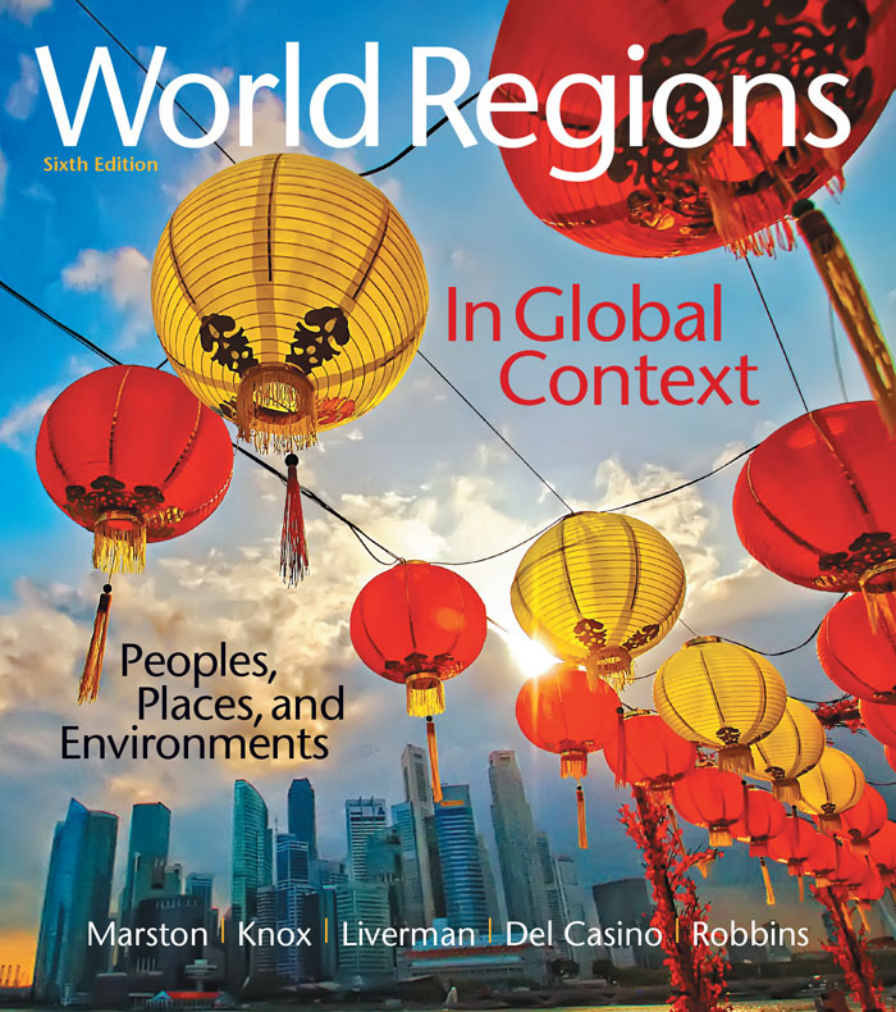
World Regions

Sixth Edition

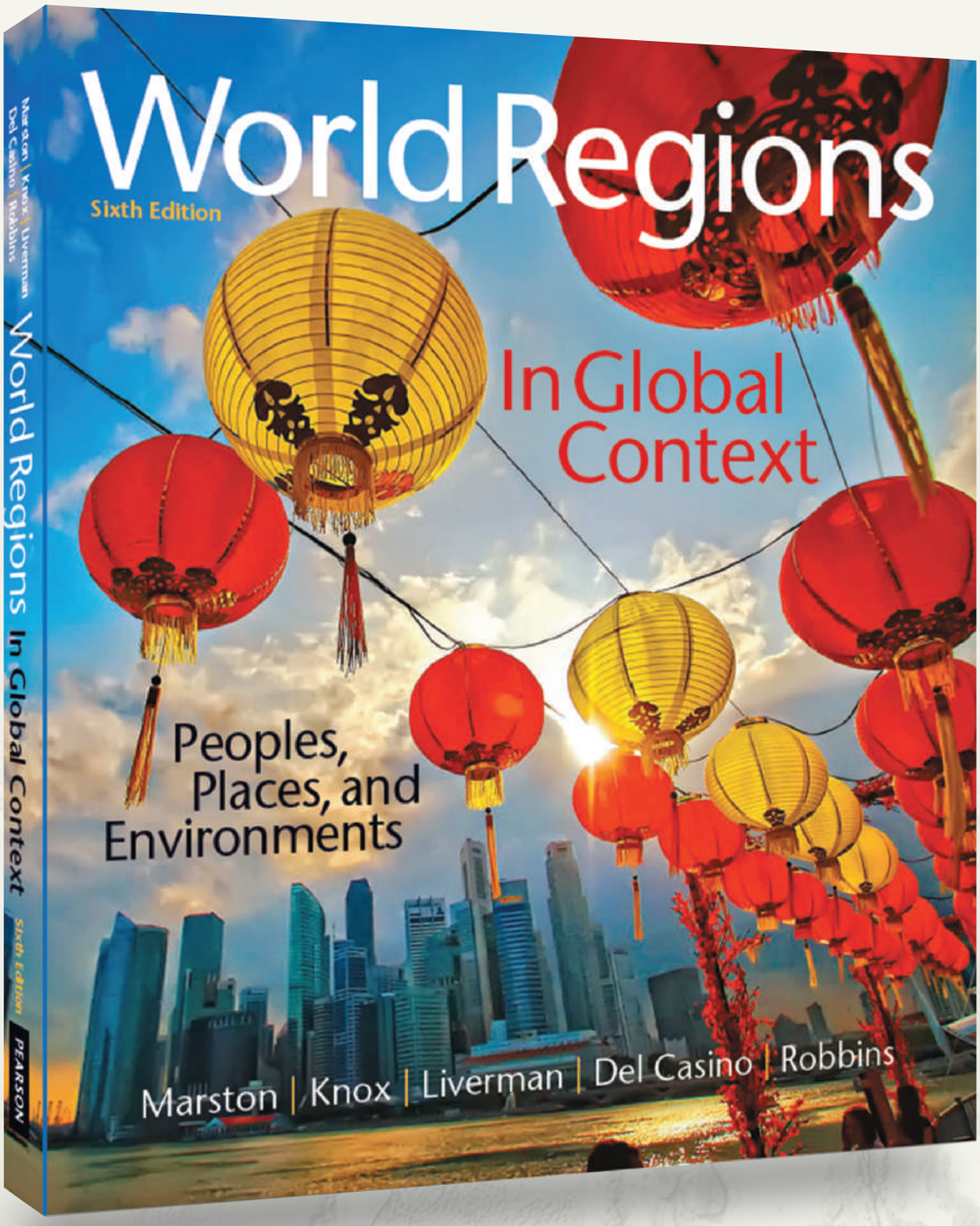
In Global Context

Peoples, Places, and Environments



Marston | Knox | Liverman | Del Casino | Robbins

A Conceptual Exploration of World Regions & the Issues Critical to Geography Today



PEARSON

The Important Issues & People Shaping World Regions

NEW! Sustainability in the Anthropocene features explore efforts to develop more sustainable lifestyles, cities, or food systems in each region by highlighting a specific project or place where people are implementing solutions that are socially, economically, and ecologically sustainable.

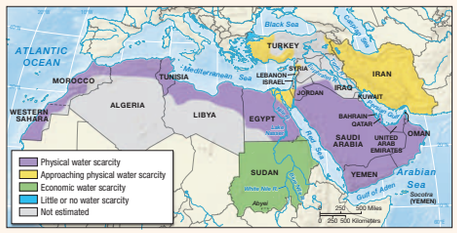
Water Scarcity and Quality

The future of water scarcity and water's availability and quality are serious issues in the Middle East and North Africa. As the region's population grows and the regional economy demands more water for the manufacturing sector as well as for the production of food, the scarcity of water resources will become more acute.

"As the region's population grows and the regional economy demands more water for the manufacturing sector as well as for the production of food, the scarcity of water resources will become more acute."

The Causes of Water Scarcity A number of factors contribute to the region's future map of water scarcity (FIGURE 4.1.1). In some places, economic conditions make water access difficult, while in other places, changes in global climate and overuse of freshwater resources have pushed many countries in the region to the brink. For example, excessive extraction of water from oasis wells has been occurring for such a long period that oases are dying. The countries of the Persian Gulf region have some of the highest per capita water use rates in the world, nearly double that of Europe. This fact further exacerbates the region's problem of water security.

The Future of Water Quality The expansion of the agricultural economy of the region appears, on the surface, as a positive economic indicator. But, chemical fertilizers for agriculture have a direct impact on the quality of the water available for drinking. Conflict in the region has also had a direct impact on water quality in the region, as fighting directly impacts water quality assurance systems as well as basic access to clean water (FIGURE 4.1.2).



▲ FIGURE 4.1.1 **Map of Water Scarcity** The reasons for water scarcity are tied to the physical use and depletion of water resources, a result of climate change, and economic. What this suggests is that water scarcity is both an ecological and social issue.

1. **What are some of the factors that are worsening water scarcity in the region?**
2. **What is degrading water quality in the region? What are the implications for the region's growing population if water quality continues to deteriorate?**

▶ FIGURE 4.1.2 **Child in Syria Seeking Water** A Syrian boy, who fled with his family from the violence in their village in 2012, carries a plastic container as he walks to fill it with water at a refugee camp in the Syrian village of Atma near the Turkish border with Syria.

Refugees Flee the Violence of the Syrian Civil War

Imagine waking up one morning and remembering that you are no longer sleeping in your home country but are now a refugee in a foreign land. For the millions of people displaced by conflict in Syria a few have found their way to countries as distant and different as the United Kingdom. A woman from Syria has managed just this, first by making her way to the Mediterranean Coast and then across the sea to Europe. Another woman, named Nor, was fortunate to find herself in a refugee camp when she was given further refuge in the United Kingdom (FIGURE 4.4.1).

For many of those who remain in the refugee camps, however, life is difficult. The camps remain under-resourced, families are crowded together in temporary shelters, and weather conditions make everyday life difficult, particularly in the winter months. For many, particularly the approximately 1.6 million children who have been displaced by the war, the trauma of war can be felt each day in the camp. Many women, children, and men have been victims of torture, rape, or other sorts of violence. Others have seen their family members killed. The camps, while providing some relief from the violence of the war in Syria, do not end the trauma from the war (FIGURE 4.4.2). Many want to flee to Europe or other destinations where they hope their lives will be better.

"Many women, children, and men have been victims of torture, rape, or other sorts of violence. Others have seen their family members killed."

▲ FIGURE 4.4.1 **Syrian Refugess Camp, Qtma, Turkey** Millions of Syrians have been displaced by the conflict in their home country. Many have fled to makeshift camps just outside Syria in countries, such as Turkey.

1. **Where do we find many of Syria's refugees today?**
2. **What are the living conditions of those who remain in the refugee camps?**

Syrian Refugees in U.K.
https://goo.gl/Lqqyju

▶ FIGURE 4.4.2 **Syrians Awaiting Asylum** Syrians occupied parts of France's Calais Port in 2013 in an attempt to pressure the French and British government to grant them the right of asylum.

NEW! Faces of the Region features explore the experience of different people within each world region, asking what is it like to be a young person in one place or what is it like to grow older in another place. It looks at the everyday, real-life experience of migration and asks how and in what ways changing demographics in each world region may be impacting how people come to know and understand their place in the world.

Current & Compelling Stories from the Regions

UPDATED! Geographies of Indulgence, Desire, and Addiction features link people in one world region to people throughout the world through a discussion of the local production and global consumption of regional commodities, helping students appreciate the links between producers and consumers around the world as well as between people and the natural world. New topics include luxury cars, beer and wine, and trekking.

