revised due to recent withdrawals and new membership applications (Chapter 8)
- Updated and improved map of women in legislatures around the world (Chapter 8)
- Improved map depicting legislative reapportionment in the United States (Chapter 8)
- New map illustrating the uneven geography of research and innovation in the United States as measured by patents (Chapter 10)
- Improved map of population changes in U.S. metropolitan regions (Chapter 11)
- Figures and tables now reflecting 2015 population data from the the U.S. Census Bureau and new UN Population Division data and projections (Chapter 5 and Chapter 11)
- New map of global soil degradation (Chapter 12)
- All maps, graphs, charts, and tables related to natural resource reserves, production, or use have been updated. Maps depicting trade in crude oil and natural gas have been updated and improved (Chapter 12)
- New satellite images showing toxic algal blooms (Chapter 13)
- New Appendix 3 using 2015 population and economic data

New/Revised Boxes

The boxed elements in the book have been updated if necessary or replaced with new discussion texts.

- New Geography & Public Policy box "Changing Place Names" covering trends in recent geographic name changes (Chapter 6)
- Moved the environmental justice box from the political geography chapter (Chapter 8) to the environmental impacts chapter (Chapter 13)
- Updated data in the Legislative Women box (Chapter 8)
- Revised Geography & Public Policy Box, "Incentives or Bribery?" describing the recent competition between states for a new Boeing airplane assembly plant (Chapter 10)
- Revised Geography & Public Policy Box, "The Homeless" (Chapter 11), presenting new methods of addressing homelessness
- Revised Geography & Public Policy box, "Fuel Economy and CAFE Standards" (Chapter 12)
- New box, "Eating Fossil Fuels," highlighting the connections between fossil fuels and agriculture (Chapter 12)

New/Revised Topical Discussions

- New opening vignette about the 2015 earthquake that struck Nepal
- New opening vignette about harmful algal blooms including unsafe drinking water supplies in Toledo, Ohio in 2014
- New discussion of the refugee crisis and population dislocations caused by the Syrian civil war (Chapter 7)
- Updated discussion of heavily indebted countries and debt-relief programs (Chapter 9)
- Updated discussion of the use of genetically modified crops and related scientific concerns
- Expanded discussion of the interrelated challenges of food production, fertilizer use, energy supplies, water supplies, water pollution, and global climate change
- New discussion summarizing progress in meeting the United Nation's Millennium Development Goals during the 1990–2015 period
- New discussion of changes to the nuclear energy industry after the 2011 Fukushima accident in Japan
- New discussion of harmful algal blooms and expanded discussion of eutrophication due to agriculture and fertilizer use
- The discussion on climate change updated to be in line with current scientific thinking on the subject

Acknowledgments

A number of reviewers have greatly improved the content of this and earlier editions of *Introduction to Geography* by their critical comments and suggestions. Although we could not act upon every helpful suggestion, or adopt every useful observation, all were carefully and gratefully considered. In addition to those acknowledgments of assistance detailed in previous editions, we note the thoughtful advice provided by the following individuals.

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We gratefully express appreciation to these and unnamed others for their help and contributions and specifically absolve them of responsibility for decisions on content and for any errors of fact or interpretation that users may detect. Finally, we note with deep appreciation and admiration the efforts of the publisher's "book team," separately named on the copyright page, who collectively shepherded this revision to completion. We are grateful for their highly professional interest, guidance, and support.

Arthur Getis
Mark D. Bjelland
Victoria Getis

Pedigogocal content in Introduction to Geography has been created to gain and retain student attention, the essential first step in the learning process.

CHAPTER 6

Cultural Geography

Hindu pilgrims worship at dawn in the sacred Ganga (Ganges) River at Varanasi, India. © *Porterfield/Chickering/Science Source*

CHAPTER OUTLINE

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Numbered **Chapter Outlines** are included on the opening page of each chapter to clarify the organization of the chapter and to make it easy to locate specific topics of discussion.

Each chapter opens with **Learning Objectives** students can use to guide their study and help them focus on critical concepts. These objectives specify what students are expected to know, understand, and be able to do after studying the chapter.

Vignettes are used to begin each chapter with a brief real-life story intended to capture student interest and prepare them for the subject matter to follow.

LEARNING OBJECTIVES

After studying this chapter you should be able to:

- 3.1 Characterize the three classes of rock.
- 3.2 Define folding, joint, and faulting.
- 3.3 Illustrate how plate tectonics relate to earthquakes.
- 3.4 Explain how a tsunami originates.
- 3.5 Compare the effect of mechanical and chemical weathering on landforms.
- 3.6 Compare the effect of groundwater erosion with that of surface water erosion.
- 3.7 Relate how glaciers form and how their erosion creates landscapes.
- 3.8 Define landform features such as deltas, alluvial fans, natural levees, and moraines.
- 3.9 Understand the landform changes due to waves, currents, and wind.

Although too early for sunbathers and snorkelers, the Hawaiian Islands will have a new island to add to their collection, which contains such scenic beauties as Oahu, Maui, and Kauai. It is Loihi, 0.8 kilometer (0.5 mi) below sea level, just 27 kilometers (17 mi) from the big island of Hawaii. Because the speed of its ascent must be measured in geologic time, it probably will not appear above the water surface for another million or so years. It is a good example, however, of the ceaseless changes that take place on the Earth's surface. As the westernmost of the islands erode and sink below sea level, new islands arise at the eastern end. In Loihi's most recent explosion in 1996, scientists feared that a giant wave would be set off at the surface that could devastate the islands, including the city of Honolulu and popular Waikiki Beach. Fortunately, this was not the case.

Humans on their trip through life continuously are in touch with the ever-changing, active, moving physical environment. Most of the time, we are able to live comfortably with the changes, but when a freeway is torn apart by an earthquake, or floodwaters force us to abandon our homes, we suddenly realize that we spend a good portion of our lives trying to adapt to the challenges the physical environment has for us.

For the geographer, things just will not stand still—not only little things, such as icebergs or new islands rising out of the sea, or big ones, such as exploding volcanoes changing their shape and form, but also giant things, such as continents that wander about like nomads and ocean basins that expand, contract, and split in the middle like worn-out coats.

Geologic time is long, but the forces that give shape to the land are timeless and constant. Processes of creation and destruction are continually at work to fashion the seemingly eternal structure upon which humans live and work. Two types of forces interact to produce those infinite local variations in the surface of the Earth called *landforms:* (1) forces that push, move, and raise the Earth's surface and (2) forces that scour, wash, and wear down the surface. Mountains rise and are then worn away. The eroded materials—soil, sand, pebbles, rocks—are transported to new locations and help create new landforms. How long these processes have worked, how they work, and their effects are the subject of this chapter.

Much of the research needed to create the story of land-forms results from the work of geomorphologists. A branch of the fields of geology and physical geography, *geomorphology* is the study of the origin, characteristics, and development of landforms. It emphasizes the study of the various processes that create landscapes. Geomorphologists examine the erosion, transportation, and deposition of materials and the interrelationships among climate, soils, plant and animal life, and landforms.

In a single chapter, we can only begin to explore the many and varied contributions of geomorphologists. After discussing the contexts within which landform change takes place, we consider the forces that are building up the Earth's surface and then review the forces wearing it down.

3.1 Earth Materials

The rocks of the Earth's crust vary according to mineral composition. Rocks are composed of particles that contain various combinations of such common elements as oxygen, silicon, aluminum, iron, and calcium, together with less-abundant elements. A particular chemical combination that has a hardness, density, and definite crystal structure of its own is called a **mineral.** Some well-known minerals are quartz, feldspar, and micas. Depending on the nature of the minerals that form them, rocks are hard or soft, more or less dense, one color or another, or chemically stable or not. While some rocks resist decomposition, others are very easily broken down. Among the more common varieties of rock are granites, basalts, limestones, sandstones, and slates.

Although one can classify rocks according to their physical properties, the more common approach is to classify them by the way they formed. The three main groups of rock are igneous, sedimentary, and metamorphic.

