

Human Impacts

The Carbon Cycle

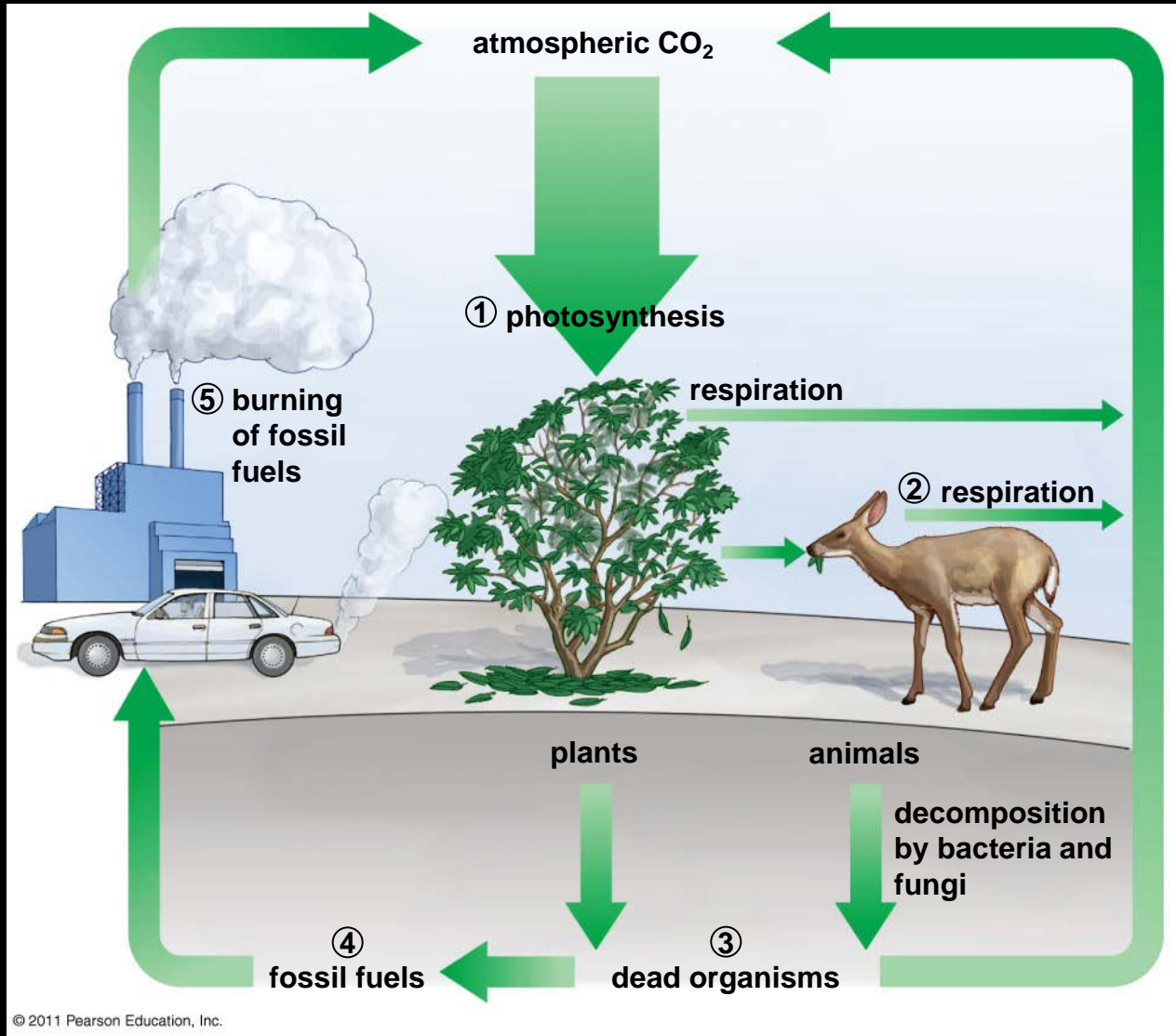
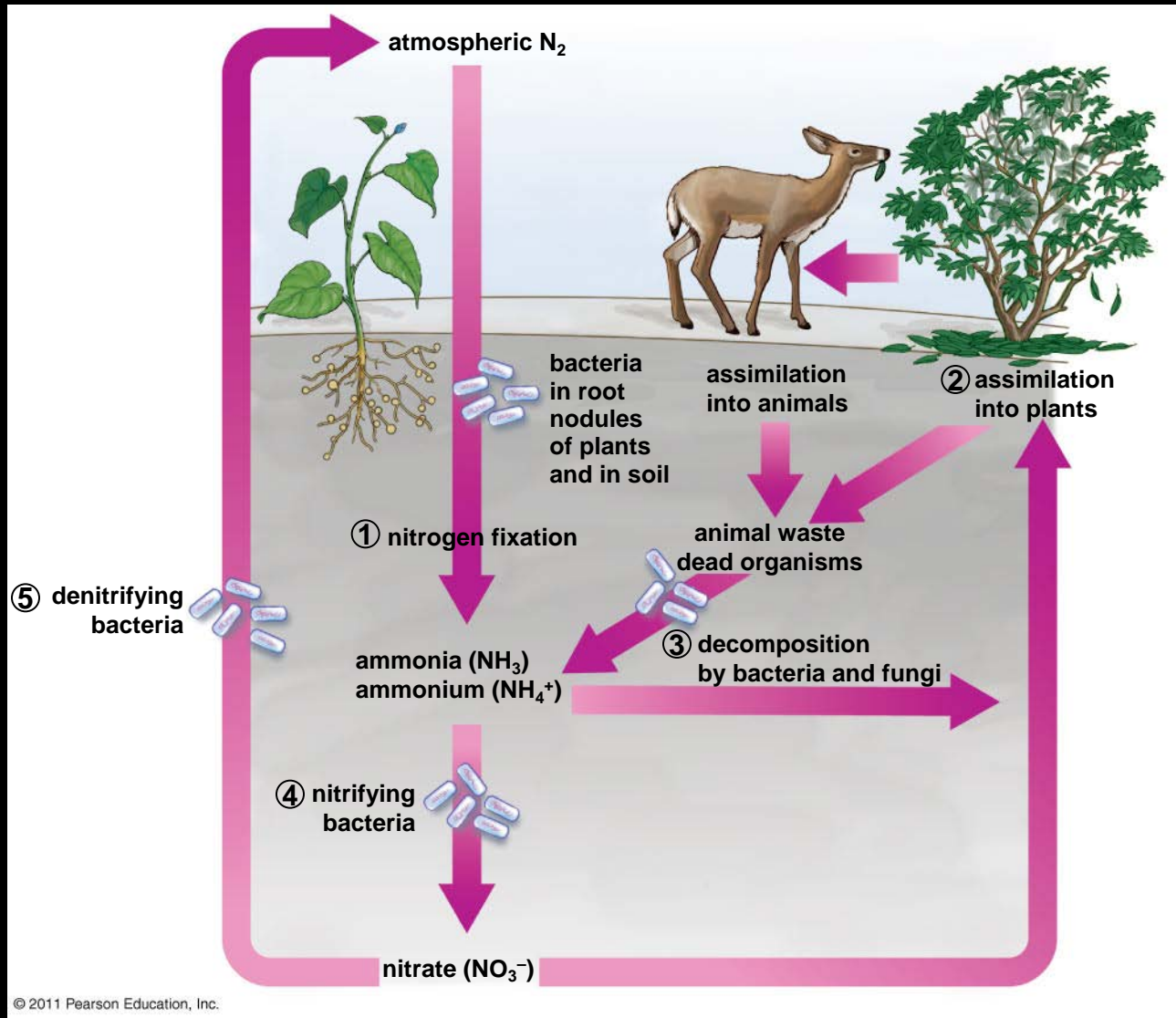


Figure 36.1

The Nitrogen Cycle



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Figure 36.2

Nutrient cycles

Aldo Leopold: *Odyssey*, from Sketches Here and There (1949)

Fertilizer Labels

"All-Purpose" vs a "Special Purpose" plant food. Specialty fertilizers are available for Roses, Vegetables, Flowering, Acid-Loving Plants, etc.

Primary product composition, always written as N-P-K (Nitrogen, Phosphorus, Potassium). This is the percentage of each available to the plants as nutrient.

Details on the N-P-K composition of the fertilizer.

A listing of the other macro- and micro-nutrients contained in the fertilizer and their quantity. Any particular brand may include these or some other combination of nutrients.

Wonder-Gro
All-Purpose Plant Food

Wonder-Gro **15-30-15**

GUARANTEED ANALYSIS

Total Nitrogen (N).....	15%	Sulfur (S).....	2.0%
5.8% Ammoniacal Nitrogen		2.0% Magnesium Sulfate (MgSO ₄)	
9.2% Urea Nitrogen		Zinc (Zn).....	0.06%
Available Phosphate (P ₂ O ₅).....	30%		
Soluble Potash (K ₂ O).....	15%		
Boron (B).....	0.02%		
Copper (Cu).....	0.07%		
0.07 Water Soluble Copper (Cu)			
Iron (Fe).....	0.15%		
0.15% Chelated Iron (Fe)			
Magnesium (Mg).....	1.5%		
1.5% Magnesium Sulfate (MgSO ₄)			
Manganese (Mn).....	0.05%		
Molybdenum (Mo).....	0.0005%		

Derived from Urea, Ammonium Phosphate, Urea Phosphate, Muriate of Potash, Boric Acid, Copper Sulfate, Iron EDTA, Manganese EDTA, Magnesium Sulfate, Sodium Molybdate, and Zinc Sulfate.