▲ **C06** Marchers in 2014 in Washington, DC protest the choking death of Eric Garner by an NYC police officer.

▲ **FIGURE 1.32 An Election in India** India is the world's most populous democracy, and people turn out to vote in local, regional, and national elections.

2.1 Geographies of Indulgence, Desire, and Addiction

Beer and Wine

Today, Britain is famous for many varieties of ale and beer. But before the cold snap of the Little Ice Age, Britons also produced and enjoyed their own wines. Until the Late Medieval period, viticulture—the cultivation of grape vines for winemaking—was common throughout Europe, extending as far north as Britain and Scandinavia during the Medieval Warm Period that lasted from about 950 to 1250 C.E. Greek civilization had established viticulture by the 6th century B.C.E. Under the Roman Empire, viticulture spread west along the north shores of the Mediterranean and along the valleys of rivers in France and Spain and north to the North Sea and the Baltic. By the 1st century C.E., wine had become a commodity of indulgence, desire, and—for some—addiction throughout Europe. But sharply reduced average temperatures during the Little Ice Age meant that viticulture retreated to Mediterranean Europe, leaving northerners to satisfy their need for alcohol with grain-based beverages, namely beer and spirits. It was a division that has characterized patterns of alcohol consumption ever since (**TABLE 2.1.1**). Incidentally, since North America was populated mostly by northern Europeans, beer and spirits, rather than wine, became characteristic of alcohol consumption in the United States and Canada.

"The beer–wine division between northern and southern Europe has persisted since the Little Ice Age."

Nevertheless, these divisions are by no means absolute. In the 16th century, Spanish and Portuguese overseas expansion saw the introduction of viticulture to the New World—to Mexico in the 1520s, Peru in the 1530s, Chile in the 1550s, and Florida in the 1560s. The British introduced viticulture to Virginia in the 1600s, and the first vineyards in California were established by Franciscan missions in the 1770s. Meanwhile, in Europe, demographic growth and increasing prosperity rapidly expanded the market for wine.

Today, the exclusivity of Europe's best wines is protected by strict systems of regulation. In France, for example, the Appellation Contrôlée system was introduced to guarantee the authenticity of wines, district by district. Such regulations have been important in reinforcing the appeal of wine as a commodity of indulgence and desire. Fine wines such as those from Burgundy, France (**FIGURE 2.1.1**) denote affluence and distinction. Meanwhile, recent climate change has meant that the frontier of viticulture in Europe has begun to shift northward. At the same time, the consumption of wine in northern Europe has increased significantly, especially among young, middle-class households. Brewers and distillers have responded to the competition by producing specialized cask ales and flavored spirits.

TABLE 2.1.1 Alcohol Consumption in Europe

Wine Consumption, 2013		Beer Consumption, 2013	
Country	**Amount in 1,000 hL***	**Country**	**Amount in 1,000 hL***
France	28, 81	Germany	85,588
Italy	21,795	United Kingdom	42,422
Germany	20,300	Poland	37,388
United Kingdom	12,738	Spain	35,169
Spain	9,100	France	19,421
Portugal	4,551	Italy	17,504
Netherlands	3,585	Romania	16,300
Greece	3,300	Czech Republic	15,278
Belgium and Luxembourg	3,054	Netherlands	11,690
Switzerland	2,650	Turkey	9,047

SOURCE: *Wine Annual Report and Statistics Wine Annual* Organisation Internationale de la Vigne du Vin, May 2014.
*hL = hectoliters; 1 hectoliter = 26.4 gallons

SOURCE: Brewers of Europe, http://www.brewersofeurope.org/uploads/mycms-files/documents/publications/2014/statistics_2014_web_2.pdf
*hL = hectoliters; 1 hectoliter = 26.4 gallons

▼ **FIGURE 2.1.1** The grape harvest in Burgundy, France.

1. **List the environmental factors that created the geographic division between beer and wine in Europe.**
2. **Compare and contrast other examples of indulgent commodities. In your analysis, do you find them to be sourced locally or imported from other places?**

▼ **FIGURE 1.3.2 Youth Demonstrate as Part of the Yo Soy 132 March in Mexico City, Mexico** Popular protests by 131 Mexican youth was augmented by a larger social movement, Yo So 132 "I am 132," which developed as a protest movement against presidential candidate, Enrique Peña Nieto, and the press, which the protesters suggested were not covering the election fairly.

NEW! The latest stories & data from the regions. Updates include: the European response to the Syrian refugee crisis; the Syrian civil war and the rise of Islamic State of Iraq and Syria (ISIS); the recent Russian annexation of Crimea; natural disasters in Southeast Asia and the threat of rising sea-levels due to climate change in Oceania; and the growing connections between China and Africa.

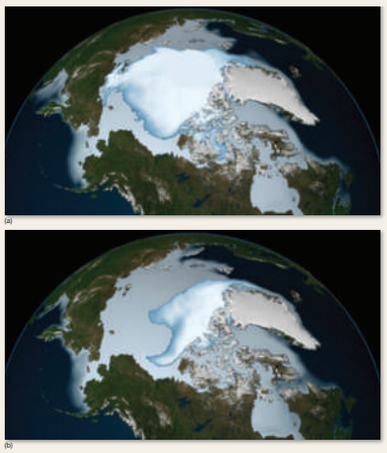
A Changing World Geography

The Arctic

For hundreds of years, explorers and sailors have sought a route through the **Northwest Passage**, an ice-choked waterway spanning the Arctic Sea between the Atlantic and Pacific Oceans, north of the Canadian and Russian mainlands. Recently, global warming has accomplished what generations of explorers and investors have failed to do—it has opened up the Northwest Passage to easier shipping. This opening significantly shortens the shipping distance between Shanghai and New York or Tokyo and London, making a globalizing world all the more tightly connected. In 2014, the Chinese-owned cargo ship "Nunavik" became the first-ever to make the journey without an icebreaker escort, carrying 23,000 tons of cargo to the port of Bayuquan, China. This journey is 40% shorter than going by way of the Panama Canal.

Ice-Free Arctic Summers? As temperatures rise, the extent of ice in the Arctic is decreasing rapidly, especially in the summer (FIGURE 3.1.1). Arctic sea ice levels are at their lowest since records have been kept. Projections based on current trends suggest that the Arctic Ocean will be free of summer ice sometime between 2030 and 2080. Far sooner, the route across the Arctic will be reliably open to global commerce, and for the first time, the seafloor will be accessible to extensive resource development involving drilling for oil and natural gas.

Far-Reaching Effects These historic changes will have devastating impacts on the wildlife of the region. Polar bears will effectively be deprived of their natural habitat and ultimately be found only in zoos. And the opening of the ice means the creation of an entirely new world region—a contested prize for key world powers, a novel area for tourism, a critical source of resources, and a connected path between the worlds of the Atlantic and Pacific. The geopolitical contest for the control of this area has already begun, with Russia, Norway, Denmark, Canada, and the United States marking territory and making legal claims on the region (FIGURE 3.1.2). In August 2007, the Russian government sent two tiny submarines to plant the Russian flag on the Arctic seafloor (FIGURE 3.1.3). In 2015, Denmark, which controls Greenland, hopes to follow suit by making a formal claim to the United Nations for control over a large portion of the Arctic seabed.



▲ FIGURE 3.1.1 **The Melting Polar Ice Cap** Shifting patterns of summer ice cover in the Arctic region between (a) 1979 and (b) 2014.

Greenland's Future Although physiographically considered part of North America, Greenland has its own indigenous populations (Kalaallisut-speaking Inuits) and wildlife (polar bear, musk ox, narwhal, and walrus) and is politically an overseas territory of Denmark. The emergence of a new geostrategic region around the North Pole, and the recently established semi-independent status of Greenland, reinforces this ambiguity. While Greenland is clearly a "victim" of global climate change, through the loss of its ice sheets, wildlife habitat, and indigenous human livelihoods, its position also allows it to assert claims on minerals and oil and gas reserves. This gives Greenland considerable influence and economic opportunity, alongside Canada, Russia, and the United States, though they remain under the nominal control of a small European power, Denmark.

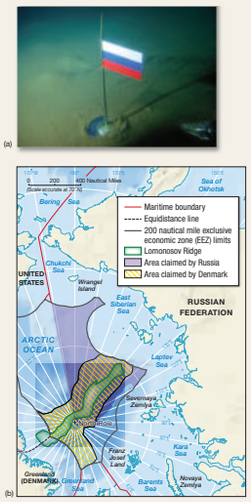
1. **For whom does the transformation of the Arctic pose problems and for whom does it present opportunities?**
2. **What new connections does the opening of the Arctic create between other existing world regions?**

Arctic Sea Ice News and Analysis

https://geo.pt/L4QHR

"The geopolitical contest for the control of this area has already begun."

▲ FIGURE 3.1.2 **Claims on the New Arctic Frontier** The national boundaries and the competing claims on this emerging region make this a dynamic place. Each of the five countries bordering the Arctic Ocean has claimed an Exclusive Economic Zone (EEZ), an area where they hold exclusive rights to drill, fish, or mine. Several claims, shown with hash marks, are claimed by nations but not recognized by the international community and depend on contested information about the shape and extension of the continental shelf.



▲ FIGURE 3.1.3 **Conflicting Claims to the Arctic Seafloor** (a) Russia planted its flag in 2007 on an undersea formation, called the Lomonosov Ridge, a gesture seen by other Arctic powers as a land grab. (b) In 2014, Denmark also claimed the ridge, arguing it is an extension of Greenland's continental shelf.

UPDATED! Emerging Regions features emphasize global and local change, and explore how world regional geography changes over time and how regions might look different in the future.

Future Geographies

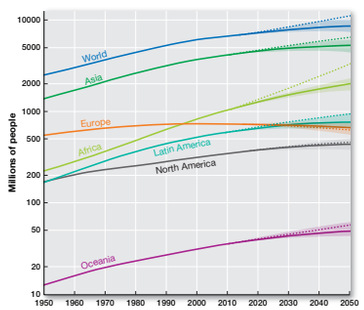
The world is in transition, and the distribution of people, money, resources, opportunities, and crises is necessarily changing as a result. Each of the chapters in this book contains a "Future Geographies" section that speculates about the future of different regions, while "Emerging Regions" sections introduce new regions that are forming now.

Population Boom or Bust?

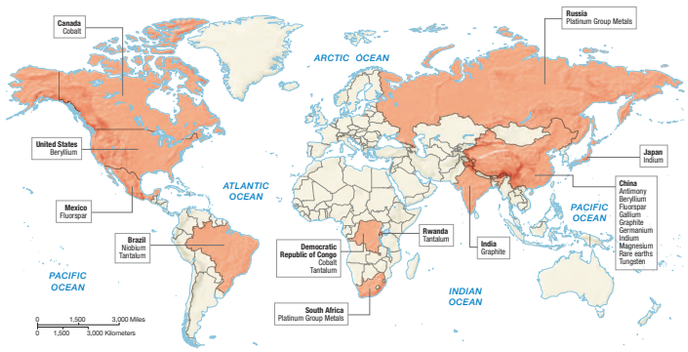
Many forces are lowering birthrates around the world, leading to leveling off or declining regional populations. In some places, populations may continue to rise, however. FIGURE 1.49 shows projected population changes according to the UN Estimates up to and 2050.

Emerging Resource Regions

The expansion of the global economy and the globalization of industry will boost the overall demand for raw materials of every kind, and this will spur the development of some previously less exploited but resource-rich regions in Africa and Asia (FIGURE 1.50). The emergence of these new resource regions has enormous implications, as in Africa, where new geopolitical, cultural, and economic relationships are forming to rising powers like China and India.