Igneous Rocks

Igneous rocks are formed by the cooling and solidification of molten rock. Openings in the crust give molten rock an opportunity to find its way into or onto the crust. When the molten rock cools, it solidifies and becomes igneous rock. The name for underground molten rock is *magma;* aboveground, it is *lava*. *Intrusive* igneous rocks are formed below ground level by the solidification of magma, whereas *extrusive* igneous rocks are created above ground level by the solidification of lava (**Figure 3.1**).

The composition of magma and lava and, to a limited extent, the rate of cooling determine the minerals that form. The rate of cooling is mainly responsible for the size of the crystals. Large crystals of quartz—a hard mineral—form slowly beneath the surface of the Earth. When combined with other minerals, quartz forms the intrusive igneous rock called *granite*.

The lava that oozes out onto the Earth's surface and makes up a large part of the ocean basins becomes the extrusive igneous rock called *basalt*, the most common rock on the Earth's surface. If, instead of oozing, the lava erupts from a volcano crater, it may cool

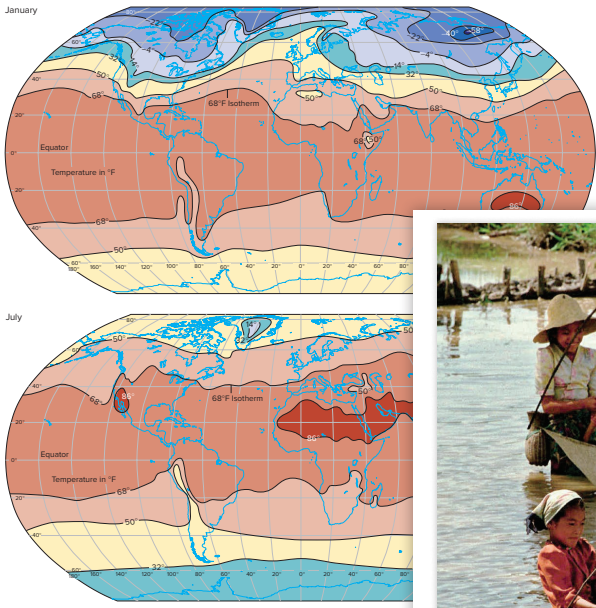


Figure 4.9 **Temperatures of the Earth.** At a given latitude, water areas are warmer than lan
Isotherms are lines of equal Temperatures.

Figure 9.21 **Fish farming in Chi**
in world food production with Asian
farming harvest. As shown here, fis
wastes enhance soil fertility and the
© *Greg Baker/AP Images.*

More than **450 full-color maps, charts, and photographs**, along with information and explanations, serve as an extension of the text. World maps have been created using the Robinson projection and colors have been chosen to accommodate most color-blind students. The Fold-out world map at the back of the text can be easily referenced for any chapter in the text.

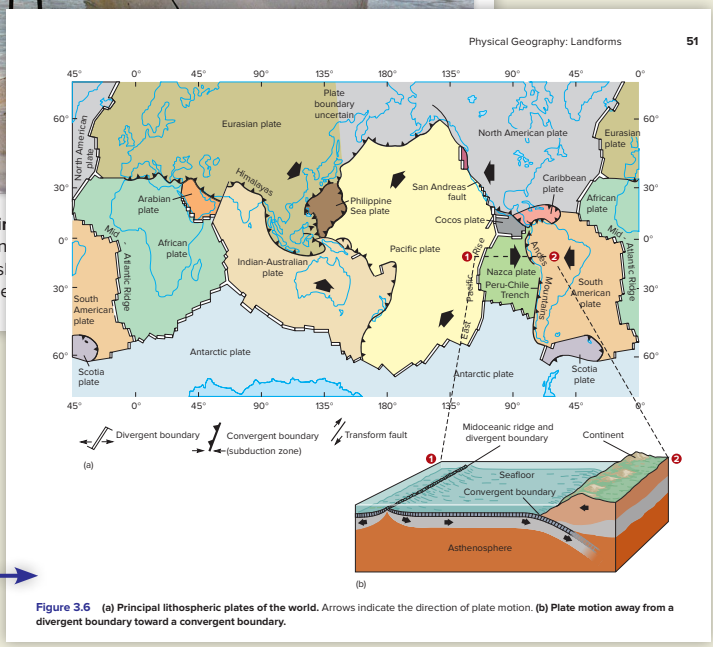
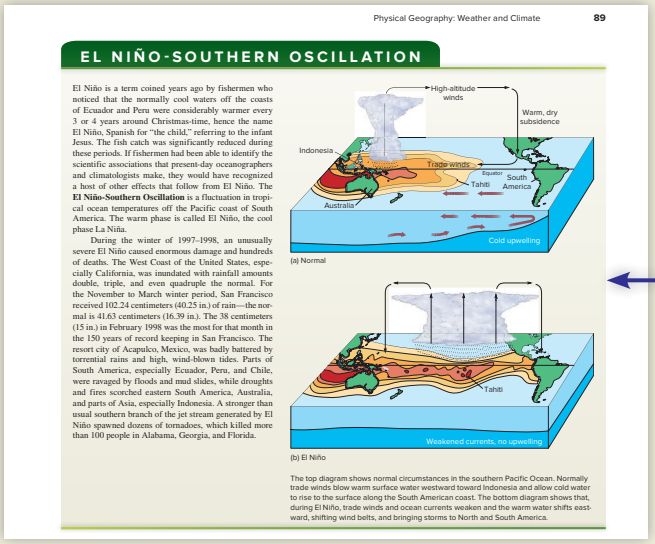


Figure 3.6 **(a) Principal lithospheric plates of the world.** Arrows indicate the direction of plate motion. **(b) Plate motion away from a divergent boundary toward a convergent boundary.**



Boxed inserts are written to further develop ideas and enhance student interest in the course material. Chapters generally include three to five boxes and most chapters include a box on gender-related issues.

Geography & Public Policy boxes highlight important or controversial issues, encouraging students to think about the relevance of geography to real-world concerns. Critical thinking questions at the end of each box prompt students to reflect upon and form an opinion about specific issues and serve as a catalyst for class discussion.

GEOGRAPHY & PUBLIC POLICY

International Population Policies

After a sometimes rancorous 9-day meeting in Cairo in September 1994, the United Nations International Conference on Population and Development endorsed a strategy for stabilizing the world's population at 7.27 billion by no later than 2015. The 20-year program of action accepted by 179 signatory countries sought to avoid the environmental consequences of excessive population growth. Its proposals were therefore linked to discussions and decisions of the UN Conference on Environment and Development held in Rio de Janeiro in June 1992.

The Cairo plan abandoned several decades of top-down government programs that promoted *population control* (a phrase avoided by the conference) based on targets and quotas and, instead, for the first time embraced policies giving women greater control over their lives, greater economic equality and opportunity, and a greater voice in reproduction decisions. It recognized that limiting population growth depends on programs that lead women to want fewer children and make them partners in economic development. In that recognition, the conference accepted the documented link between increased educational access and economic opportunity for women and falling birth rates and smaller families. Earlier population conferences—1974 in Bucharest and 1984 in Mexico City—did not fully address these issues of equality, opportunity, education, and political rights; their adopted goals had failed to achieve hoped-for changes in birth rates, in large part because women in many traditional societies had no power to enforce contraception and feared their other alternative, sterilization.

The earlier conferences had carefully avoided or specifically excluded abortion as an acceptable family planning method. It was the more open discussion of abortion in Cairo that elicited much of the spirited debate that registered religious objections by the Vatican and many Muslim and Latin American states to the inclusion of legal abortion as part of health care, and to language suggesting approval of sexual relations outside marriage. Although the final text of the conference declaration did not promote any universal right to abortion and excluded it as a means of family planning, some delegations still registered reservations to its wording on both sex and abortion. At the conference's close, however, the Vatican endorsed the declaration's underlying principles, including the family as "the basic unit of society" and the need to "stimulate economic growth and to promote gender equality, equity, and the empowerment of women."