HempSeed's Wonder-Gro turns you into an instant Wonder-Grower!

www.josehempseed.com

A detailed list of the chemical sources from which the actual nutrients were derived. Mainly of interest to chemists.

Nutrient cycles

Too Many Nutrients



Nutrient cycles

Too Many Nutrients



miseagrant.umich.edu

<http://microbiology.science.oregonstate.edu/>

Nutrient cycles

Too Many Nutrients



Nutrient cycles

Gulf of Mexico “Dead Zone”

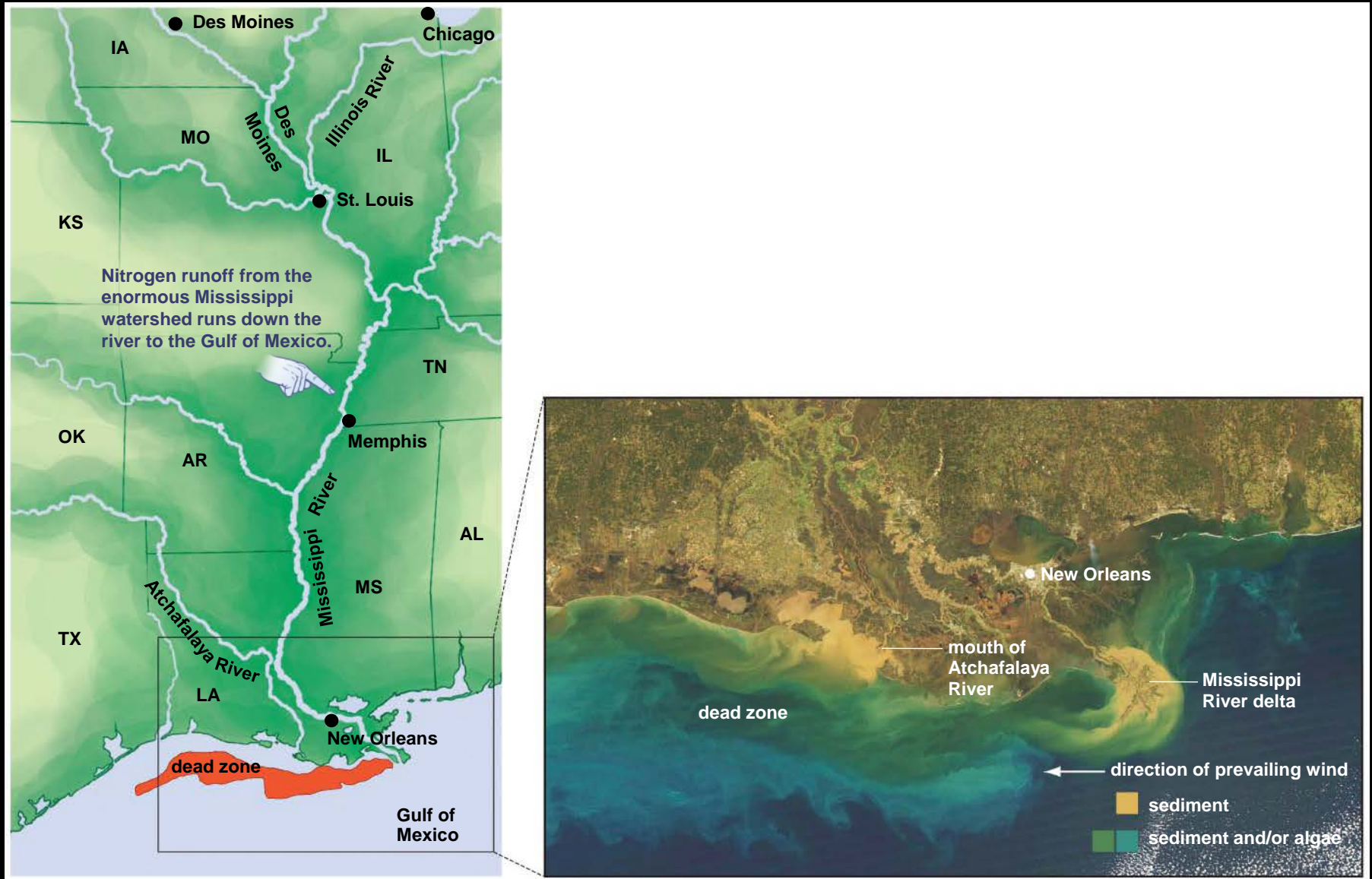
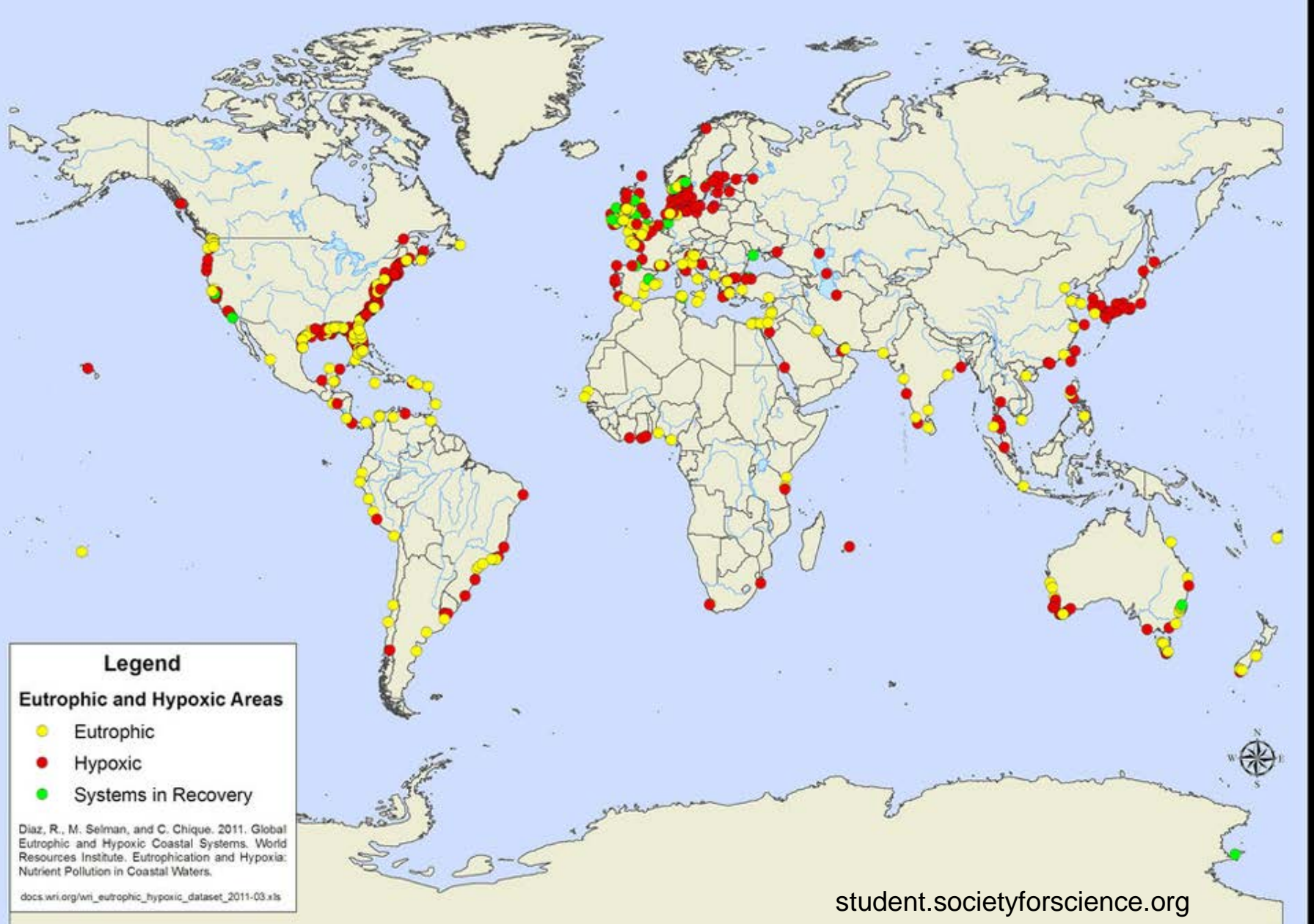
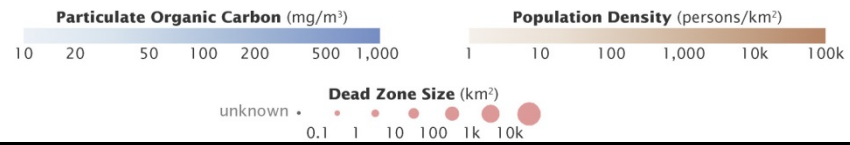
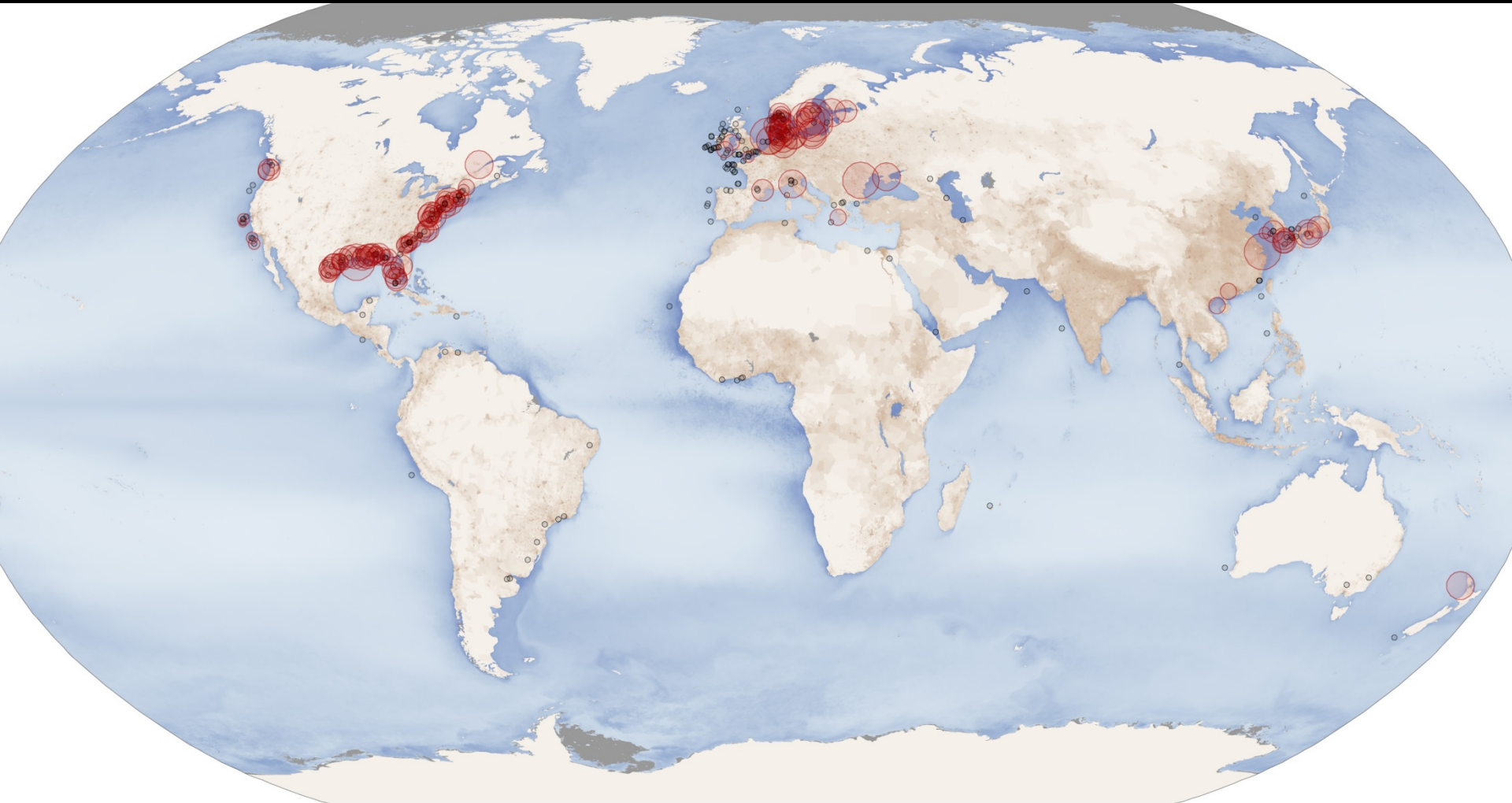