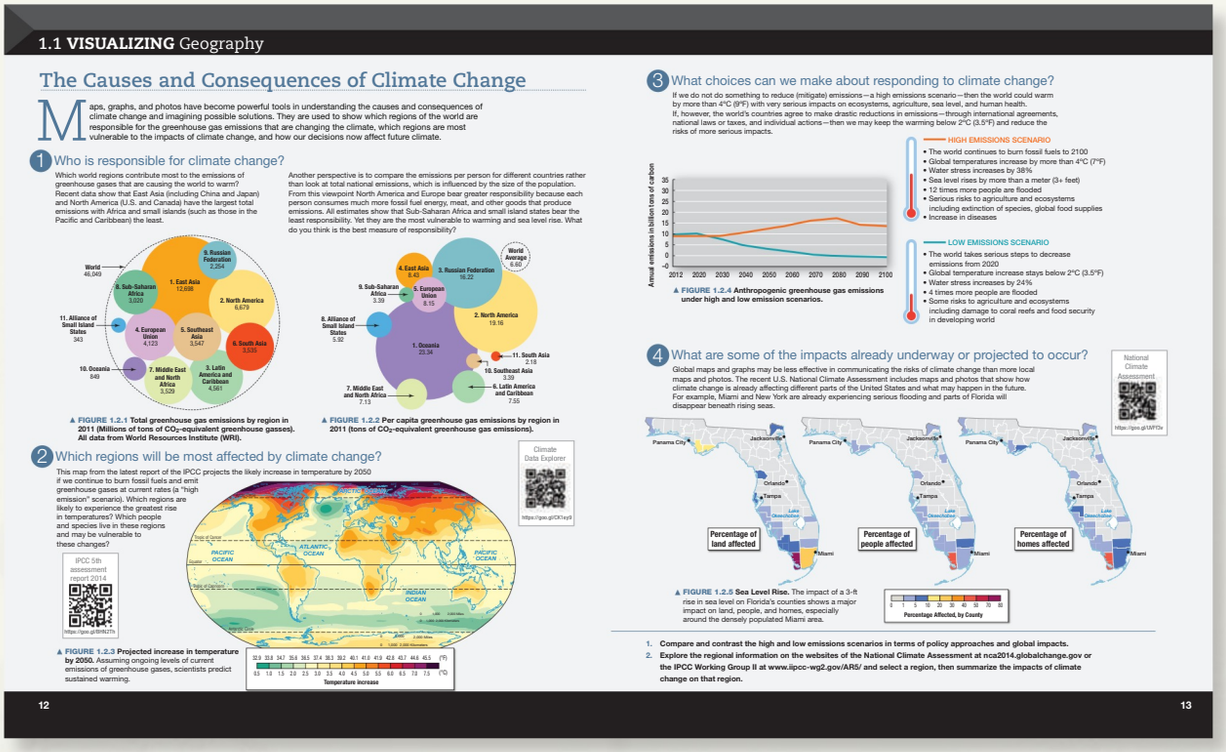
▲ FIGURE 1.49 **Population Geography of the Future** The range of projections is reflected in the widening bars further out in time.



▲ FIGURE 1.50 **Global Resource Production of Important and Rare Elements** As historically peripheral countries develop and use more of the world's resources, demands for scarce materials will increase. What are some of the applications of rare materials shown on the map (like Cobalt and Platinum)? What makes them important?

UPDATED! Future Geographies sections conclude each chapter with a brief discussion of some of the key issues facing each world region, projecting how they are likely to develop in the coming years and decades.

Dynamic Data Visualization & Critical Analysis



1.1 **VISUALIZING** Geography

The Causes and Consequences of Climate Change

Maps, graphs, and photos have become powerful tools in understanding the causes and consequences of climate change and imagining possible solutions. They are used to show which regions of the world are responsible for the greenhouse gas emissions that are changing the climate, which regions are most vulnerable to the impacts of climate change, and how our decisions now affect future climate.

1 Who is responsible for climate change?

Which world regions contribute most to the emissions of greenhouse gases that are causing the world to warm? Recent data show that East Asia (including China and Japan) and North America (U.S. and Canada) have the largest total emissions with Africa and small islands (such as those in the Pacific and Caribbean) the least.

Another perspective is to compare the emissions per person for different countries rather than look at total national emissions, which is influenced by the size of the population. From this viewpoint North America and Europe bear greater responsibility because each person consumes much more fossil fuel energy, meat, and other goods that produce emissions. All estimates show that Sub-Saharan Africa and small island states bear the least responsibility. Yet they are the most vulnerable to warming and sea level rise. What do you think is the best measure of responsibility?

▲ **FIGURE 1.2.1 Total greenhouse gas emissions by region in 2011 (Millions of tons of CO_2-equivalent greenhouse gasses). All data from World Resources Institute (WRI).**

▲ **FIGURE 1.2.2 Per capita greenhouse gas emissions by region in 2011 (tons of CO_2-equivalent greenhouse gas emissions).**

2 Which regions will be most affected by climate change?

This map from the latest report of the IPCC projects the likely increase in temperature by 2050 if we continue to burn fossil fuels and emit greenhouse gases at current rates (a "high emission" scenario). Which regions are likely to experience the greatest rise in temperatures? Which people and species live in these regions and may be vulnerable to these changes?

Climate Data Explorer

IPCC 5th assessment report 2014

▲ **FIGURE 1.2.3 Projected increase in temperature by 2050.** Assuming ongoing levels of current emissions of greenhouse gases, scientists predict sustained warming.

3 What choices can we make about responding to climate change?

If we do not do something to reduce (mitigate) emissions—a high emissions scenario—then the world could warm by more than 4°C (9°F) with very serious impacts on ecosystems, agriculture, sea level, and human health. If, however, the world's countries agree to make drastic reductions in emissions—through international agreements, national laws or taxes, and individual actions—then we may keep the warming below 2°C (3.5°F) and reduce the risks of more serious impacts.

HIGH EMISSIONS SCENARIO
- The world continues to burn fossil fuels to 2100
- Global temperatures increase by more than 4°C (7°F)
- Water stress increases by 38%
- Sea level rises by more than a meter (3+ feet)
- 12 times more people are flooded
- Serious risks to agriculture and ecosystems including extinction of species, global food supplies
- Increase in diseases

LOW EMISSIONS SCENARIO
- The world takes serious steps to decrease emissions from 2020
- Global temperature increase stays below 2°C (3.5°F)
- Water stress increases by 24%
- 4 times more people are flooded
- Some risks to agriculture and ecosystems including damage to coral reefs and food security in developing world

▲ **FIGURE 1.2.4 Anthropogenic greenhouse gas emissions under high and low emission scenarios.**

4 What are some of the impacts already underway or projected to occur?

Global maps and graphs may be less effective in communicating the risks of climate change than more local maps and photos. The recent U.S. National Climate Assessment includes maps and photos that show how climate change is already affecting different parts of the United States and what may happen in the future. For example, Miami and New York are already experiencing serious flooding and parts of Florida will disappear beneath rising seas.

National Climate Assessment

Percentage of land affected | Percentage of people affected | Percentage of homes affected

▲ **FIGURE 1.2.5 Sea Level Rise.** The impact of a 3-ft rise in sea level on Florida's counties shows a major impact on land, people, and homes, especially around the densely populated Miami area.

1. **Compare and contrast the high and low emissions scenarios in terms of policy approaches and global impacts.**
2. **Explore the regional information on the websites of the National Climate Assessment at nca2014.globalchange.gov or the IPCC Working Group II at www.ipcc-wg2.gov/AR5/ and select a region, then summarize the impacts of climate change on that region.**

UPDATED! Visualizing Geography features use cutting-edge cartography and data visualization techniques to introduce readers to a current geographic issue. Visual data provide a powerful way to convey information and analyze geographic processes in action, encouraging students to ask, "What types of geographic data can I use to answer the pressing questions of the day?"

DATA Analysis

As discussed in this chapter, human activities in the environment directly influence climate change, which affects each region in different ways. Rising sea levels due to climate change directly impact Small Island Developing States (SIDS). Yet SIDS have contributed to less than 1% of the global emissions that cause temperatures and sea levels to rise. Tulun Atoll is one such Pacific island where the population is currently facing forced relocation. Take a deeper look at climate change and SIDS by first reading the 2014 *Guardian* article, "Island nations shouldn't be left to drown from climate change" at http://www.theguardian.com/commentisfree and respond to these following questions:

1. **What are the factors causing sea levels to rise? In addition to sea-level rise, how will climate change affect Pacific islands and the surrounding ocean?**
2. **What is the "call to action" expressed by Tuilaepa Aiono Sailele Malielegaoi, the prime minister of Samoa to other world leaders?**
3. **How have New Zealand and Australia responded to climate migration of Pacific Islanders?**

Going deeper, search Vimeo.com for "Chief Bernard Tunim in Copenhagen / COP15 (2009)" to see this address delivered by Chief Bernard Tunim, a leader and fisherman from Tulun Atoll at the UN Climate Change Conference in Copenhagen, 2009.

4. **What does Chief Tunim say about what his people and island are experiencing with regard to food security, changing water levels, and the island's shoreline?**
5. **In Chief Tunim's view, what and who is destroying Tulun Atoll?**
6. **How does Chief Tunim rate the relative usefulness of the policies of international organizations in comparison with the everyday experience of his own people? Explain your answer.**
7. **What does Chief Tunim say about the government's relocation program for his people? Are his criticisms justified? Explain why or why not.**
8. **Do you agree with Chief Tunim that Europeans and North Americans should curb their consumption of fossil fuels to combat climate change? Explain your answer.**
9. **Reflecting on both the *Guardian* article and Chief Tunim's address, how much responsibility do you think the high-polluting nations have to the smaller nations who bear the greatest impacts? What percentage of this responsibility should be response, and what part should constitute preventative measures?**

Sea-Level Rise

https://goo.gl/yADxc4

NEW! Data Analysis Activities at the end of each chapter have students answer critical thinking questions based on data related to regional, economic, social, and political developments from governments, nongovernmental organizations, and other important sources.

Continuous Learning
Before, During, and After Class

BEFORE CLASS

Mobile Media and Reading Assignments Ensure Students Come to Class Prepared.

Pre-Lecture Reading Quizzes are easy to customize & assign

NEW! Reading Questions ensure that students complete the assigned reading before class and stay on track with reading assignments. Reading Questions are 100% mobile ready and can be completed by students on mobile devices.

NEW! Dynamic Study Modules personalize each student's learning experience. Created to allow students to acquire knowledge on their own and be better prepared for class discussions and assessments, this mobile app is available for iOS and Android devices.