A special United Nations "Cairo+5" session in 1999 recommended some adjustments to the earlier agreements. It urged an emphasis on measures ensuring safe and accessible abortion in countries where it is legal, called for schoolchildren at all levels to be instructed in sexual and reproductive health issues, and told governments to provide special family planning and health services for sexually active adolescents, with particular stress on reducing their vulnerability to AIDS.

In 2004, the UN reported progress toward reaching Cairo and Cairo+5 goals. The consensus was that much remained to be done to broaden programs for the poorest population groups, to invest in rural development and urban planning, to strengthen laws ending discrimination against women, and to encourage donor countries to fully meet their agreed-upon contributions to the program. Nevertheless, positive Cairo plan results were also seen in declining fertility rates in many of the world's most-populous developing countries. Some demographers and many women's health organizations pointedly claim that those declines had little to do with government planning policies. Rather, they assert, current lower and falling fertility rates were the expected result of women's assuming greater control over their economic and reproductive lives. The director of the UN Population Division noted: "A woman in a village making a decision to have one or two or at most three children is a small decision in itself. But . . . compounded by millions and millions . . . of women in India and Brazil and Egypt, it has global consequences."

That women are making those decisions, population specialists have observed, reflects important cultural factors emerging since Cairo. Satellite television takes contraceptive information even to remote villages and shows programs of small, apparently happy families that viewers think of emulating. Increasing urbanization reduces some traditional family controls on women and makes contraceptives easier to find, and declining infant mortality makes mothers more confident their babies will survive. Perhaps most important, population experts assert, is the dramatic increase in most developing states in female school attendance, with corresponding reductions in the illiteracy rates of girls and young women, who will themselves soon be making fertility decisions.

Considering the Issues

1. Do you think it is appropriate or useful for international bodies to promote policies affecting such purely personal or national concerns as reproduction and family planning? Why or why not?
2. Do you think that current international concerns over population growth, development, and the environment are sufficiently valid and pressing to risk the loss of long-enduring cultural norms and religious practices in many of the world's traditional societies? Why or why not?
3. The Cairo plan called for sizable monetary pledges from developed countries to support enhanced population planning in the developing world. For the most part, those pledges have not been honored. Do you think the financial obligations assigned to donor countries are justified in light of the many other international needs and domestic concerns faced by their governments? Why or why not?
4. Many environmentalists see the world as a finite system unable to support ever-increasing populations; to exceed its limits would cause frightful environmental damage and global misery. Many economists counter that free markets will keep supplies of needed commodities in line with growing demand and that science will, as necessary, supply technological fixes in the form of substitutes or expansion of production. In light of such diametrically opposed views of population growth consequences, is it appropriate or wise to base international programs solely on one of them? Why or why not?

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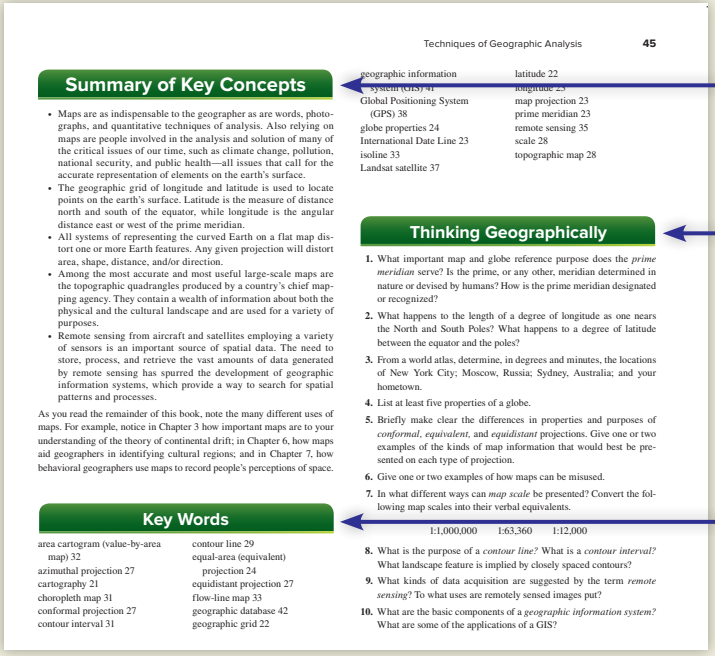

Summary of Key Concepts

- Maps are as indispensable to the geographer as are words, photographs, and quantitative techniques of analysis. Also relying on maps are people involved in the analysis and solution of many of the critical issues of our time, such as climate change, pollution, national security, and public health—all issues that call for the accurate representation of elements on the earth's surface.
- The geographic grid of longitude and latitude is used to locate points on the earth's surface. Latitude is the measure of distance north and south of the equator, while longitude is the angular distance east or west of the prime meridian.
- All systems of representing the curved Earth on a flat map distort one or more Earth features. Any given projection will distort area, shape, distance, and/or direction.
- Among the most accurate and most useful large-scale maps are the topographic quadrangles produced by a country's chief mapping agency. They contain a wealth of information about both the physical and the cultural landscape and are used for a variety of purposes.
- Remote sensing from aircraft and satellites employing a variety of sensors is an important source of spatial data. The need to store, process, and retrieve the vast amounts of data generated by remote sensing has spurred the development of geographic information systems, which provide a way to search for spatial patterns and processes.

As you read the remainder of this book, note the many different uses of maps. For example, notice in Chapter 3 how important maps are to your understanding of the theory of continental drift; in Chapter 6, how maps aid geographers in identifying cultural regions; and in Chapter 7, how behavioral geographers use maps to record people's perceptions of space.

Key Words

area cartogram (value-by-area map) 32
azimuthal projection 27
cartography 21
choropleth map 31
conformal projection 27
contour interval 31
contour line 29
equal-area (equivalent) projection 24
equidistant projection 27
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scale 28
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Thinking Geographically

1. What important map and globe reference purpose does the *prime meridian* serve? Is the prime, or any other, meridian determined in nature or devised by humans? How is the prime meridian designated or recognized?
2. What happens to the length of a degree of longitude as one nears the North and South Poles? What happens to a degree of latitude between the equator and the poles?
3. From a world atlas, determine, in degrees and minutes, the locations of New York City; Moscow, Russia; Sydney, Australia; and your hometown.
4. List at least five properties of a globe.
5. Briefly make clear the differences in properties and purposes of *conformal*, *equivalent*, and *equidistant* projections. Give one or two examples of the kinds of map information that would best be presented on each type of projection.
6. Give one or two examples of how maps can be misused.
7. In what different ways can *map scale* be presented? Convert the following map scales into their verbal equivalents.

   1:1,000,000 1:63,360 1:12,000

8. What is the purpose of a *contour line?* What is a *contour interval?* What landscape feature is implied by closely spaced contours?
9. What kinds of data acquisition are suggested by the term *remote sensing*? To what uses are remotely sensed images put?
10. What are the basic components of a *geographic information system?* What are some of the applications of a GIS?

Chapters **Summaries of Key Concepts** appear at the end of each chapter as a way to reinforce the major ideas of the chapter and guide student understanding of key concepts.

Thinking Geographically questions are easily assignable and provide students an opportunity to check their grasp of chapter material.

A **Key Words** list with page references makes it easy for students to verify their understanding of the most important terms in the chapter.

Appendix 1: Map Projections include a discussion of methods of projection, globe properties and map distortion, and classes of projection.

Appendix 2: Climates, Soils, and Vegetation supplements Chapter 4 *Physical Geography: Weather and Climate* by providing information about soil formation, soil profiles and horizons, soil taxonomy, and natural vegetation regions.

Appendix 3: 2012 World Population Data Sheet for the Population Reference Bureau (a modified version) includes basic demographic data and projections for countries, regions, and continents, as well as selected economic and social statistics helpful in national and regional comparisons. The comparative information in the appendix data is useful for student projects, regional and topical analyses, and the study of world patterns.