Figure 36.3





The Hydrologic Cycle

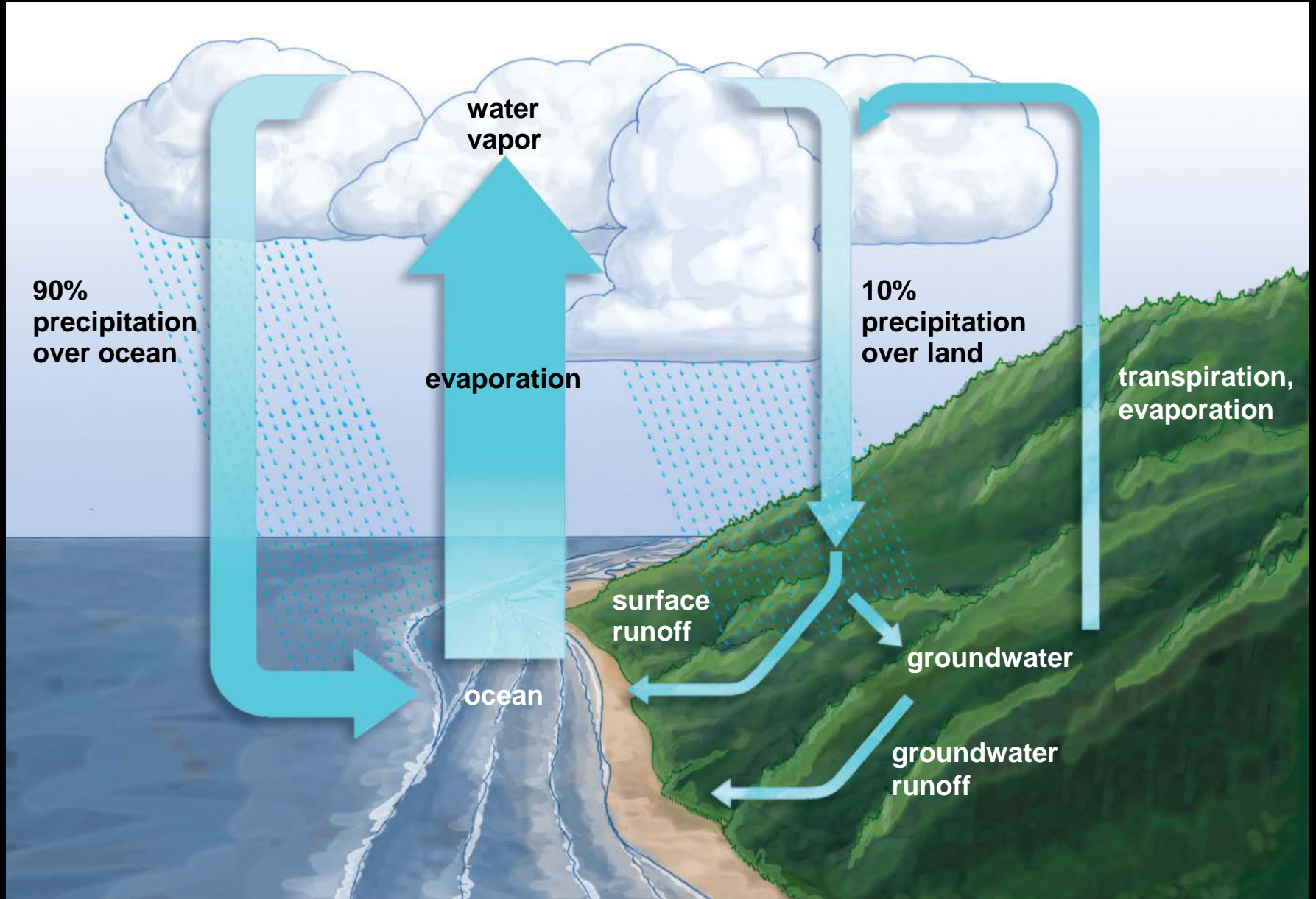
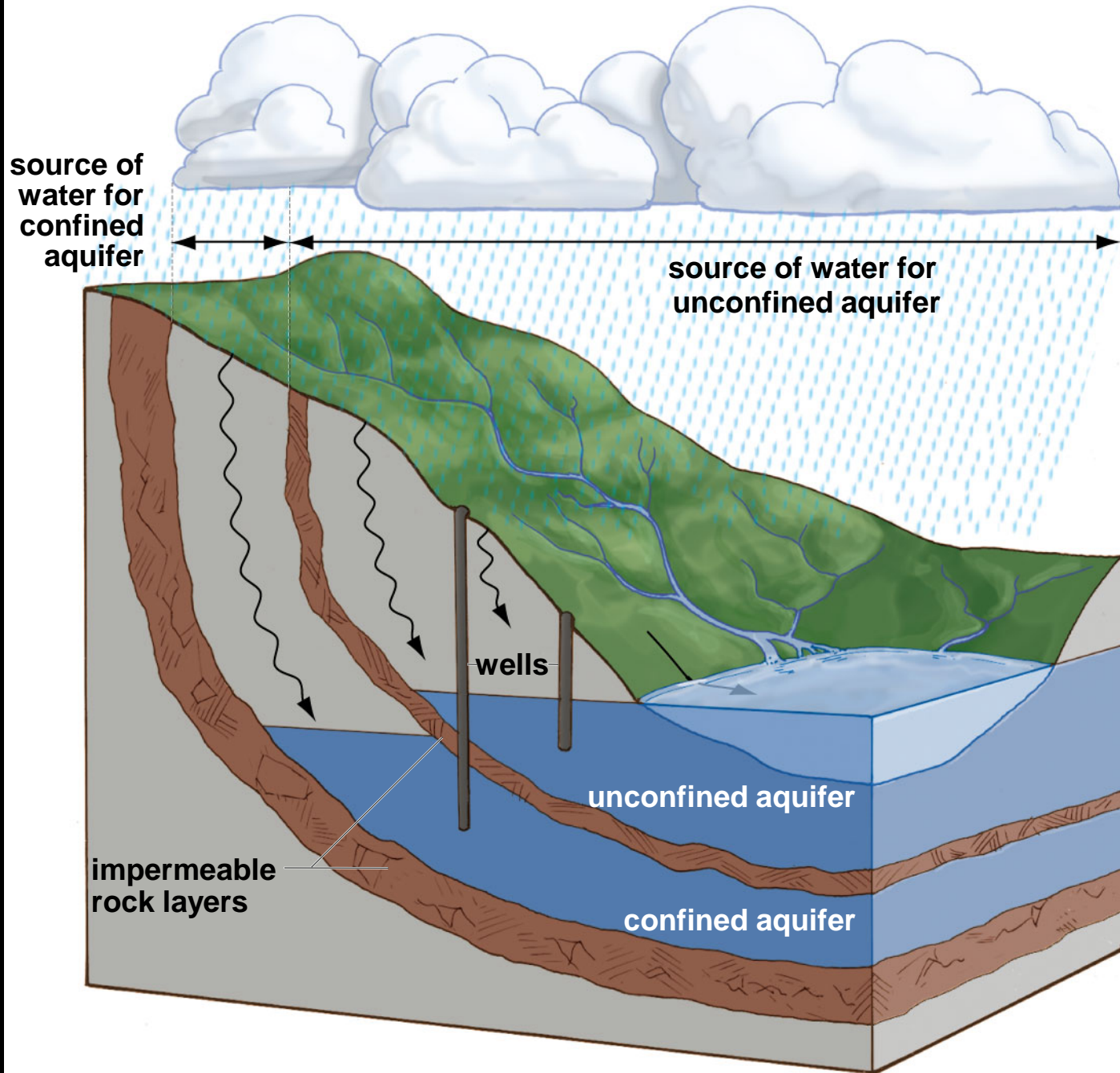