Pearson eText in MasteringGeography

gives students access to the text whenever and wherever they can access the internet. eText features include:

- Now available on smartphones and tablets.
- Seamlessly integrated videos and other rich media.
- Fully accessible (screen-reader ready).
- Configurable reading settings, including resizable type and night reading mode.
- Instructor and student note-taking, highlighting, bookmarking, and search.

with MasteringGeography

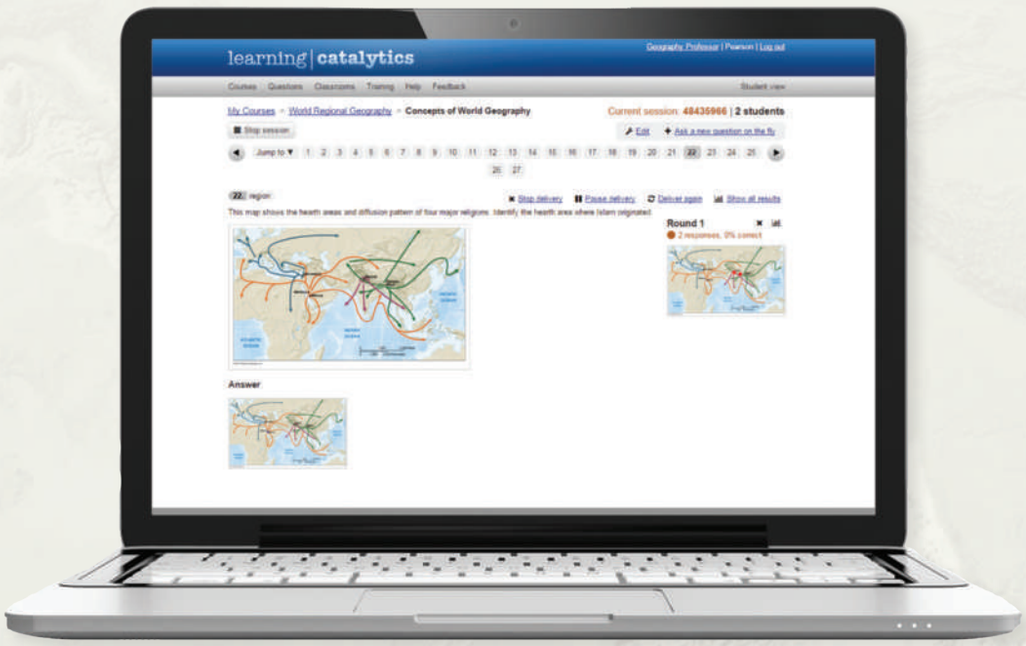
DURING CLASS

Learning Catalytics™ and Engaging Media

What has Professors and Students excited? Learning Cataltyics, a 'bring your own device' student engagement, assessment, and classroom intelligence system, allows students to use their smartphone, tablet, or laptop to respond to questions in class. With Learning Cataltyics, you can:

- Assess students in real-time using open ended question formats to uncover student misconceptions and adjust lecture accordingly.
- Automatically create groups for peer instruction based on student response patterns, to optimize discussion productivity.

> ***"My students are so busy and engaged answering Learning Catalytics questions during lecture that they don't have time for Facebook."***
> Declan De Paor, *Old Dominion University*



Enrich Lecture with Dynamic Media

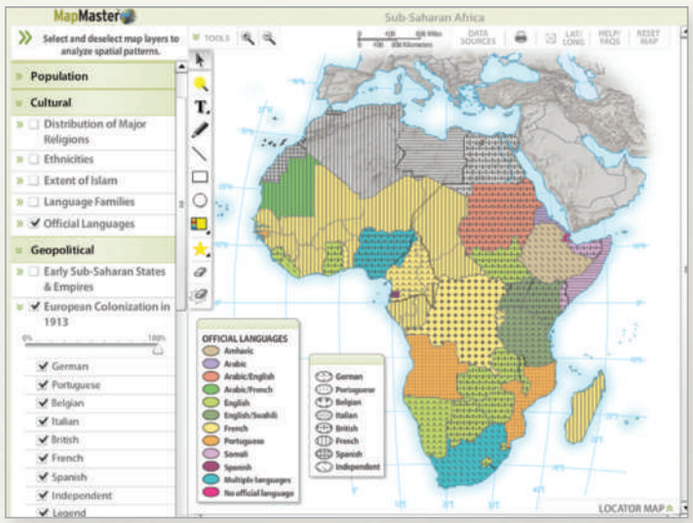
Teachers can incorporate dynamic media into lecture, such as Videos, MapMaster Interactive Maps and Geoscience Animations.

MasteringGeography™

MasteringGeography delivers engaging, dynamic learning opportunities—focusing on course objectives and responsive to each student's progress—that are proven to help students absorb world regional geography course material and understand challenging geography processes and concepts.

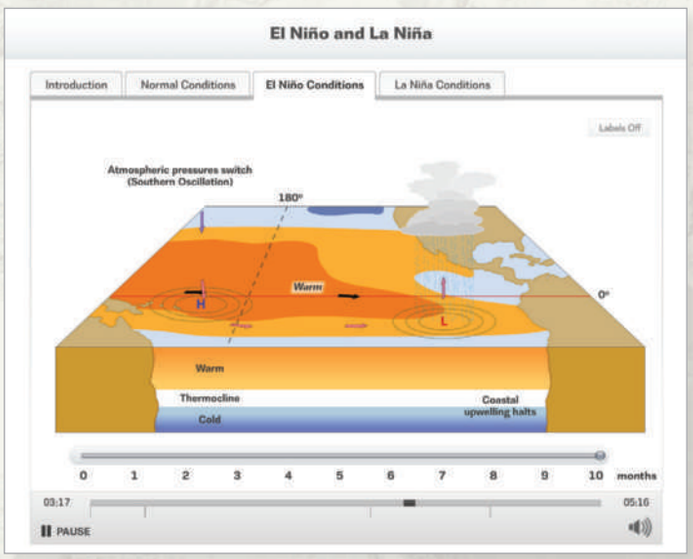
AFTER CLASS

Easy to Assign, Customizable, Media-Rich, and Automatically Graded Assignments



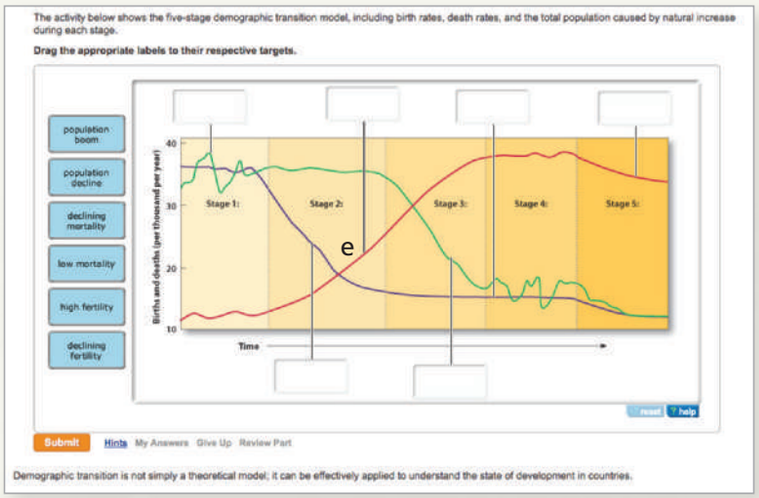
MapMaster Interactive Map Activities are inspired by GIS, allowing students to layer various thematic maps to analyze spatial patterns and data at regional and global scales. This tool includes zoom and annotation functionality, with hundreds of map layers leveraging recent data from sources such as NOAA, NASA, USGS, United Nations, and the CIA.

NEW! Geography Videos from such sources as the BBC and *The Financial Times* are now included in addition to the videos from Television for the Environment's Life and Earth Report series in **MasteringGeography**. Approximately 200 video clips for over 25 hours of video are available to students and teachers and **MasteringGeography**.



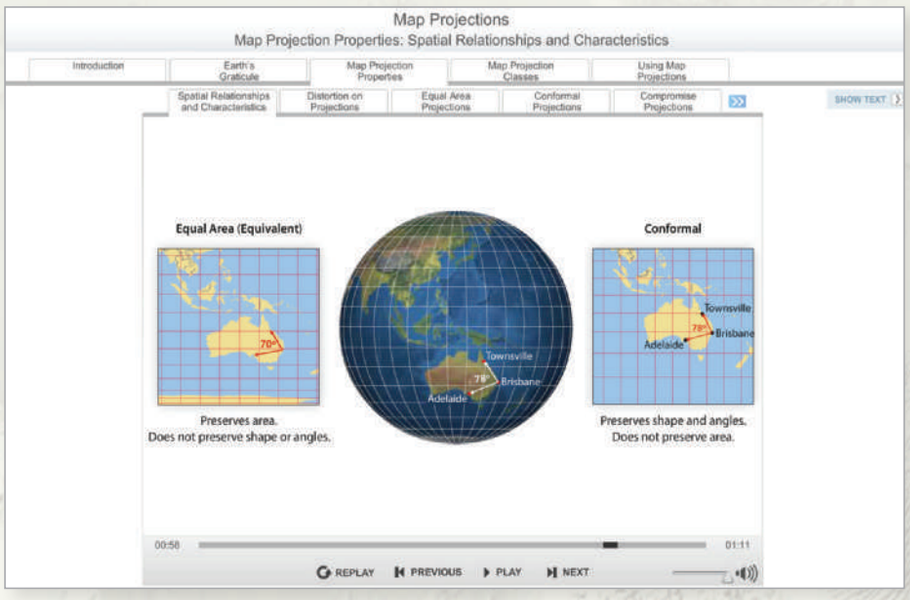
GeoScience Animations visualize complex physical geoscience concepts, and include audio narration.

www.MasteringGeography.com

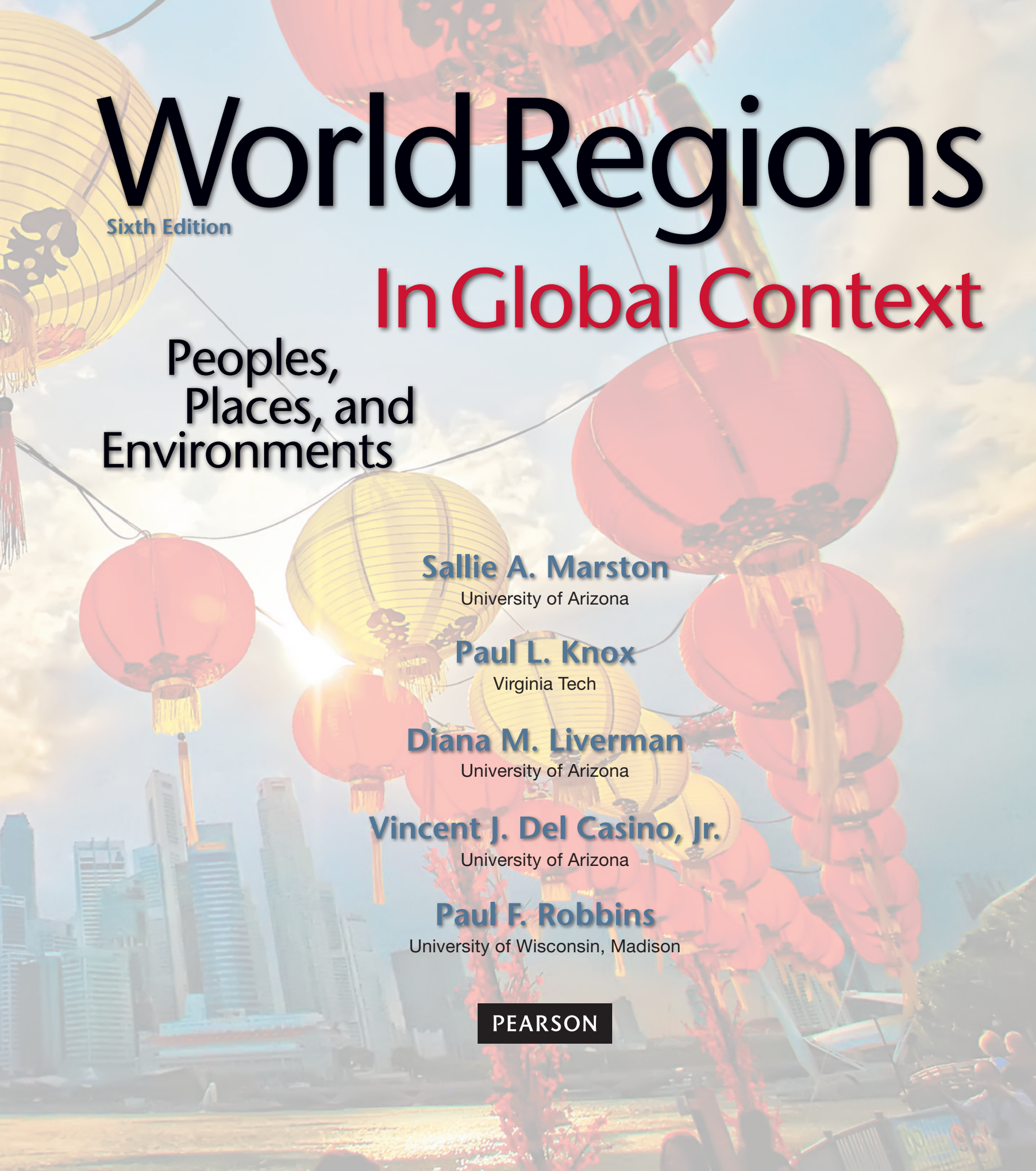


NEW! GeoTutors. Highly visual coaching items with hints and specific wrong answer feedback help students master the toughest topics in geography.