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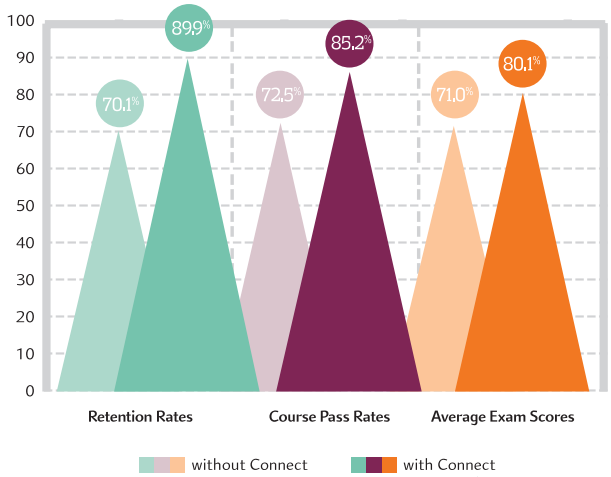

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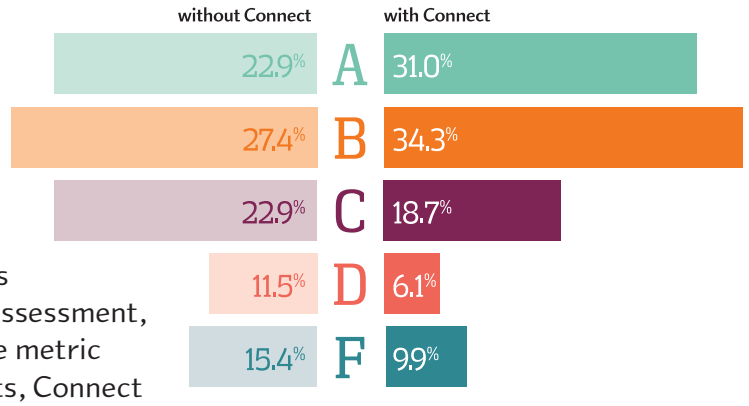

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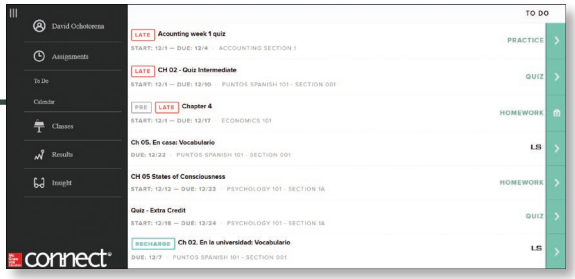

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CHAPTER 1

Introduction

Two Sherpas carry heavy packs in the Himalayas near Mount Everest. Sherpas are an ethnic group who live in the high mountains of Nepal. Many Sherpas are expert mountaineers who work in risky positions as guides and porters for the tourist mountain climbing industry. © *Sean White/Design Pics RF.*

CHAPTER OUTLINE

LEARNING OBJECTIVES

After studying this chapter you should be able to:

- **1.1** Understand what geographers mean when they say that "location matters."
- **1.2** Describe what is meant by physical and cultural landscapes.
- **1.3** Discuss how geography aids in understanding national and international problems.
- **1.4** Explain how the word *spatial* is used in the discipline of geography.
- **1.5** Appreciate which concepts are used to understand the processes of human interaction.
- **1.6** Summarize the kinds of understanding encompassed in the National Standards.

Nepal is home to some of the most dramatic landscapes in the world. Rising from tropical lowlands on the border with India to the world's highest peaks in the Himalayas, this small country has been nicknamed "the mountain kingdom." The Himalayas were built and continue to grow due to the collision of two of the Earth's crustal plates. The Indian subcontinent is moving northeast at a rate of about 4 centimeters per year, about the same rate at which human fingernails grow. The collision of the Indian crustal plate with Eurasia pushes up mountains and builds stresses that are periodically relieved by earthquakes. On April 28, 2015, a magnitude 7.9 earthquake struck Nepal, just 77 kilometers from Kathmandu, the country's capital and largest city. Thousands of buildings crumpled and landslides buried villages and roadways, killing over 9,000 people (see **Figure 1.1**). Adding to the tragedy, many cultural treasures such as monumental towers, Buddhist stupas, and Hindu temples were damaged or destroyed. The Kathmandu Valley has seven cultural landscape sites designated by the United Nations as being of global significance. These cultural sites include historic royal palace squares, sacred sites, and celebrated Hindu and Buddhist monuments. The quake also triggered an avalanche on Mount Everest, the world's highest mountain, killing 19 climbers in the base camp and stranding hundreds of climbers and their Sherpa guides on the mountainside. The climbing season for 2015 was shut down. Thus, the earthquake also devastated both the cultural tourism and ecotourism sectors that are vital to Nepal's economy. Long after the world's media attention has moved on, Nepal's residents continue to work resiliently to rebuild their country's homes, businesses, roads, utilities, historic landmarks, and religious structures. As they rebuild their lives, institutions, and economy, they hope that the tourists will soon return.

The study of geography, by combining knowledge of earth systems and human societies, sheds important light on events such as these. Studying geography can also help societies become more resilient and sustainable. In Chapter 3, for example, we discuss the processes that cause earthquakes and build mountains and other landforms. While news reports often refer to catastrophes such as these as "natural disasters," there was more than nature involved in the 2015 Nepal earthquake. For example, natural disasters, such as hurricanes, floods, landslides, and earthquakes that hit poor low-income countries have death tolls many times higher than those that hit high-income countries. Partly to blame for the many deaths in the 2015 Nepal earthquake were construction materials that could not withstand the forces unleashed by this earthquake. Brick, stone, or concrete buildings without steel reinforcing bars cannot handle the ground shaking of an earthquake and often collapse. As discussed in Chapter 7, Nepal is classified by the United Nations as among the least developed countries in the world. Per capita incomes in Nepal average 1/25th of those in the United States of America. Nepali scientists actively monitor the earthquake hazards in their country and in 1994 building regulations were passed to increase earthquake safety. But in many cases, the building code was ignored because the builders simply could not afford the steel reinforcing materials to make homes, schools, and commercial buildings safe.

Relief and recovery efforts were complicated by poor road and utility systems and the lack of emergency services. Extreme poverty meant there was no insurance policy or bank account

Figure 1.1 Earthquake destruction in Kathmandu, Nepal. The April 25, 2015 earthquake toppled many culturally significant buildings and caused 9,000 fatalities and US$4 billion in damage. Natural disasters are tragic reminders of the close relationships between human societies and the natural environment. © *Michelle Fyneweaver.*

to fall back upon for many Nepali residents who lost homes, jobs, and family members. One bright spot was the use of new geographic techniques to assess damage and map the changing locations of people displaced by the earthquake. Satellite imagery provided insights into the condition of buildings and the location of landslides. Anonymous cell phone data from millions of Nepali users were collected by a nonprofit organization and used to track the location of people displaced by the quake so that relief could be directed to where it was needed. The tragic Nepal earthquake of 2015 is a reminder that human actions take place in the context of a particular geographic environment. It is also a reminder that, just as maps were essential tools in the rescue, relief, and recovery processes, many of the world's pressing problems require a geographic understanding that brings together earth systems, human cultures, the locations of human activities, and the relationships between human societies and their environment—all important themes in the study of geography.

1.1 What Is Geography?

Many people associate the word *geography* simply with knowing *where* things are: whether they be countries, such as Myanmar and Uruguay; cities, such as Timbuktu or Almaty; or deposits of natural resources, such as petroleum or iron ore. Some people pride themselves on knowing which rivers are the longest, which mountains are the tallest, and which deserts are the largest. Such factual knowledge about the world has value, permitting us to place current events in their proper spatial setting. When we hear of an earthquake in Turkey or an assault in Chechnya, we at least can visualize where they occurred. Knowing *why* they occurred in those places, however, is considerably more important.