Figure 36.4



Enormous Stores of Underground Water

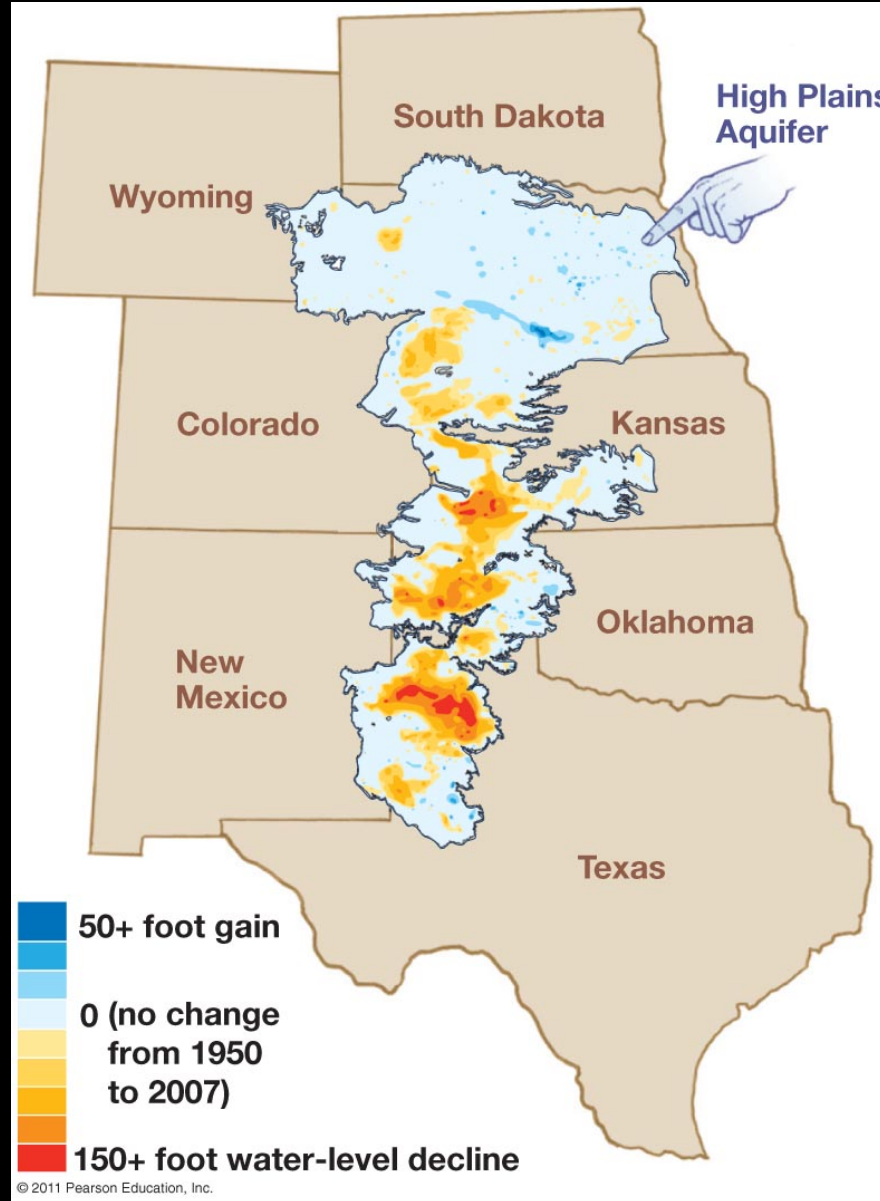


Figure 36.7

Local groundwater sources:
United States Geological Survey (USGS),
Water Replenishment District (WRD) documents

Groundwater: local aquifers

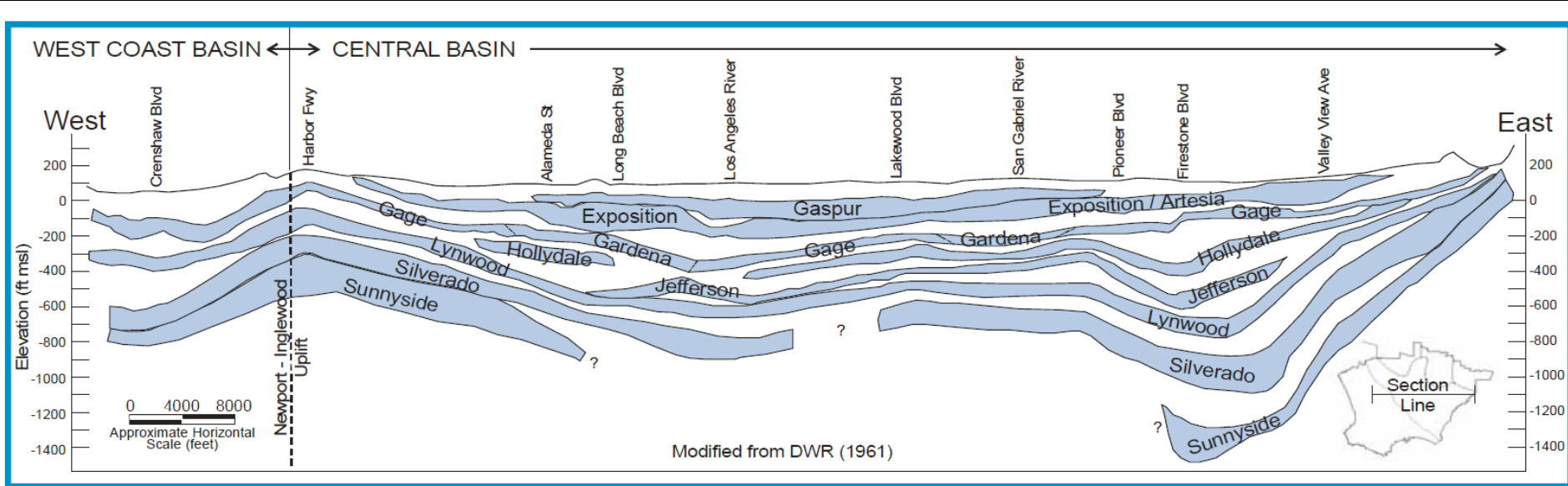
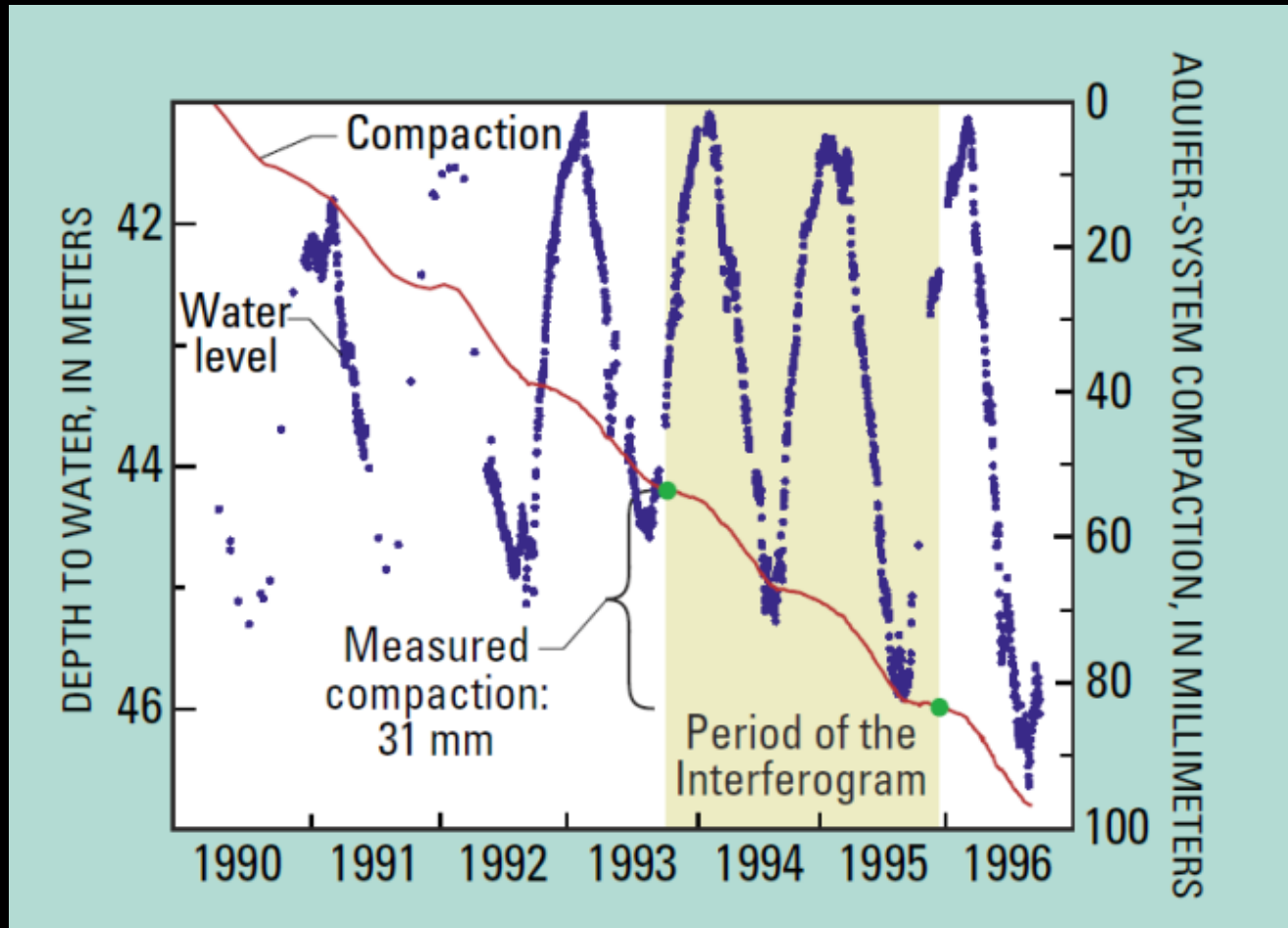
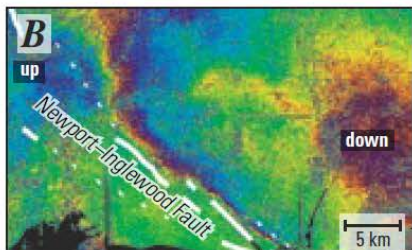