UPDATED! Encounter (Google Earth) activities provide rich, interactive explorations of world regional geography concepts, allowing students to visualize spatial data and tour distant places on the virtual globe.



Map Projections interactive tutorial media helps reinforce and remediate students on the basic yet challenging Chapter 1 map projection concepts.



World Regions

Sixth Edition

In Global Context

Peoples, Places, and Environments

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Preface

"One book, one pen, one child, and one teacher can change the world."

Malala Yousafzai[1]

We live in a world of global interconnection and dynamic change. This means that if we want to understand the human condition or the changing environment, we have to look at both our local community and the wider world. We have to challenge our assumptions about what we think we know. We have to work together. *World Regions in Global Context* provides a framework for understanding the global connections that affect relationships within world regions, while also recognizing that the events that take place locally can have an impact on a global scale. Of course, no textbook can provide the answers to all the complex questions about the forces that fuel these global connections and local changes. That's why we have classes, students, teachers, travel, and other ways of understanding the world! But *World Regions in Global Context* can shed some light on the dynamic and complex relationships between people and the world they inhabit. This book gives students the basic geographical tools and concepts they need to understand the complexity of today's global geography and the world regions that make up that geography.

New to the 6th Edition

The 6th edition of *World Regions in Global Context* has been thoroughly revised by the authors and editorial team based on reviews from teachers and scholars in the field. Every line and graphic in the book has been reviewed and edited for maximum clarity and effectiveness. The text has been significantly edited to provide additional space for infographics, data-driven maps, and images. The new edition includes significant changes as well as a number of new features that make the revised text more accessible and engaging.

- Global change, especially climate change, is becoming an increasingly pressing issue as is responses to that change. The 6th edition takes up this concern by more overtly incorporating a discussion of environmental change in each chapter through the reorganized subsection titled **Environment, Society, and Sustainability**. The increasing emphasis on sustainable solutions to climate change and other environmental challenges is marked by the addition of other features in the text as well, including a new box feature.
- **Sustainability in the Anthropocene** This feature provides an example of efforts to develop more sustainable lifestyles, cities, or food systems in this era of the "Anthropocene"—a newly proposed geologic era of human influences. In each region we have highlighted a specific project or place where people are implementing solutions that are socially, economically, and ecologically sustainable.
- **Faces of the Region** explores the experience of different people within each world region. It takes up the challenge of asking what is it like to be a young person in one place, or what is it like to grow older in another place, or what it's like to grow up in a place that is experiencing dramatic change. It looks at the everyday, real-life experiences of migration and generational change and asks how and in what ways changing demographics in each world region may be impacting how people come to know and understand their place in the world.
- Geography is strongly invested in the use of maps and other visual data. The **Visualizing Geography** feature has been updated with a new emphasis on infographics and maps that encourage data and visual analyses. It builds on and extends that tradition with extensive use of visualizations and maps to focus on issues such as global sea-level rise, the consequences of conflict in the Middle East and North Africa, and the migration of Muslim populations into Europe.
- Every chapter review includes a new **Data Analysis** feature in which students apply chapter concepts and answer critical thinking questions based on data accessed via Quick Response (QR) links to Web sites of governments, nongovernmental organizations, and other important sources of data related to regional, economic, social, and political developments.
- Recognizing the importance of population dynamics as a factor in many regional challenges, the Culture and Populations section of each chapter contains a section, **Demographic Change**, with updated population statistics and trends as well as new population pyramids helping students to visualize the societal impacts of population change.
- The **maps, images, graphs, and tables** that make up the text's visual program have been revised. Readers will notice that many maps now include images that highlight key features. The photo program for this edition has also been substantially revised with newer and different photos. We have added questions that prompt students to look more carefully at some of the graphics and images.
- We have **updated the histories, stories, and current events** in each chapter. As readers know, the world has changed a lot since the previous edition of this book. To respond to these changes, we have included stories on the European response to the Syrian refugee crisis; the Syrian civil war and the rise of Islamic State of Iraq and Syria (ISIS); the recent Russian annexation of Crimea; natural disasters in Southeast Asia and the threat of rising sea-levels due to climate change in Oceania; and the growing connections between China and Africa, for example. New and updated information has been added to all the special feature material as well, including all the new **Geographies of Indulgence, Desire, and Addiction** features on luxury cars, beer and wine, and trekking.
- **Chapter 1** now includes a new section on how one can begin "Thinking Like a Geographer."

[1]This is an excerpt from Malala Yousafzai's speech at the UN General Assembly on July 12, 2013 (http://www.independent.co.uk/news/world/asia/the-full-text-malala-yousafzai-delivers-defiant-riposte-to-taliban-militants-with-speech-to-the-un-general-assembly-8706606.html), downloaded September 11, 2015.

Objectives and Approach

World Regions in Global Context has two primary objectives. The first is to provide a body of knowledge about world regions and their distinctive political and economic practices, cultural and environmental landscapes, and sociocultural attributes. The second is to emphasize that although there is diversity among world regions, all world regions are connected through new and changing relationships. This approach informs the book's thematic structure, which is organized to engage readers in a discussion of environmental, social, historical, economic, and territorial change as well as cultural practices and demographic shifts.

Thematic Structure

This book is built on an opening chapter that describes how one thinks like a geographer. The 10 regional chapters follow, explore, and elaborate on the concepts laid out in **Chapter 1**. In each chapter, we balance discussions of global interconnections with local realities. To do this systematically, we divide each regional chapter into four major categories, each highlighting a set of themes that are central to understanding world regions.

Environment, Society, and Sustainability

We begin each chapter with a discussion of the physical and environmental context of the region; this includes a discussion of climate and climate change; geological resources, risks, and water; ecology, land, and environmental management; and sustainability. Our aim is to demonstrate how environment is shaped by, and shapes, the region's inhabitants over time.

History, Economy, and Territory

This section focuses on the historical geographic context for each world region and illustrates how the economies and territories that make up each world region have evolved over time. Included are discussions of historical landscapes and legacies; economy, accumulation, and the production of inequality; and territory and politics.

Culture and Populations

This section explores the cultures and populations of each world region. This section emphasizes the relationships between population change and settlement patterns, while exploring the importance of urbanization in each region. This section is broken down into three subsections focusing on culture, religion, and language; cultural practices, social differences, and identity; and demography and urbanization.

Future Geographies

In keeping with the theme of this textbook, which emphasizes ongoing change, each chapter concludes with a brief discussion of some of the key issues facing each world region, projecting how they are likely to develop in the coming years and decades.

Pedagogy and Content Enrichment

The book includes a number of important pedagogical devices to help readers understand the complex processes that connect our world and make it different.

Learning Outcomes and Learning Outcomes Revisited

On the opening pages of each regional chapter, we provide a list of *Learning Outcomes*. This list directs students to the key take-away points in the chapter. They are intentionally broad, drawing from a number of different discussions throughout each chapter. At the end of the chapter, we return to these learning outcomes and offer brief comments on them. The *Learning Outcomes Revisited* section helps readers grapple with some of the larger conceptual material and focuses student review and also includes key questions.

Apply Your Knowledge

Apply Your Knowledge questions ask readers to synthesize the information in the text and respond to applied questions that link back to the chapter's broad learning outcomes. Readers will find six to eight of these question in each chapter. Many have been updated with QR links to Web sites where students can access current data that deepens their understanding of regional issues.

Special Content Features

New and updated box features provide students with an opportunity for in-depth exploration of key chapter content. In addition to a new emphasis on data analysis, the 6th edition's box features include critical thinking questions to encourage students to self-assess and reflect on what they have learned.

- **Visualizing Geography** In each chapter, we use cutting-edge cartography and data visualization techniques to introduce readers to a current geographic issue. Visual data provide a powerful way to convey information and analyze geographic processes in action, encouraging students to ask, "What types of geographic data can I use to answer the pressing questions of the day?"
- **Emerging Regions** This feature emphasizes global and local change and underscores the importance that these new regions have now and may have in the future. Readers are encouraged to explore *Emerging Regions* with an eye toward asking how world regional geography changes over time and how it might look different in the future.
- **Faces of the Region** This section explores the experience of different people within each world region. It takes up the challenge of asking what is it like to be a young person in one place or what is it like to grow older in another place. It looks at the everyday, real-life experience of migration and asks how and in what ways changing demographics in each world region may be impacting how people come to know and understand their place in the world.

- **Geographies of Indulgence, Desire, and Addiction** This feature links people in one world region to people throughout the world through a discussion of the local production and global consumption of regional commodities, helping students appreciate the links between producers and consumers around the world as well as between people and the natural world.
- **Sustainability in the Anthropocene** This feature provides an example of efforts to develop more sustainable lifestyles, cities, or food systems in each region by highlighting a specific project or place where people are implementing solutions that are socially, economically, and ecologically sustainable.

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MasteringGeography™ now features an expansive library of BBC video clips, a new next generation of Geographic Information System (GIS)–inspired MapMaster interactive maps, Dynamic Study Modules for World Regional Geography, a responsive-design eText 2.0 version of the book, and more.

Conclusion

This book is the product of conversations among the authors, colleagues, students, and the editorial team about how best to teach a course on world regional geography. In preparing the text, we have tried to help students make sense of the world by connecting conceptual materials to the most compelling current events. We have also been careful to represent the best ideas the discipline of geography has to offer by mixing cutting-edge and innovative theories and concepts with more classical and proven approaches and tools. Our aim has been to show how important a geographic approach is for understanding the world and its constituent places and regions.

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We are indebted to many people for their assistance, advice, and constructive criticism in the course of preparing this book. Among those who provided comments on various drafts and editions are the following professors:

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Paul Robbins received his PhD in geography from Clark University in 1996. He is currently the director of the Nelson Institute for Environmental Studies at the University of Wisconsin–Madison. Previously, he taught at the University of Arizona, Ohio State University, the University of Iowa, and Eastern Connecticut State University. His teaching and research focus on the relationships between individuals (e.g., homeowners, hunters, professional foresters), environmental actors (e.g., lawns, elk, mesquite trees), and the institutions that connect them. He and his students seek to explain human environmental practices and knowledge, the influence the environment has on human behavior and organization, and the implications this holds for ecosystem health, local community, and social justice. Robbins's past projects have examined chemical use in the suburban United States, elk management in Montana, forest product collection in New England, and wolf conservation in India.