Geography is much more than place names and locations. It is the study of spatial variation, of how and why things differ from place to place on the surface of the Earth. It is, further, the study of how observable spatial patterns evolved through time. Just as knowing the names and locations of organs in the human body does not equip one to perform open-heart surgery, knowing where things are located is only the first step toward understanding why things are where they are, and what events and processes determine or change their distribution. Why are earthquakes common in Turkey but not in Russia, and why is Chechnya but not Tasmania wracked by insurgency? Why are the mountains in the eastern United States rounded and those in the western states taller and more rugged? Why do you find a concentration of French speakers in Quebec but not in other parts of Canada?

In answering questions such as these, geographers focus on the interaction of people and social groups with their environment—planet Earth—and with one another; they seek to understand how and why physical and cultural spatial patterns evolved through time and continue to change. Because geographers study both the physical environment and human use of that environment, they are sensitive to the variety of forces affecting a place and the interactions among them. To explain why Brazilians burn a significant portion of the tropical rain forest each year, for example, they draw on their knowledge of the climate and soils of the Amazon Basin; population pressures, landlessness, and the need for greater agricultural area in rural Brazil; the country's foreign debt status; midlatitude markets for lumber, beef, and soybeans; and Brazil's economic development objectives. Understanding the environmental consequences of the burning requires knowledge of, among other things, the oxygen and carbon balance of the Earth; the contribution of the fires to the greenhouse effect, acid rain, and depletion of the ozone layer; and the relationships among deforestation, soil erosion, and floods.

Geography, therefore, is about Earth space and the content of that space. We think of and respond to places from the standpoint of not only where they are but, what is more important, what they contain or what we think they contain. Reference to a place or an area usually calls up images about its physical nature or what people do there, and this often suggests to us, without our consciously thinking about it, how those physical things and activities are related. Examples include "Bangladesh," "farming," and "flooding" as well as "Colorado," "mountains," and "skiing." That is, the content of an area has both physical and cultural aspects, and geography is always concerned with understanding both (**Figure 1.2**).

1.2 Evolution of the Discipline

Geography's combination of interests was apparent even in the work of the early Greek geographers who first gave structure to the discipline. Geography's name was reputedly coined by the Greek scientist Eratosthenes over 2200 years ago from the words *geo,* "the Earth," and *graphein,* "to write." From the beginning, that writing focused both on the physical structure of the Earth and on the nature and activities of the people who inhabited the various lands of the known world. To Strabo (c. 64 B.C.–A.D. 20), the task of geography was to "describe the several parts of the inhabited world, . . . to write the assessment of the countries of the world [and] to treat the differences between countries." Even earlier, Herodotus (c. 484–425 B.C.) had found it necessary to devote much of his writing to the lands, peoples, economies, and customs of the various parts of the Persian Empire as necessary background to an understanding of the causes and course of the Persian wars.

Greek (and, later, Roman) geographers measured the Earth, devised the global grid of parallels and meridians (marking latitudes and longitudes; see p. 7), and drew upon that grid surprisingly sophisticated maps of their known world (**Figure 1.3**). They explored the apparent latitudinal variations in climate and described in numerous works the familiar Mediterranean Basin and the more remote, partly rumored lands of northern Europe, Asia, and equatorial Africa. Employing nearly modern concepts, they described river systems, explored cycles of erosion and patterns of deposition, cited the dangers of deforestation, described variations in the natural landscape, and noted the consequences of environmental abuse. Against that physical backdrop, they focused their attention on what humans did in home and distant areas—how they lived; what their distinctive similarities and differences were in language, religion, and custom; and how they used, altered, and perhaps destroyed the lands they inhabited.

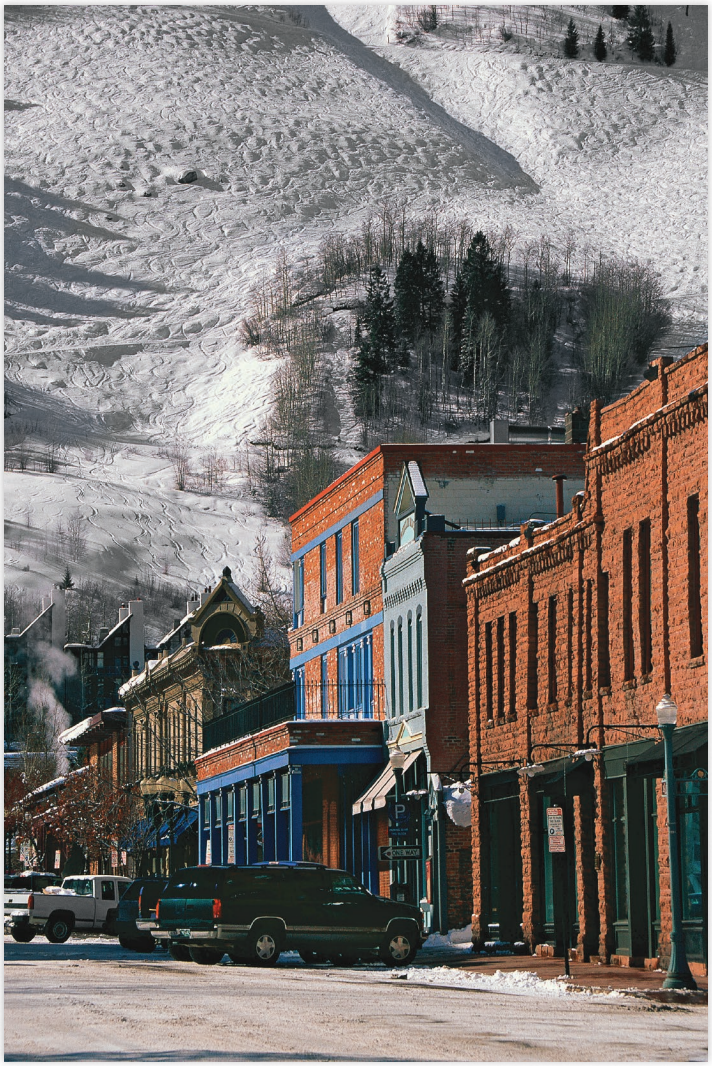


Figure 1.2 Aspen, Colorado, demonstrates changing interactions between physical environment and human activity. Mineral resources, mountainous terrain, and abundant snowfall have made different, specialized human uses attractive and possible. The brick buildings in the foreground are the legacy of its original settlement as a silver mining town, peaking with over 5000 residents in 1890 but declining to about 700 by 1930. The groomed ski slopes in the background represent the town's current identity as a premier ski resort, year-round tourist destination and home to celebrities. © *Punchstock RF.*

Strabo, indeed, cautioned against the assumption that the nature and actions of humans were determined by the physical environment they inhabited. He observed that humans were the active elements in a human-environmental partnership.

The interests guiding the early Greek and Roman geographers were and are enduring and universal. The ancient Chinese, for example, were as involved in geography as an explanatory viewpoint as were westerners, though there was no exchange between them. Further, as Christian Europe entered its Middle Ages between A.D. 800 and 1400 and lost its knowledge of Greek and Roman geographic work, Muslim scholars—who retained that knowledge—undertook to describe and analyze their known world in its physical, cultural, and regional variation.

In the 15th and 16th centuries, European voyages of exploration and discovery put geography at the forefront of the scientific revival. Modern geography had its origins in the surge of scholarly inquiry that, beginning in the 17th century, gave rise to many of the traditional academic disciplines we know today. In its European rebirth, geography from the outset was recognized—as it always had been—as a broadly based integrative study. Patterns and processes of the physical landscape were early interests, as was concern with humans as part of the Earth's variation from place to place. The rapid development of geology, botany, zoology, climatology, and other natural sciences by the end of the 18th century strengthened regional geographic investigation and increased scholarly and popular awareness of the intricate interconnections of things in space and between places. By that time, accurate determination of latitude and longitude and scientific mapping of the Earth had made assignment of place information more reliable and comprehensive. A key figure during this period of geographic research was Alexander von Humboldt. Humboldt, for whom Humboldt University in Berlin, Germany, is named, led ambitious scientific expeditions to distant places and synthesized vast amounts of geographic data in his famous writings.