Figure 2—Generalized Cross Section going East / West through Central and West Coast Basins showing Aquifers

Groundwater: seasonal changes

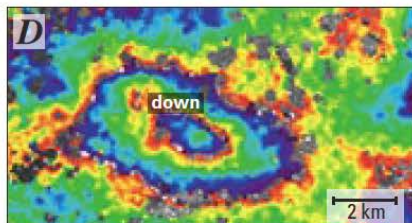


Groundwater



Ground-Water Barriers

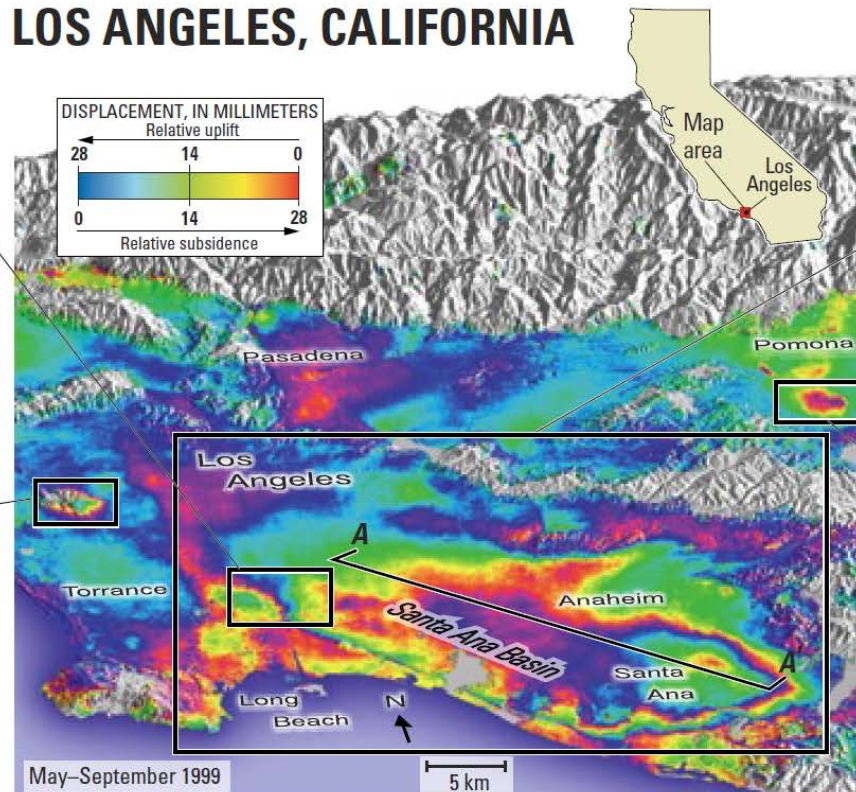
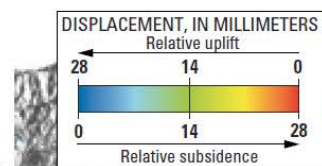
Faults and geologic structures often impede the flow of ground water and can be recognized as linear InSAR features where ground-water levels decline on one side of the fault or rise on the other side of the fault



Hydrocarbon Production

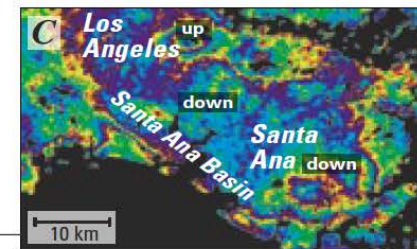
The pumping of oil is often imaged as a "bull's-eye" feature, such as the 58 mm of subsidence measured in the Beverly Hills Oil Field (5 years: Oct. 1993–Oct. 1998)

LOS ANGELES, CALIFORNIA



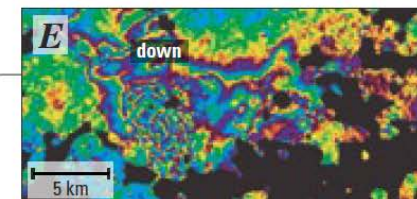
May–September 1999

(modified from Bawden and others, 2001)



Multi-Year Subsidence

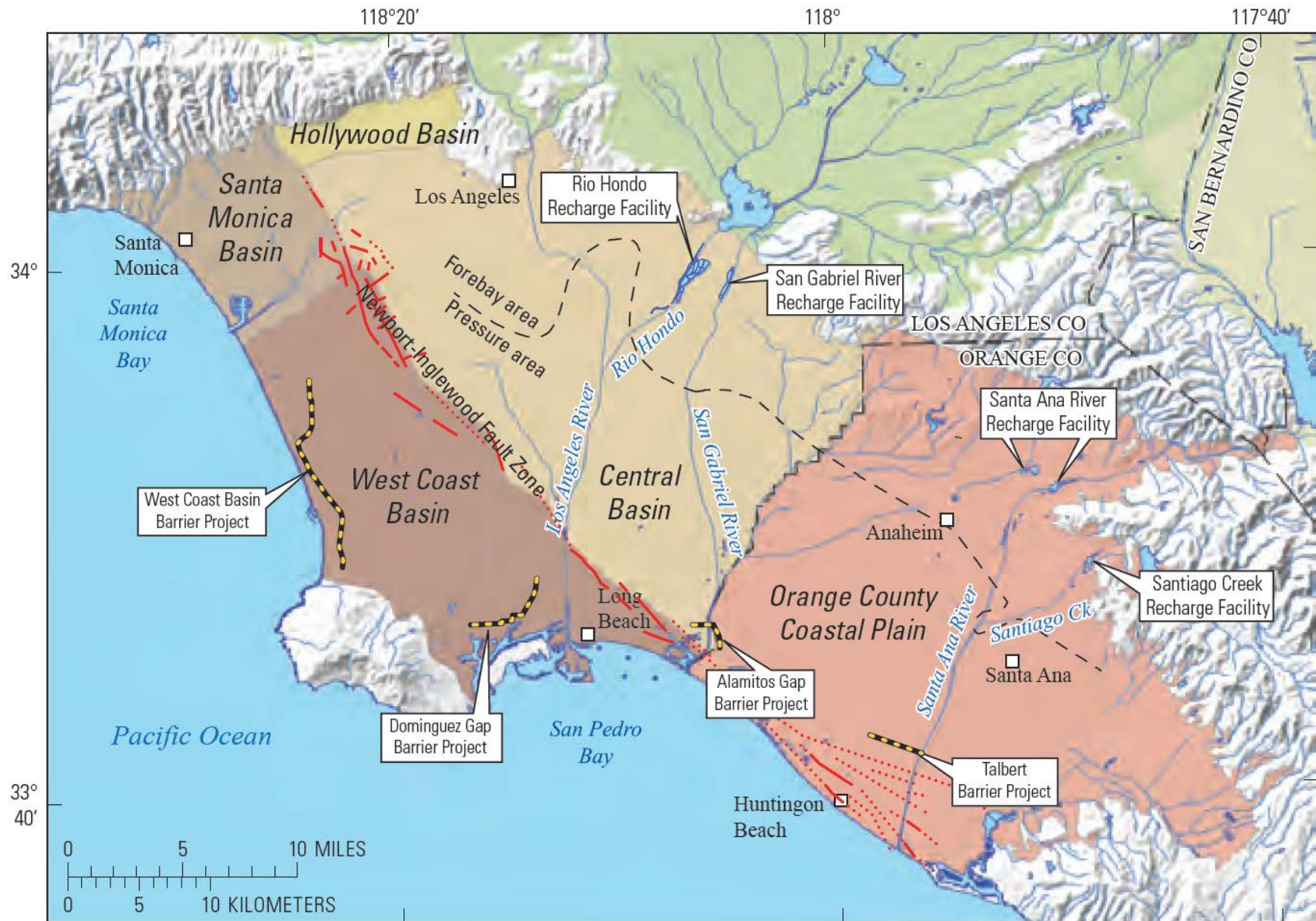
As water levels decline near Santa Ana, the land surface subsides at a rate of about 20 mm per year (Oct. 1993–Oct. 1998)