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- *Encounter World Regional Geography* Workbook and Website by Jess C. Porter (0321681754)
- *Encounter Human Geography* Workbook and Web site by Jess C. Porter (0321682203)
- *Encounter Physical Geography* Workbook and Web site by Jess C. Porter and Stephen O'Connell (0321672526)

Dire Predictions: Understanding Global Warming 2nd edition by Michael Mann and Lee R. Kump (0133909778) For any science or social science course in need of a basic understanding of Intergovernmental Panel on Climate Change (IPCC) reports, periodic reports from the IPCC evaluate the risk of climate change brought on by humans. But the sheer volume of scientific data remains inscrutable to the general public, particularly to those who may still question the validity of climate change. In just over 200 pages, this practical text presents and expands upon the essential findings in a visually stunning and undeniably powerful way to the lay reader. Scientific findings that provide validity to the implications of climate change are presented in clear-cut graphic elements, striking images, and understandable analogies. The 2nd Edition covers the latest climate change data and scientific consensus from the ongoing Fifth Assessment Report and integrates links to media and active learning to capture learning opportunities for students. The text is also available in various eText formats, including an eText upgrade option in MasteringGeography.

People carry bags of coltan down a hill from the Mudere mine, near Rubaya, Democratic Republic of Congo (DRC). Miners dig 50 meters underground for the minerals before transporting them to a nearby river where they are separated before being sold to dealers. Mine accidents are common in DR Congo, where raw materials are mined for the manufacture of many commercial items, including electronics.

1

World Regions in Global Context

Here is an experiment you shouldn't try. Grab your cell phone, throw it on the ground, stomp on it, and pick through the pieces. Amid the remnants, you can find the world. The screen was manufactured in Mexico. The microprocessor chip was assembled in a factory in China, owned by a company in South Korea, funded by investment from the United States. The software code that runs the phone was designed by a programmer in India. The electronics are made from materials found in copper mines in Chile and coltan mines in the Democratic Republic of the Congo (DRC), and the lead that soldered together the circuit board comes from Australia. Your cell phone cannot exist without the resources and knowledge of all these different world regions.

The objects we use in our daily lives are produced through international linkages and are central to the processes of globalization. Globalization reflects a world where places and people are increasingly connected. Thanks to these connections, resources and products as well as ideas, languages, culture, and music flow from place to place, making places seem more *similar*. And yet places remain strikingly *different* in spite of these similarities. Why?

If you visited all the places involved in the production of your phone, you would find well-educated, highly paid technicians living in Bangalore, India. In Mexico, the urban-based factory that produced the screen employs workers who migrated from rural areas. The Chilean copper mine is an enormous pit mine, three miles wide and a half-mile deep, drawing and polluting water from local communities. In Australia mines are located on lands where indigenous people struggle for their rights, and in the DRC the mining of coltan has fueled conflicts. In all these places, cell phones have become the way people connect to each other, but these places are *different* because of the economic, cultural, and environmental transformations that happen when they connect to global networks. This process is regionalization—a world where novel cultures, ideas, and products emerge from the mix of elements into new unique regions. The conclusion you can draw smashing your cell phone and considering its global origins is: *places are different because they are connected.*

Learning Outcomes

- ***Compare*** and contrast the concepts of globalization and regionalization.
- ***Describe*** the Anthropocene's global impacts on earth systems and analyze related environmental issues and sustainability choices.
- ***Differentiate*** between forms of economic activity and explain why these forms vary around the globe.
- ***Explain*** contemporary economic development trends and describe the main indicators of social and economic advancement.
- ***Identify*** the global, regional, and national actors that play a vital role in the world today.
- ***Explain*** the implications of globalization and regionalization for world regions and cultures.
- ***Provide*** examples of how the global distribution of languages and religions is changing.
- ***Apply*** the demographic transition model and use population pyramids to explain how and why regional population growth rates rise and fall.

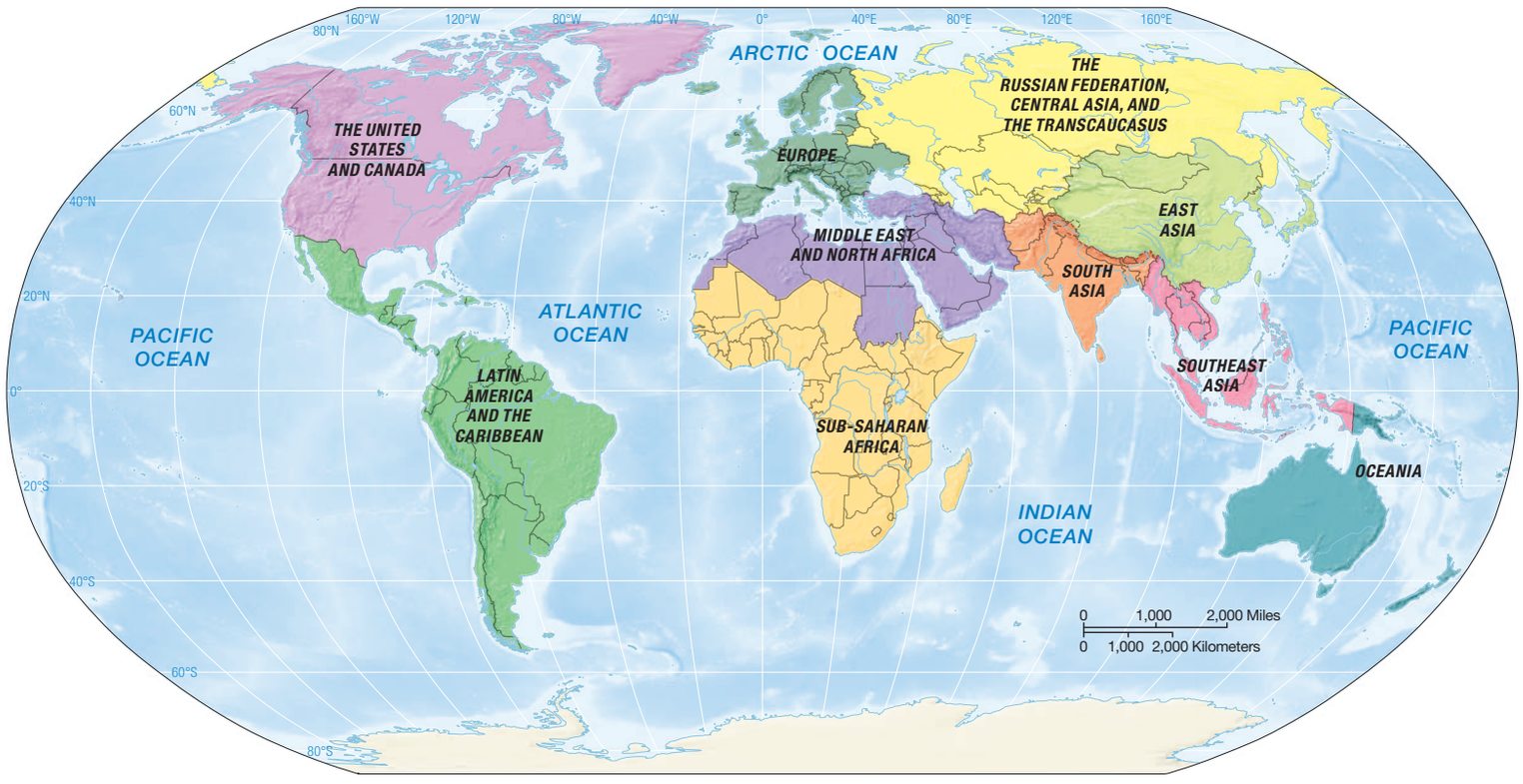
Thinking Like a Geographer

Geography is the study of global relationships involving everything from how people earn a living to how they interact with the environment. Geographers seek to understand where things are, why they are there, and how they are connected. **Geography** comes from the Greek word *geographia,* which translates as "writing the world." Geographers map, travel, and measure the world to provide rich accounts of Earth's characteristics. Geographers investigate the physical features of Earth and its atmosphere, the spatial organization and distribution of human activities, and the complex interrelationships between people and the natural and built (meaning "human-made" or "human-altered") environments in which they live. Geographers—with their knowledge of the world and its connection to our communities, economy and environment—play important roles in business and government, education, health and environmental management and are well positioned to understand our rapidly changing world with its risks and opportunities.

Geographers do this through the study of **physical geography**, which is concerned with climate, weather patterns, landforms, soil formation, and plant and animal ecology and through **human geography**, which focuses on the spatial organization of human activity and how humans make Earth into a home. **Environmental geography** connects physical and human geography, as geographers also study the relationship between humans and the natural and built environments in which they live. The power of **world regional geography** lies in its ability to describe and examine global geographic processes, while at the same time explaining *why* and *how* certain patterns emerge on Earth. This book uses physical, human, and environmental geography to explore relationships within and among **world regions** (FIGURE 1.1).

Place and the Making of Regions

World regions can best be thought of as an aggregation of **places** and the connections that develop between those places over time. Places themselves are dynamic, with changing properties and fluid boundaries that are the product of a wide variety of environmental and human factors. Places exert a strong influence, for better or worse, on people's physical well-being, opportunities, and lifestyle choices. Places also contribute to people's collective memory and are powerful emotional and cultural symbols. The meanings given to place may be so strong that they become a central part of the shared identity of the people experiencing them. A **sense of place** refers to the feelings evoked among people as a result of the experiences and memories they associate with a place and to the symbolism they attach to that place. A sense of place develops out of the human capacity to reorganize the natural world into a built environment. Geographers think of the built environment as **landscape**, Earth's surface as transformed by human activity. As a product of human actions over time, landscape provides evidence about our character



▲ **FIGURE 1.1 World Regions** This map highlights the expanse of each of the ten world regions discussed in this book.

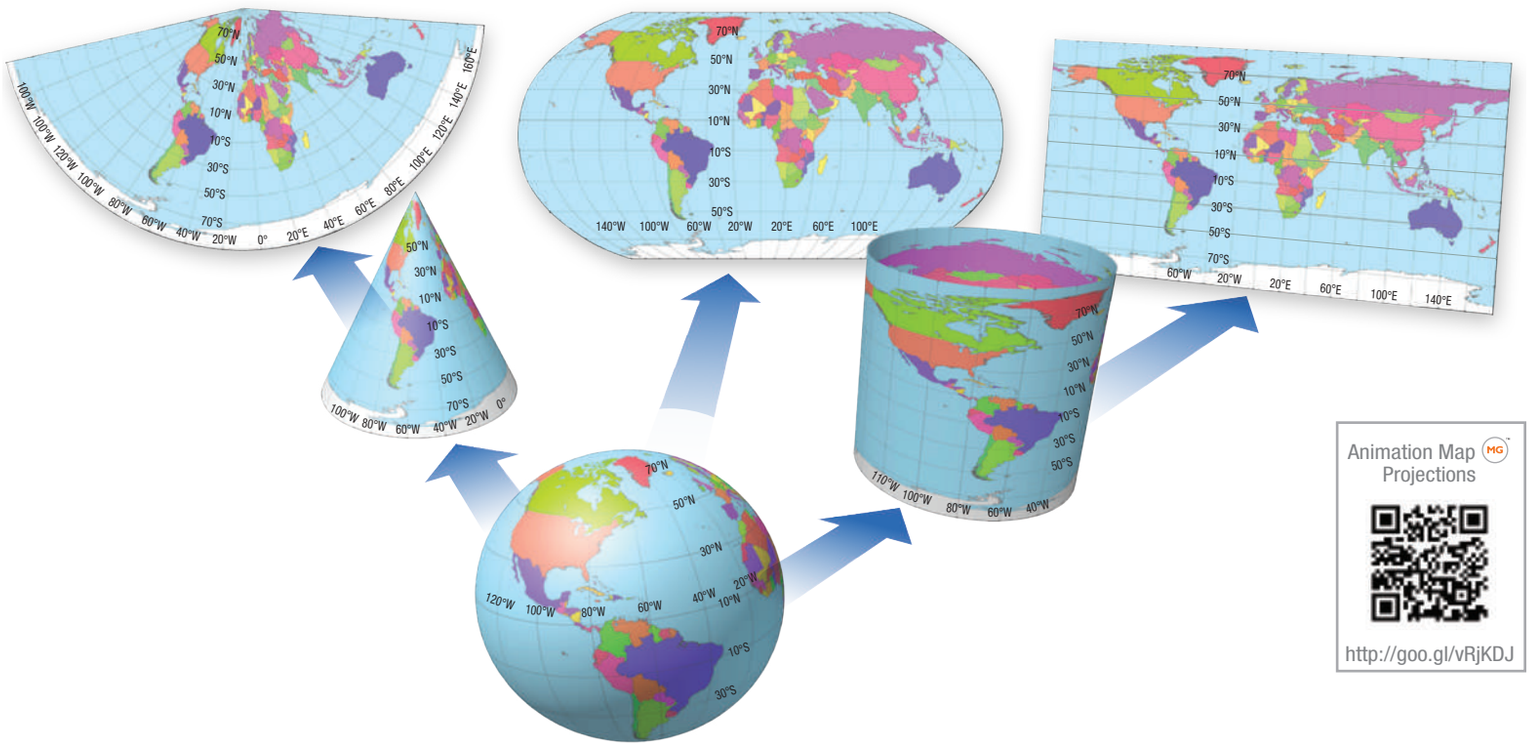
and experience, our struggles and human triumphs. Through an analysis of landscape, geographers compare the meanings of the natural environment and built environment in the context of different places and regions.