Subfields of Geography

During the 19th century, national censuses, trade statistics, and ethnographic studies gave firmer foundation to human geographic investigation. By the end of the 19th century, geography had become a distinctive and respected discipline in universities throughout Europe and in other regions of the world where European academic examples were followed. The proliferation of professional geographers and geography programs resulted in the development of a whole series of increasingly specialized disciplinary subdivisions, many represented by separate chapters of this book. Political geography, urban geography, and economic geography are examples of some of these subdivisions.

Geography's specialized subfields are not isolated from one another; rather, they are closely interrelated. Geography in all its subdivisions is characterized by three dominating interests. The first is in the spatial variation of physical and human phenomena on the surface of the Earth; geography examines relationships between human societies and the natural environments that they occupy and modify. The second is a focus on the systems that link physical phenomena and human activities in one area of the Earth with other areas. Together, these interests lead to a third enduring theme, that of regional analysis: geography studies human-environmental (or "ecological") relationships and spatial systems in specific locational settings. This areal orientation pursued by some geographers is called *regional geography.*

Other geographers choose to identify particular classes of things, rather than segments of the Earth's surface, for specialized study. These *systematic geographers* may focus their attention on one or a few related aspects of the physical environment or of human populations and societies. In each case, the topic selected for study is examined in its interrelationships with other spatial systems and areal patterns. *Physical geography* directs its attention to the natural environmental side of the human-environmental structure. Its concerns are with landforms and their distribution,

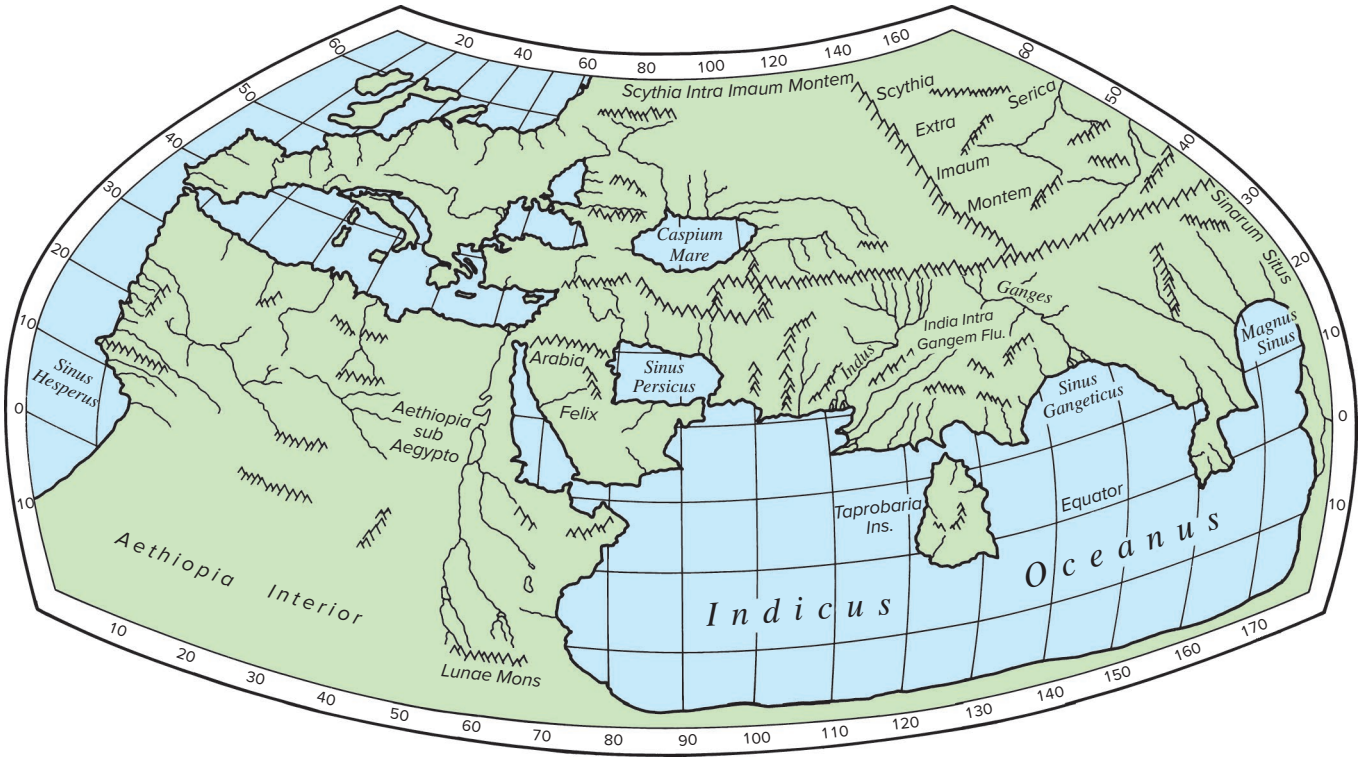


Figure 1.3 **World map of the 2nd century A.D. Greco-Egyptian geographer-astronomer Ptolemy.** Ptolemy (Claudius Ptolemaeus) adopted a previously developed map grid of latitude and longitude based on the division of the circle into 360°, permitting a precise mathematical location for every recorded place. Unfortunately, errors of assumption and measurement rendered both the map and its accompanying six-volume gazetteer inaccurate. Ptolemy's map, accepted in Europe as authoritative for nearly 1500 years, was published in many variants in the 15th and 16th centuries. The version shown here summarizes the extent and content of the original. Its underestimation of the Earth's size convinced Columbus a short westward voyage would carry him to Asia.

with atmospheric conditions and climatic patterns, with soils or vegetation associations, and the like. The other systematic branch of geography is *human geography*. Its emphasis is on people: where they are, what they are like, how they interact over space, and what kinds of landscapes of human use they erect on the natural landscapes they occupy.

Why Geography Matters

There are three good reasons why people study geography. First, it is the only discipline concerned with understanding why and how both physical and cultural phenomena differ from place to place on the surface of the Earth. Each chapter in this book is designed to give you a basic knowledge of the many processes that shape our world. Chapter 3, for example, introduces you to the tectonic forces that warp, fold, and fault landforms; create volcanoes; and cause earthquakes and tsunami. The discussion of cultural geography in Chapter 6 will give you a framework for understanding the technological, sociological, and ideological components of culture and an awareness of the forces that bring about changes in a culture over time.

Second, a grasp of the broad concerns and topics of geography is vital to an understanding of the national and international problems that dominate daily news reports. Global climate change, the diffusion of HIV-AIDS, Ebola, Zika, and other viruses, international trade imbalances, inadequate food supply and population growth in developing countries, turmoil in Africa and the Middle East—all of these problems have geographic dimensions, and geography helps explain them. To be geographically illiterate is to deny oneself not only the ability to comprehend local and world problems but also the opportunity to contribute meaningfully to the development of policies for dealing with them.

Third, because geography is such a broad field of study, a great diversity of job opportunities await those who pursue college training in the discipline. Geographic training opens the way to careers in a wide array of fields (see "Careers in Geography"). Geographical techniques of analysis are used for interpreting remotely sensed images, determining the optimum location for new businesses, monitoring the spread of infectious diseases, delineating voting districts, and a host of other tasks. A good book to read is *Why Geography Matters* (Oxford University Press, 2005) by Harm J. de Blij.

1.3 Some Core Geographic Concepts

The topics included within the broad field of geography are diverse. That very diversity, however, emphasizes the reality that all geographers—whatever their particular topical or regional

CAREERS IN GEOGRAPHY

Geography admirably serves the objectives of a liberal education. It can make us better-informed citizens, more able to understand the important issues facing our communities, our country, and our world and better prepared to contribute solutions.

Can it, as well, be a pathway to employment for those who wish to specialize in the discipline? The answer is yes, in a number of different types of jobs. One broad cluster is concerned with supporting the field itself through teaching and research. Teaching opportunities exist at all levels, from elementary to university postgraduate. Teachers with some training in geography are in increasing demand in elementary and high schools in the United States, reflecting geography's inclusion as a core subject in the federally adopted *No Child Left Behind Act* and the national determination to create a geographically literate society (see "The National Standards," p. 16). At the college level, specialized teaching and research in all branches of geography have long been established, and geographically trained scholars are prominently associated with urban, community, and environmental studies; regional science; locational economics; and other interdisciplinary programs.