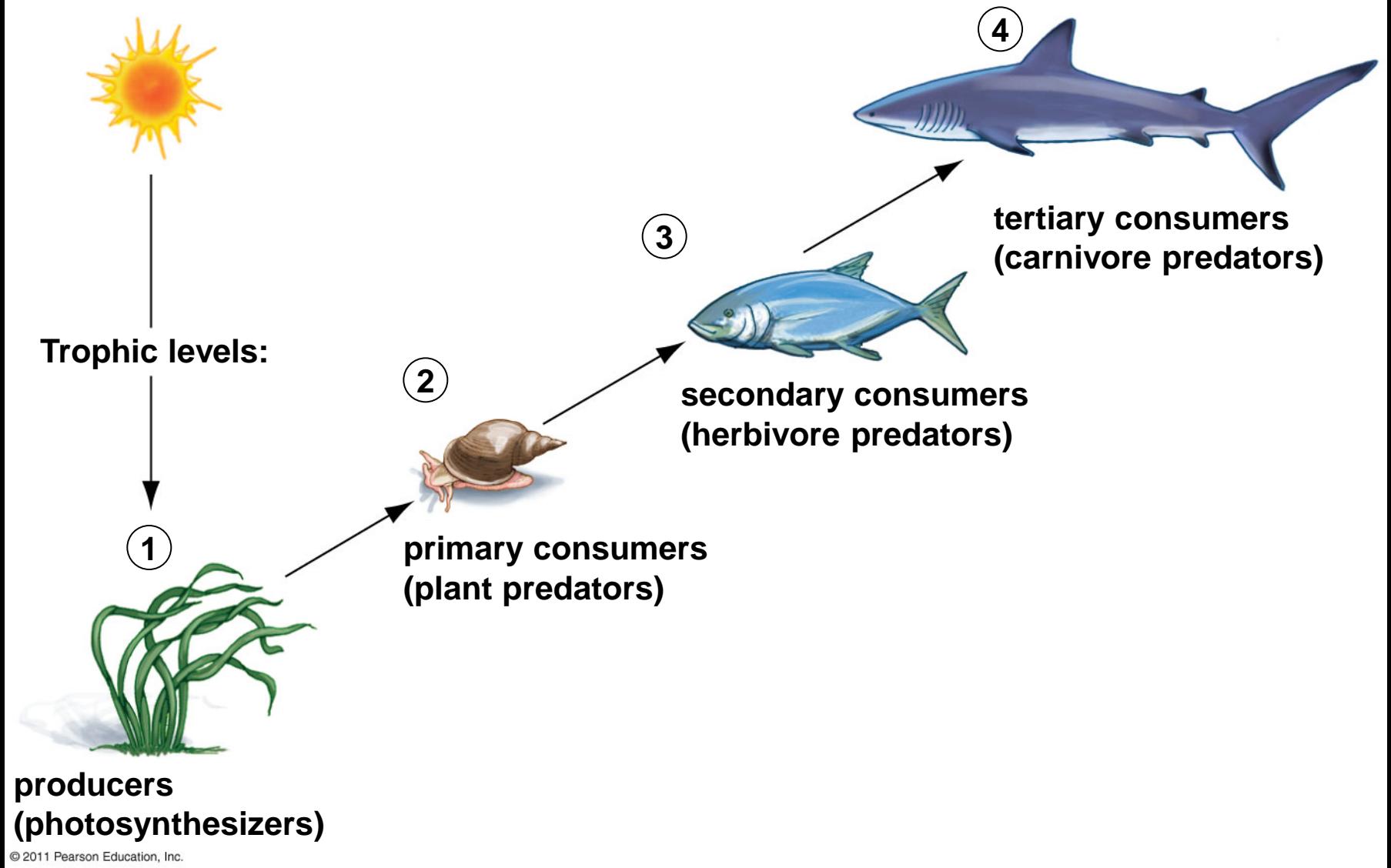
Localized Subsidence

More than 180 mm of ground-water-pumping induced subsidence (1993–95) resulted in cracked building foundations near Pomona