Regions are best thought of as the connections that emerge between and among places over time. When this happens at a global scale—between different countries, for example—we identify these as *world regions.* At the same time, people's own conceptions of place, **region**, and identity may generate strong feelings of regionalism. **Regionalism** is a term used to describe the strong feeling of collective identity often shared by people who inhabit a region with distinctive characteristics. The feelings that one has toward places and regions also generate one's geographical imagination. A **geographical imagination** is how people think about the world around them—their own places and the places of others. Combined with critical thinking, a geographical imagination allows geographers to understand changing meanings of social identity and the relationships among people, places, and regions.

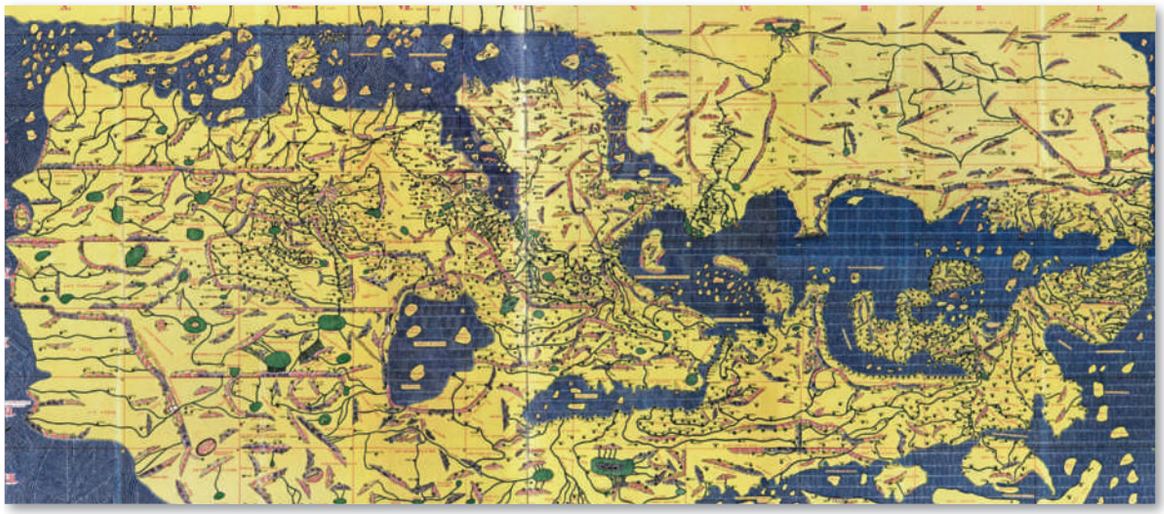
Maps and Mapping

Geographers use many tools to study the world, including maps as well as statistical and qualitative techniques. There is not one singular way that geographers ask and answer questions related to change over time and across space. Geographers do, however, rely on maps to illustrate the patterns and processes of world regional geographies (see Appendix for more detail). A **map** is a visual representation and generalization of the world (**FIGURE 1.2**). Maps can locate places using a coordinate **system** of latitude and longitude. Maps also represent the names that people ascribe to places and the relationships that exist between places. Maps help geographers ask questions about the relationship between different sociocultural, political-economic, or environmental distributions, human activities and living experiences as well as uses of the natural environment. Maps are not neutral objects, as every single map is created through a series of choices about what should and what should not appear on it (**FIGURE 1.3**). A map set at the global **scale** tends to be more general than one at regional, national, or even local scale.

Mapping the world is complicated by the dynamic nature of the world itself, its changing features, and its transforming regions. On a constantly changing Earth, every map is only a snapshot. This basic reality about mapping reflects the larger challenge posed by this book, which is to explain how and why the map of world regions looks the way it does. Some regions that we take for granted now would have made no sense to people in the past. The Ancient Celts or Romans would never have recognized "Europe" as a coherent world region 2,000 years ago. How did Europe become what we recognize today? With this sort of question in mind, this chapter introduces the basic tools and fundamental concepts that geographers use to study the world and describes the conceptual framework that informs the subsequent chapters.



▲ **FIGURE 1.2 Maps and Mapping** All maps are partial representations of the world. The projection of the world from a spherical object to a flat map always produces certain distortions in distance, direction, area, or size. There are many different map projections that geographers use to measure, assess, and analyze global and regional patterns and processes. Understanding the reason for choosing one map projection or one approach to mapping data over another is one of the core critical thinking skills that all geographers must develop over time. **What makes a map a representation of reality and not reality itself? What are the choices that cartographers must make when making a map?**



◀ **FIGURE 1.3 Tabula Rogeriana** Muhammed al-Idrisi, an Islamic cartographer, had a strong impact on mapmaking worldwide. Tabula Rogeriana is a "map of the known world," which al-Idrisi produced in 1154 for King Roger of Sicily. It includes Europe, Asia, and North Africa. The Islamic tradition places the south at the top of the map, in contrast to many world maps today. The map became the basis of many other maps of the world by both Islamic and European cartographers.

"It is the process of making new global connections—through trade, migration, or environmental exchange—that allows or causes regions to change."

Globalization and Regionalization

The world has always been global. Since *Homo sapiens* walked out of East Africa and long after the moment when McDonald's began to appear in malls in Kenya (**FIGURE 1.4**), the environments, economies, and societies of the globe have been tied together. In today's world, these connections have intensified and become more widespread in a process geographers call **globalization**. Globalization is a system of elements—political-economic, sociocultural, environmental—linked together so that changes in one element often result in changes in another. Some scholars predict that the most recent wave of globalization will result in unprecedented consolidation and homogenization of the world's ecologies, economies, and societies. They stress that globalization is a process that breaks down boundaries, makes places similar, and connects them by encouraging the flow of ideas, products, and practices.

▲ **FIGURE 1.4 A Mall in Kenya** A shopping mall is more than just a place of consumption; it is an iconic marker of a certain form of development. The concept of the mall has been globalized over the last 50 years, and malls can now be found throughout the world. Most malls provide goods and services tied to global products as well as goods unique to the local market. Malls also play valuable roles as public spaces.

And yet parts of the world retain their uniqueness and new world regions may emerge over time. We use the term **regionalization** to describe how and why new regions emerge. As we will see, it is the process of making new global connections that allows or causes world regions to change. These connections mean that world regions are:

- best studied by considering how they interact and develop as part of wider global political-economic, sociocultural, and environmental *systems*;
- best conceptualized as *interdependent,* as they affect, and are affected by, each other; and
- best understood as products of *change* over time.

These three themes are intertwined in the processes of globalization and regionalization, the twin forces that generate a world of regions that is *both* globally interconnected and locally differentiated. Globalization becomes an engine of regionalization and regional differences can contribute to globalization. Put another way, it is the process of making new global connections—through trade, migration, or environmental exchange—that allows or causes regions to change. These connections have far-reaching effects. They create global and regional trade networks, ethnic neighborhoods in cities, new consumer products and ways of shopping, and even new migrant communities (**FIGURE 1.5**). They may lead to the formation of new ecological communities or new agricultural systems based on imported crops and animals. By studying world regions, we can understand why and how differences emerge, even as global processes connect the world's regions in new and important ways. That *places are different because they are connected* is the single central lesson of this book.

▲ **FIGURE 1.5 Migration Networks Among Mexico's Farmworkers** This map represents the movement of one migrant farm family in Mexico over the course of a year. They are certainly not alone, as thousands of people follow such patterns across Mexico and between Mexico and other countries, such as the United States. **Why do farmers migrate in Mexico? Can you think of other examples of economically-driven agricultural migration patterns in the world today?**

Apply Your Knowledge

1.1 Identify three examples of how globalization has affected your local community.

1.2 Using the examples you selected, list the ways in which your local community influences globalization. For example, a "big box" store is part of the global economy, but often sells products or services tailored for different regions, such as urban or rural essentials, Southwest or Northeast specialties.

Ecological Footprint

https://goo.gl/TcIL1T

A World of Regions

Exploring the interconnections among world regions not only helps explain the contemporary world, but it also allows us to think about where the world might go from here. The world we grew up in, and all the regions we know now, will not and cannot be the ones we will inhabit in the future. New regions and clusters are developing as places in the world connect in new ways. To highlight the changing nature of regions, consider that the regions and countries described in this edition of this book are already different from those in the previous edition published only three years ago. Regional changes in politics and government (as in the struggle over Crimea between Ukraine and Russia), the continuing emergence of economic power centers (such as Brazil and China) in what used to be called the underdeveloped world, and new regional opportunities and challenges (such as the Arctic melting as a result of global warming) demonstrate the ever-changing nature of world regions (**FIGURE 1.6**).

In an effort to address the emerging and future topics that affect each region, we introduce several *Emerging World Regions* throughout the text. An **emerging world region** is an area where loosely connected locations are developing shared characteristics that differentiate them from other world regions, past and present. These areas may become increasingly important to global relationships or systems. For example, the Arctic, which has often been viewed in fragments (as part of a number of different world regions, such as the United States and Canada, Europe, and Russia), is now linked closely together through human migration, international trade, and shared environmental problems. An emerging world region may also be noncontiguous—it might not share borders with other partners in the region. This is the case for new regions, such as BRICS—Brazil, Russia, India, China, and South Africa—which have strong regional connections even though they are spread widely across the planet.

▲ **FIGURE 1.6 The Emergence of a New Country** The emergence of the Republic of South Sudan in 2011 was celebrated in many ways. In this photo a citizen of the new country waves a flag as part of the independence celebration.

Organizing and Exploring the World's Regions

The world region concept is a useful tool for organizing and understanding information about the world. Accordingly, the framework for the study of world regions in this chapter provides the structure for the 10 world regional chapters that follow. Each chapter is organized around a set of themes common to every world region, though unique in each.

- *Environment, Society, and Sustainability:* How environments change and are changed by people
- *History, Economy, and Territory:* How history, economics, and politics evolve over time
- *Culture and Populations:* How people and cultures all around the world interact and change
- *Future Geographies:* How contemporary regional differences and new global forces are likely to impact important real world issues in coming years

You will find that within each of these areas of analysis, global systems connect world regions and, as a result, produce differences between them. The remainder of this chapter explores the core concepts of this thematic framework.