Because of the breadth and diversity of the field, training in geography involves the acquisition of techniques and approaches applicable to a wide variety of jobs outside the academic world. Modern geography is both a physical and social science and fosters a wealth of technical skills. The employment possibilities it presents are as many and varied as are the public and private agencies and enterprises dealing with the natural environment, with human economic and social activities, and with the acquisition and analysis of spatial data.

Many professional geographers work in government at the federal, state, and local levels and in a variety of international organizations. Indeed, geographers have made careers in essentially all of the many bureaus and offices of the executive departments of the U.S. national government—Agriculture, Commerce, Education, Health and Human Services, Homeland Security, Housing and Urban Development Interior, and others—and in their counterparts at the state level. Such major independent federal agencies as the Central Intelligence Agency (CIA), National Aeronautics and Space Administration (NASA), Federal Trade Commission, National Geospatial-Intelligence Agency (NGA), Federal Aviation Agency, and many others have steady need for geographically trained workers.

Although many positions do not carry a geography title, physical geographers serve as water and other natural resource analysts, weather and climate experts, soil scientists, and the like. Areas of recent high demand include environmental managers and technicians and geographic information specialists. Geographers who have specialized in environmental studies find jobs in both public and private agencies. Their work may include assessing the environmental impact of proposed development projects on such things as air and water quality and endangered species, as well as preparing the environmental impact statements required before construction can begin.

Human geographers work in many different roles in the public sector. Jobs include data acquisition and analysis in health care, transportation, population studies, economic development, and international economics. Many geography graduates find positions as planners in local and state government agencies concerned with housing and community development, park and recreation planning, and urban and regional planning. They map and analyze land use plans and transportation systems, monitor urban land development, make informed recommendations about the location of public facilities, and engage in basic social science research.

Most of the same specializations are found in the private sector. Geographic training is ideal for such tasks as business planning and market analysis; factory, store, and shopping center site selection; and community and economic development programs for banks, public utilities, and railroads. Publishers of maps,

interests—are united by the similar questions they ask and the common set of basic concepts they employ to consider their answers. Of either a physical or cultural phenomenon, they will inquire: What is it? Where is it? How did it come to be what and where it is? Where is it in relation to other physical or cultural realities that affect it or are affected by it? How is it part of a functioning whole? How does its location affect people's lives and the content of the area in which it is found?

These and similar questions are rooted in geography's concern with Earth space and are derived from enduring central themes in geography. In answering them, geographers draw upon a common store of concepts, terms, and methods of study that together form the basic structure and vocabulary of geography. Geographers believe that recognizing spatial patterns is the essential starting point for understanding how people live on and shape the Earth's surface.

Geographers use the word *spatial* as an essential modifier in framing their questions and forming their concepts. Geography, they say, is a *spatial science.* It is concerned with the *spatial distribution* of phenomena, with the *spatial extent* of regions, the *spatial behavior* of people, the *spatial relationships* between places on the Earth's surface, and the *spatial processes* that underlie those behaviors and relationships. Geographers use *spatial data* to identify *spatial patterns* and to analyze *spatial systems, spatial interaction, spatial diffusion,* and *spatial variation* from place to place.

The word *spatial* comes, of course, from *space,* and to geographers it always carries the idea of the way things are distributed, the way movements occur, and the way processes operate over the whole or a part of the surface of the Earth. The geographer's space, then, is Earth space, the surface area occupied or available to be occupied by humans. Spatial phenomena have locations on that surface, and spatial interactions occur among places, things, and people within the Earth area available to them. The need to understand those relationships, interactions, and processes helps frame the questions that geographers ask.

Those questions have their starting point in basic observations about the location and nature of places and about how places are similar to or different from one another. Such observations, though

atlases, news and travel magazines, and the like employ geographers as writers, editors, and mapmakers.

The combination of a traditional, broad-based liberal arts perspective with the technical skills required in geographic research and analysis gives geography graduates a competitive edge in the labor market. These field-based skills include familiarity with geographic information systems (GIS, explained in Chapter 2), cartography and computer mapping, remote sensing and photogrammetry, and competence in data analysis and problem solving. In particular, students with expertise in GIS, who are knowledgeable about data sources, hardware, and software, are finding they have ready access to employment opportunities. The following table, based on the booklet "Careers in Geography,"[a] summarizes some of the professional opportunities open to students who have specialized in one (or more) of the various subfields of geography. Also, be sure to read the discussion of geography careers accessed on the homepage of the Association of American Geographers at www.aag.org. Additional links on the topic of geography careers can be found in the Online Learning Center for this text. The link can be found in the Preface.

Geographic Field of Concentration	Employment Opportunities
Cartography and geographic information systems	Cartographer for federal government (agencies such as Defense Mapping Agency, U.S. Geological Survey, or Environmental Protection Agency) or private sector (e.g., Environmental Systems Research Institute, ERDAS, Intergraph, or Bentley); map librarian; GIS specialist for planners, land developers, real estate agencies, utility companies, local government; remote-sensing analyst; surveyor
Physical geography	Weather forecaster; outdoor guide; coastal zone manager; hydrologist; soil conservation/agricultural extension agent
Environmental studies	Environmental manager; forestry technician; park ranger; hazardous waste planner
Cultural geography	Community developer; Peace Corps volunteer; health care analyst
Economic geography	Site selection analyst for business and industry; market researcher; traffic/route delivery manager; real estate agent/broker/appraiser; economic development researcher
Urban and regional planning	Urban and community planner; transportation planner; housing, park, and recreation planner; health services planner
Regional geography	Area specialist for federal government; international business representative; travel agent; travel writer
Geographic education	Elementary/secondary school teacher; general geography college professor; overseas teacher

[a]"Careers in Geography," by Richard G. Boehm. Washington, D.C.: National Geographic Society, 1996. Previously published by Peterson's Guides, Inc.

simply stated, are profoundly important to our comprehension of the world we occupy.

- Places have location, direction, and distance with respect to other places.
- A place has size; it is large, medium, or small. Scale is important.
- A place has both physical structure and cultural content.
- The attributes, or characteristics, of places develop and change over time.
- The content of places is structured and explainable.
- The elements of places interrelate with other places.
- Places may be generalized into regions of similarities and differences.

These basic notions are the means by which geographers express fundamental observations about the Earth space they examine and put those observations into a common framework of reference. Each of the concepts is worth further discussion, for they are not quite as simple as they seem.

Location, Direction, and Distance

Location, direction, and *distance* are everyday ways of assessing the space around us and identifying our position in relation to other things and places of interest. They are also essential in understanding the processes of spatial interaction that figure so importantly in the study of both physical and human geography.

Location

The location of places and things is the starting point of all geographic study as well as of our personal movements and spatial actions in everyday life. We think of and refer to location in at least two different senses, *absolute* and *relative*.

Absolute location is the identification of place by a precise and accepted system of coordinates; therefore, sometimes it is called *mathematical location*. We have several such accepted systems of pinpointing positions. One of them is the global grid of

parallels and meridians—that is, latitude and longitude (discussed in Chapter 2, pp. 21–23). With it, the absolute location of any point on the Earth can be accurately described by reference to its degrees, minutes, and seconds of *latitude* and *longitude*.

Other coordinate systems are also in use. Survey systems such as the township, range, and section description of property in much of the United States give mathematical locations on a regional level, and street address precisely defines a building according to the reference system of an individual town. Absolute location is unique to each described place, is independent of any other characteristic or observation about that place, and has obvious value in the legal description of places, in measuring the distance separating places, or in finding directions between places on the Earth's surface.