Groundwater



Trophic Levels



Energy flow

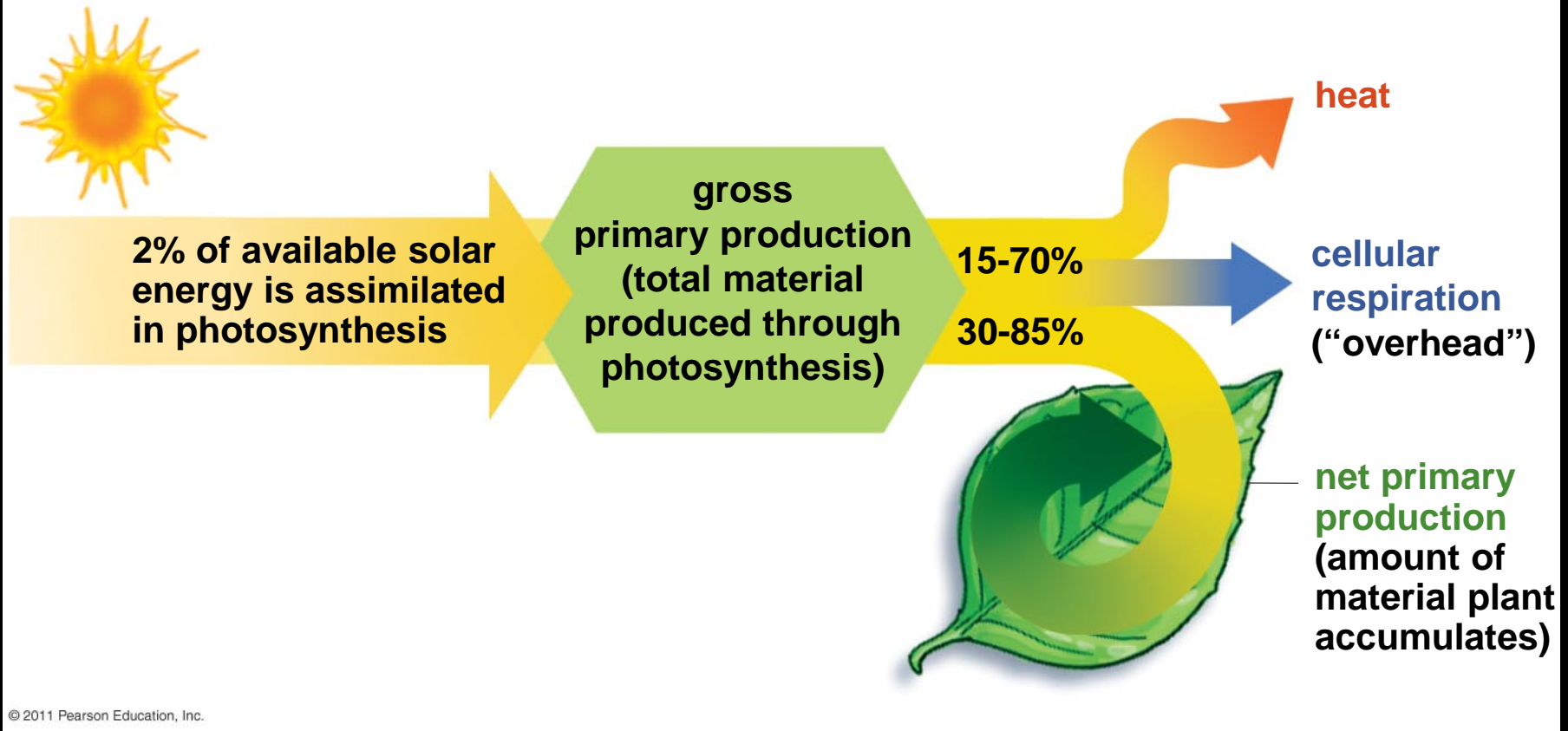
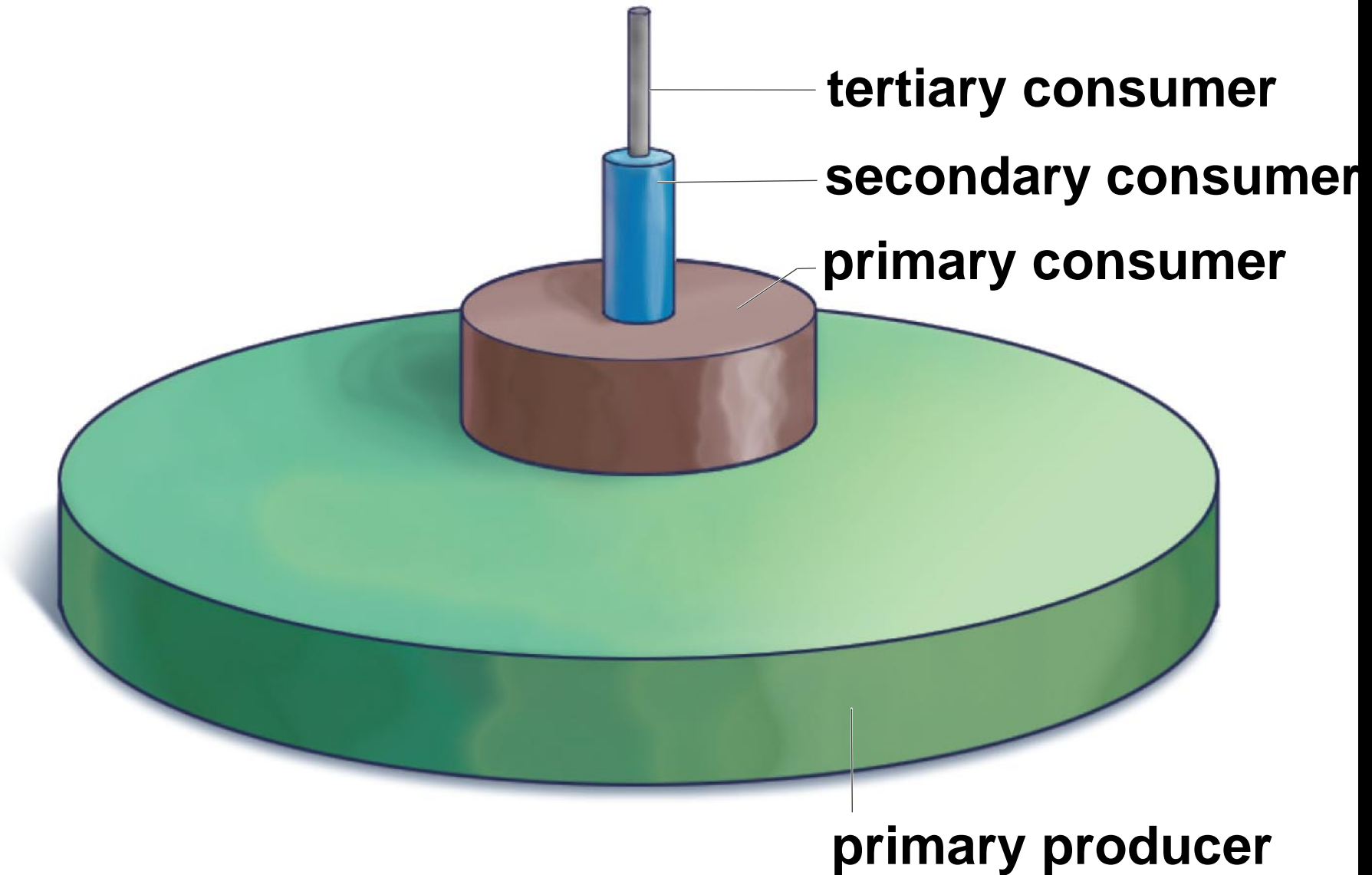
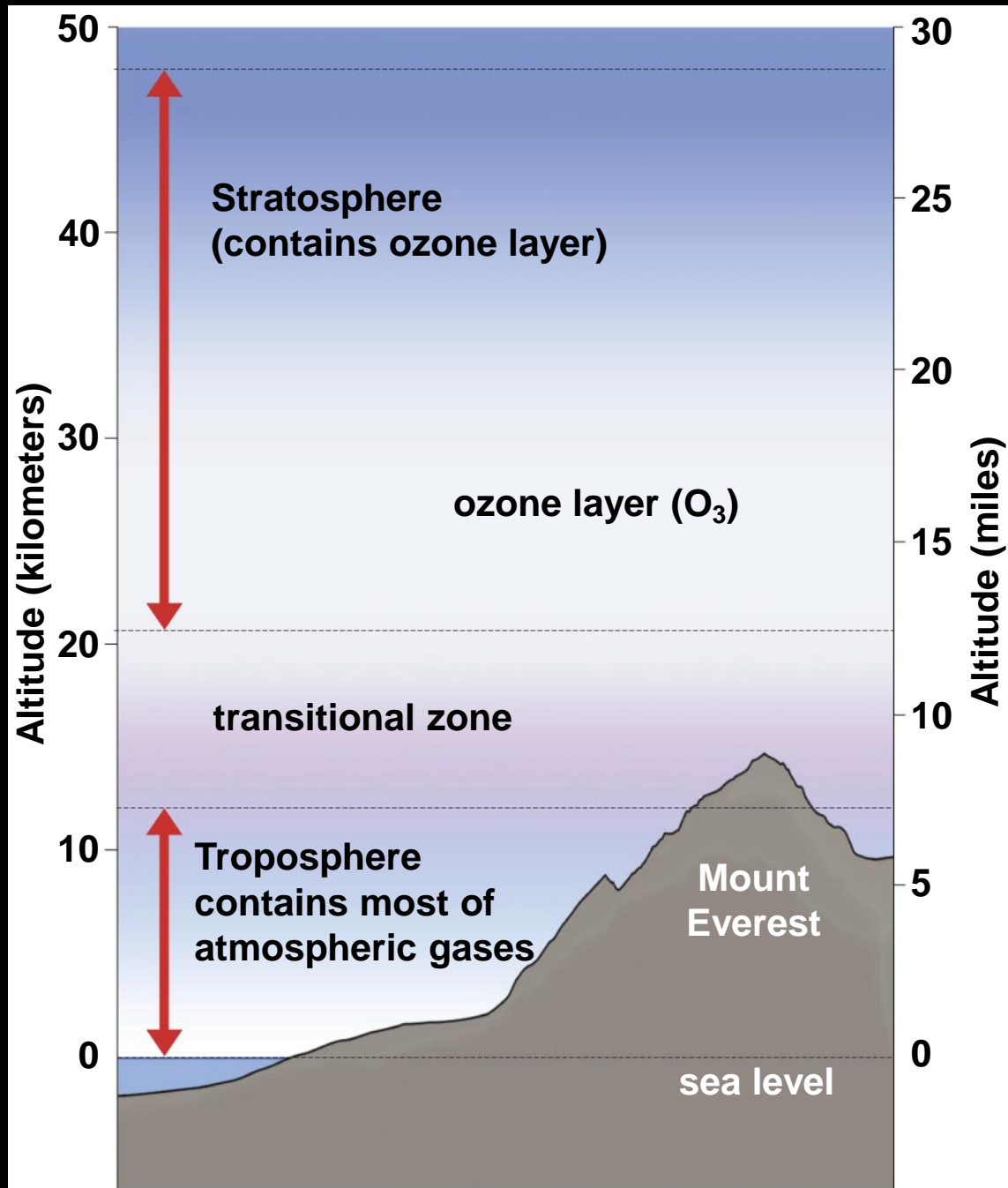