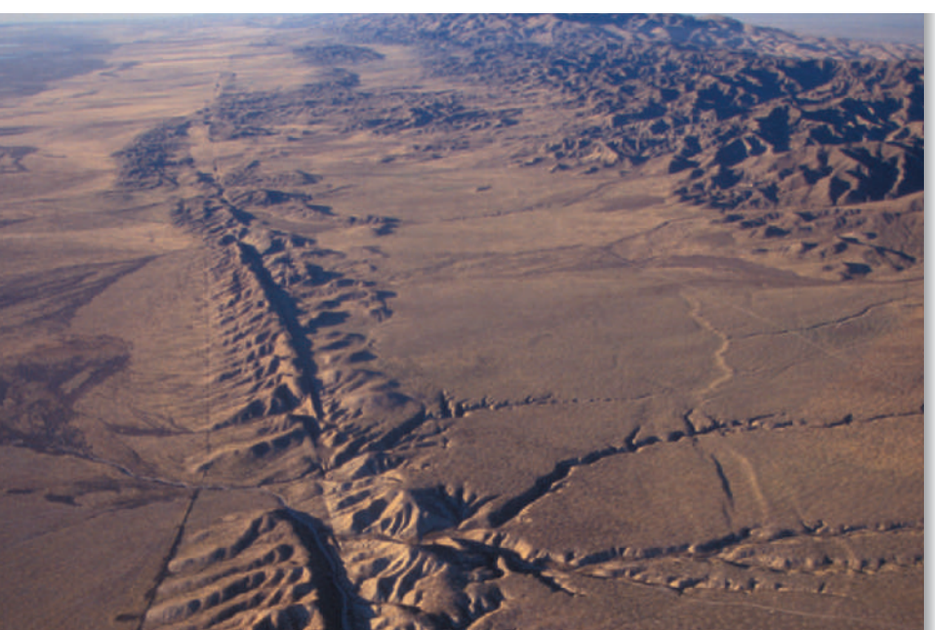
Environment, Society, and Sustainability

The environment can be understood as everything that surrounds us—air, water, plants and animals, buildings, and even society and culture. In this book we use the term environment to describe the physical and ecological setting for human activities where the environment is critical to the study of world regions. Environmental characteristics that are studied by physical geographers and other Earth scientists include rainfall, temperature, vegetation, soils, wildlife, geology, and landforms. World regions are shaped as the environment influences many opportunities for societies, but also as people transform the environment. A physical environment with extreme cold, little water or frequent storms, and unstable geology can pose great challenges for human survival, yet humanity now occupies extreme and hazardous environments in places such as the Arctic region of Russia or drought and earthquake prone California in the United States (**FIGURE 1.7**).

Although some still call our physical and biological surroundings the 'natural' environment, almost all aspects of the Earth system have now been transformed by human action and there is very little untouched 'nature'. And humans, as one of many species occupying the planet, are part of nature as well.

Much of our evolution as a species took place during the Pleistocene epoch. Scientists have traditionally divided Earth's history into epochs lasting thousands of years during which geological conditions produce characteristic rock layers and fossils. The Pleistocene epoch lasted from about 2.5 million to 11,700 years ago and included major glaciations when much of North America and Europe were covered with ice, with ecosystems dominated by now extinct large mammals such as mammoths and with the emergence of modern humans. The Pleistocene ended when the ice retreated and warmer stable temperatures allowed for the development of agriculture and the expansion of human populations during the most recent epoch called the Holocene.

▼ **FIGURE 1.7 San Andreas Fault, California** Two tectonic plates sliding past each other cause frequent earthquakes along the San Andreas Fault, visible in this image.



We now live in the **Anthropocene**—the period of Earth's history where human activity dominates the earth system (see Sustainability in the Anthropocene: "Welcome to the Anthropocene" on pp. 18–19). In the last 200 years we have cleared more than half of the world's forest cover, polluted rivers and oceans with chemicals and plastic, warmed the climate by doubling the carbon dioxide content of the atmosphere, and contributed to the extinction of hundreds of species. In short, human activities now occur on such a vast scale that we are altering the air, water, and ecology in ways that risk the sustainability of many places on Earth. Environmental sustainability is a concept that challenges us to live within the constraints of the earth's system without causing irreversible damage to it or harming the lives of future generations. Sustainability requires evaluation of our decisions and their environmental impacts, including our choices regarding consumption, affluence, production, population, technology, and social organization. The characteristics of different regions—culture, politics, lifestyles, and economy—have significant impacts on their sustainability.

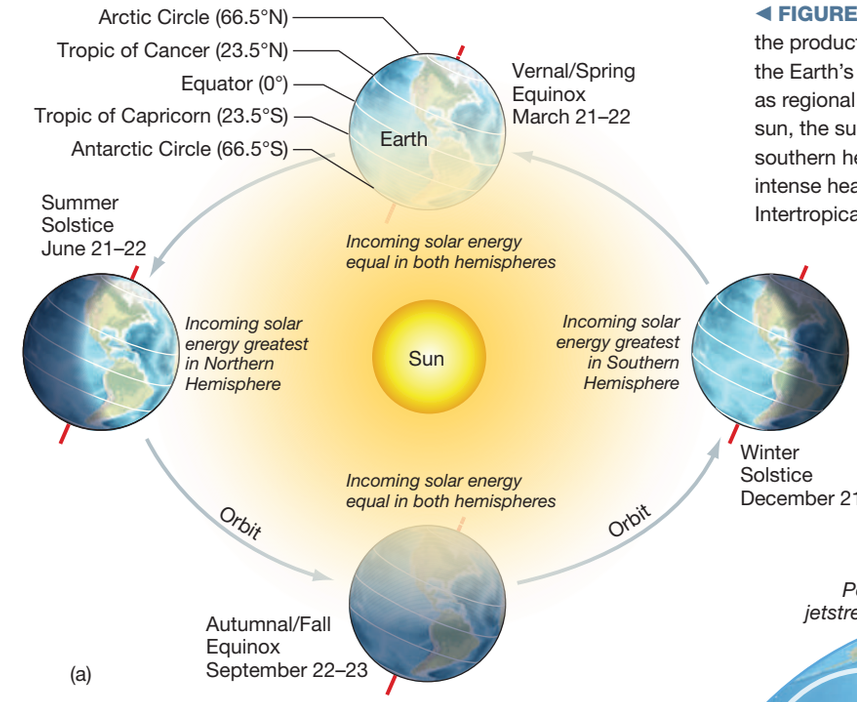
In each world region, we discuss how climate, geology, and ecology have influenced the development of the region. We also discuss the human use of the environment in the Anthropocene and describe what is being done in each region to confront the challenges of sustainability and environmental change.

Climate and Climate Change

Weather and climate are ever-present aspects of the environment that impact our lives. **Weather** is the current state of temperature and precipitation (it is a cold day or it is raining) at a particular time and place. **Climate** is the average weather or typical conditions of temperature, precipitation (e.g., rain, snow), and other weather variables (e.g., humidity, wind) at a location over the longer term (this is generally a cold place or a wet place or summers are hot). Climate—the saying goes—is what we expect, weather is what we get.

Our weather and climate are products of the **climate system**—the effects of the sun's energy with the interactions of air (atmosphere), water (hydrosphere), ice (cryosphere), landforms (lithosphere), and ecosystems (biosphere). The climate is not the same everywhere because places receive different amounts of sunlight and have different atmospheric compositions (e.g., because of dust or pollution); amounts of water, snow, and ice; and dissimilar landforms and ecosystems. But climate regions are also connected. As the sun heats one region and cools another, masses of air rise and fall and flow with winds and currents from one place to another, bringing moisture that can fall as rain or transporting pollution across the globe. If any of these components of the climate system change, the average temperature or precipitation may also change local and global conditions in a process called **climate change**.

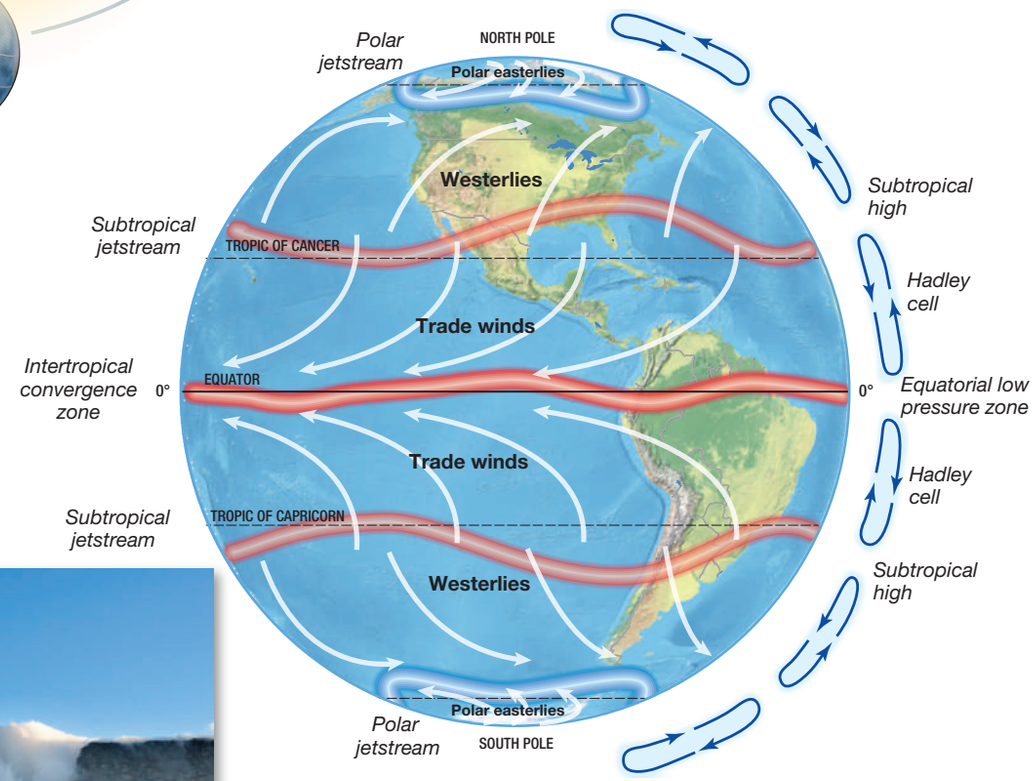
Regional Climate The climates of world regions are influenced by a number of basic factors. These include the orientation to the sun at different times of the year and the associated variations in solar radiation; the configuration of land, sea, and mountains; the resulting **atmospheric circulation** of air and ocean currents that



◀ **FIGURE 1.8 Drivers of Global and Regional Climate** Global climates are the product of the way energy and moisture are distributed unevenly around the Earth's surface. These patterns are related to Earth-Sun relations as well as regional and local conditions. (a) As the tilted earth moves around the sun, the sun's rays are strongest over the northern hemisphere in June and southern hemisphere in December creating summer and winter seasons. (b) The intense heating of land by the sun's rays at the equator causes air to rise at the Intertropical Convergence Zone (ITCZ), with intense rainfall, and to move poleward in the Hadley cell, sinking over the tropics and creating dry conditions. The spin of the earth causes air moving north and south to the poles or equator to curve into easterly and westerly wind belts known as the Trade Winds and Westerlies, with strong winds in the upper atmosphere known as Jet streams. (c) At the local level, air blowing from sea onto land, and rising over mountains, cools, and moisture condenses causing precipitation (rain, snow).

Animation Earth Sun Relations
http://goo.gl/XVJd3y

Global Wind Patterns
http://goo.gl/9K2Zhw



(b)

(c)

transport heat and moisture from one place to another; and precipitation processes (**FIGURE 1.8**).

These influences combine to create climatic patterns across the world that can be classified according to temperature and moisture characteristics. The most commonly used classification, shown in **FIGURE 1.9**, is based on that of Köppen, which has five major types of climate: tropical, dry, temperate, continental and highland. Subdivisions indicate whether seasons are wet or dry, warm or cool, and the presence of ice.