When geographers—or real estate agents—remark that "location matters," however, their reference is usually not to absolute but to **relative location**—the position of a place or thing in relation to that of other places or things (**Figure 1.4**). Relative location expresses spatial interconnection and interdependence and may carry social (neighborhood character) and economic (assessed valuations of vacant land) implications. On an immediate and personal level, we think of the location of the school library not in terms of its street address or room number but where it is relative to our classrooms, the cafeteria, or another reference point. On the larger scene, relative location tells us that people, things, and places exist not in a spatial vacuum but in a world of physical and cultural characteristics that differ from place to place.

New York City, for example, may be described in absolute terms as located at (approximately) latitude 40°43′N (read as 40 degrees, 43 minutes north) and longitude 73°58′W. We have a better understanding of the meaning of its location, however, when reference is made to its spatial relationships: to the continental interior through the Hudson-Mohawk lowland corridor or to its position on the eastern seaboard of the United States. Within the city, we gain understanding of the locational significance of Central Park or the Lower East Side not solely by reference to the street addresses or city blocks they occupy but also by their spatial and functional relationships to the total land use, activity, and population patterns of New York City.

In view of these different ways of looking at location, geographers make a distinction between the *site* and the *situation* of a place (**Figure 1.5**). **Site,** an absolute location concept, refers to the physical and cultural characteristics and attributes of the place itself. It is more than mathematical location, for it tells us something about the specific features of that place. **Situation,** on the other hand, refers to the relations between a place and other places. It is an expression of relative location with particular reference to items of significance to the place in question. Site and situation in the city context are further examined in Chapter 11.

Figure 1.4 **The reality of *relative location*** on the globe may be strikingly different from the impressions we form from flat maps. The position of Russia with respect to North America when observed from a polar perspective emphasizes that relative location properly viewed is important to our understanding of spatial relationships and interactions between the two world areas.

Direction

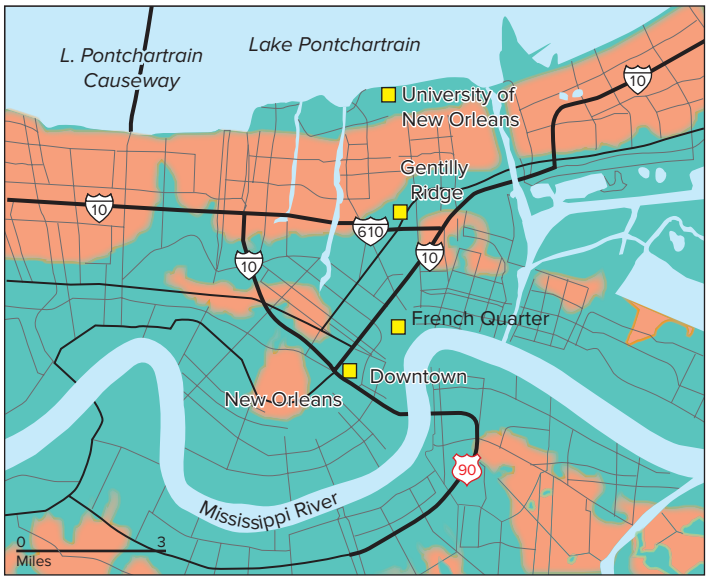
Direction is the second universal spatial concept. Like location, it has more than one meaning and can be expressed in absolute or relative terms. **Absolute direction** is based on the cardinal points of north, south, east, and west. These appear in all cultures, derived from the obvious "givens" of nature: the rising and setting of the sun for east and west, the sky location of the noontime sun and of certain fixed stars for north and south.

We also commonly use **relative,** or *relational,* **directions.** In the United States, we go "out West," "back East," or "down South"; we worry about conflict in the "Near East" or economic competition from the "Far Eastern countries." Despite their reference to cardinal compass points, these directional references are culturally based and locationally variable. The Near East and the Far East locate parts of Asia from the European perspective; they are retained in the Americas by custom and usage, even though one would normally travel westward across the Pacific, for example, to reach the "Far East" from California, British Columbia, or Chile. For many Americans, "back East" and "out West" are reflections of the migration paths of earlier generations for whom home was in the eastern part of the country, to which they might look back. "Up North" and "down South" reflect our accepted custom of putting north at the top and south at the bottom of our maps.

Distance

Distance joins *location* and *direction* as a commonly understood term that has dual meanings for geographers. Like its two companion spatial concepts, distance may be viewed in both an absolute and a relative sense.

Absolute distance refers to the spatial separation between two points on the Earth's surface, measured by an accepted standard unit—such as miles or kilometers for widely separated locales, feet or meters for more closely spaced points. **Relative distance** transforms those linear measurements into other units more meaningful to human experience or decision making.



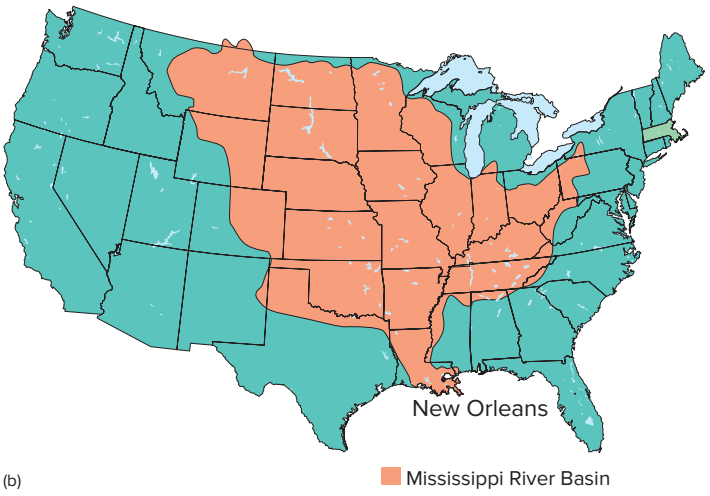


Figure 1.5 **Site and Situation** (a) The *site* of New Orleans is hardly ideal for building a city. The French occupied the most suitable high ground they could find near the mouth of the Mississippi River. The site extends from the "high ground" on the natural levee next to the Mississippi River to former wetlands near Lake Pontchartrain. Much of the city and its suburbs are below sea level on sinking soils composed of soft sediments deposited by past river floods. (b) The *situation* of New Orleans is ideal for building a city. New Orleans is connected to 9000 miles of navigable waterways through the Mississippi River, which drains a basin that stretches from the Rocky Mountains to the Appalachian Mountains.

To know that two competing malls are about equidistant in miles from your residence is perhaps less important in planning your shopping trip than is knowing that, because of street conditions or traffic congestion, one is 5 minutes and the other 15 minutes away (**Figure 1.6**). Most people, in fact, think of time distance rather than linear distance in their daily activities; downtown is 20 minutes by bus, the library is a 5-minute walk. In some instances, money rather than time is the distance transformation.

Figure 1.6 **Travel times from downtown San Diego,** 2002, in minutes. Lines of equal travel time (*isochrones:* from Greek *isos,* equal, and *chronos,* time) mark off the different linear distances accessible within given spans of time from a starting point. The fingerlike outlines of isochrone boundaries reflect variations in road conditions, terrain, traffic congestion, and other aids or impediments to movement. Note the effect of freeways on travel time.

An urban destination might be estimated to be a $10 cab ride away, information that may affect either the decision to make the trip at all or the choice of travel mode to get there. As a college student, you already know that rooms and apartments are less expensive at a greater distance from campus.

A *psychological* transformation of linear distance is also frequent. A solitary late-night walk back to the car through an unfamiliar or dangerous neighborhood seems far longer than a daytime stroll of the same distance through familiar and friendly territory. A first-time trip to a new destination frequently seems much longer than the return trip over the same path. Nonlinear distance and spatial interaction are further considered in Chapter 7.

Size and Scale

When we say that a place may be large, middle size, or small, we speak both of the nature of the place itself and of the generalizations that can be made about it. Geographers are concerned with **scale,** though we may use that term in different ways. We can, for example, study a problem such as population or landforms at the local scale or on a global scale. Here, the reference is purely to the size of unit studied. More technically, scale tells us the relationship between the size of an area on a map and the actual size of the