Figure 36.13

Energy Pyramid



Atmosphere



James May
U2 flight

Atmosphere Growing Concentration of Atmospheric CO₂

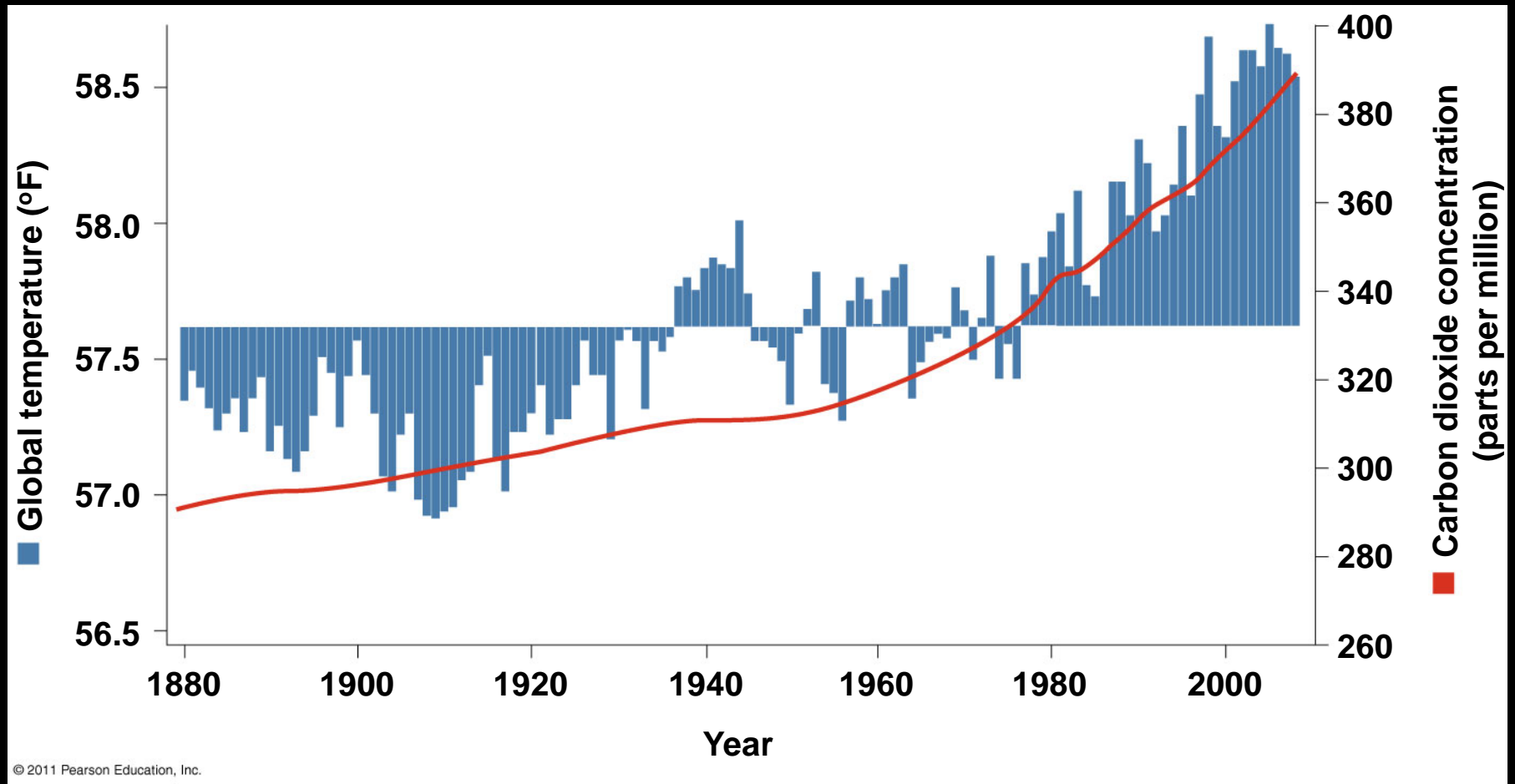


Figure 36.17

Atmosphere

Old carbon vs. new carbon,
or, coal vs. banana

<http://www.youtube.com/watch?v=uStoBFtjy8U>

NEW CARBON VS. OLD CARBON

Created by



6
C
Carbon
12,01

All of the carbon atoms in our world rotate through a complex set of processes called the Carbon Cycle. It is a closed system with a fixed amount of carbon that must be somewhere in the world at all times.

1	H	Helium	He	Helium	2
3	Li	Lithium	Be	Beryllium	4
11	Na	Sodium	Mg	Magnesium	12
19	K	Potassium	Ca	Calcium	20
27	Rb	Rubidium	Sr	Strontium	36
37	Cs	Cesium	Ba	Barium	54
55	Rf	Rutherfordium	Ra	Radium	88

NEW CARBON
Recycles from plants and trees to the air and back without increasing atmospheric carbon load.
It is carbon neutral.

Source

Plants



Derivative

Biomass

Method

Growth & Harvest



Supply

Renewable



Products

Pulp & Bioplastics



Disposal

Composting



Carbon Exchange

Closed System – Recycles



OLD CARBON

When released into the air, it does not recycle and adds to the atmospheric carbon load.

It is not carbon neutral.

Source

Fossil Fuels

Derivative

Petroleum

Method

Extraction



Supply

Finite



Products

Plastics



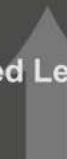
Disposal

Landfill or Incineration



Carbon Exchange

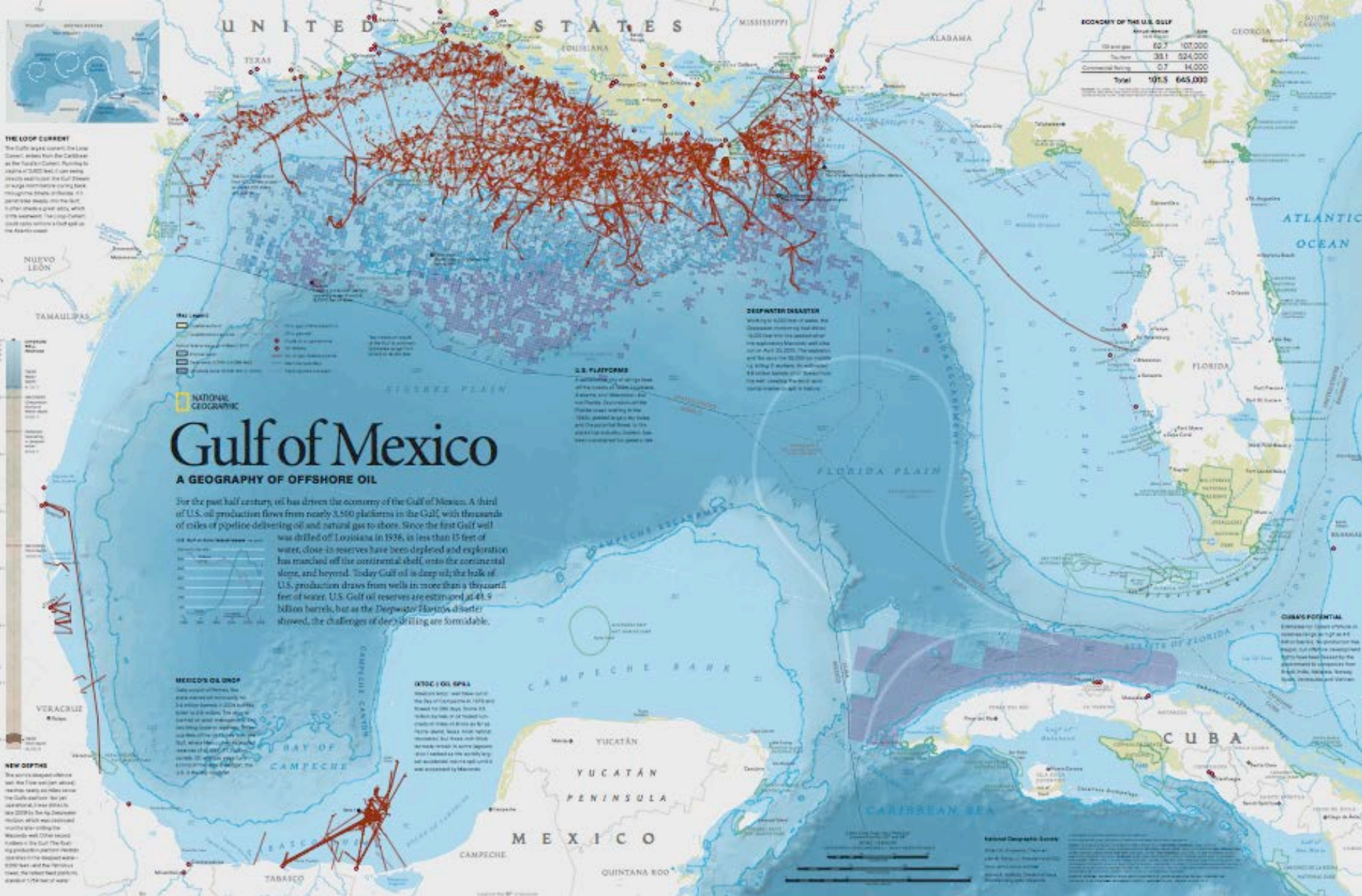
None – Increased Levels



Geography of Offshore Oil

[http://ngm.nationalgeographic.com/
2010/10/gulf-oil-spill/gulf-map-
interactive?rptregcta=reg_free_np&
rptregcampaign=20131016_rw_me
mbership_nlp_us_ot_w#finished](http://ngm.nationalgeographic.com/2010/10/gulf-oil-spill/gulf-map-interactive?rptregcta=reg_free_np&rptregcampaign=20131016_rw_membership_nlp_us_ot_w#finished)

Atmosphere



Gulf of Mexico A GEOGRAPHY OF OFFSHORE OIL

For the past half century, oil has driven the economy of the Gulf of Mexico. A third of U.S. oil production flows from nearly 3,500 platforms in the Gulf, with thousands of miles of pipeline delivering oil and natural gas to shore. Since the first Gulf well was drilled off Louisiana in 1928, in less than 15 feet of water, close-in reserves have been depleted and exploration has marched off the continental shelf, onto the continental slope, and beyond. Today Gulf oil is deep into the bulk of U.S. production draws from wells in more than a thousand feet of water. U.S. Gulf oil reserves are estimated at 41.9 billion barrels, but as the Deepwater Horizon disaster showed, the challenges of deep drilling are formidable.

MEXICO'S OIL BOOM
Gulf oil exports to Mexico rose 24 million barrels in 2010, helping to offset a 20% decline in U.S. oil exports to Mexico. The U.S. Gulf oil boom has helped Mexico's economy, but it has also helped Mexico's environment. The U.S. Gulf oil boom has helped Mexico's economy, but it has also helped Mexico's environment.

DEEPWATER DISASTER
The Deepwater Horizon disaster in 2010 was a major setback for the U.S. Gulf oil industry. It highlighted the challenges of deep drilling and the need for improved safety measures.

THE GULF CURRENT
The Gulf Stream current flows from the Caribbean to the North Atlantic. It is a major factor in the Gulf of Mexico's climate and is a key element of the global ocean circulation system.

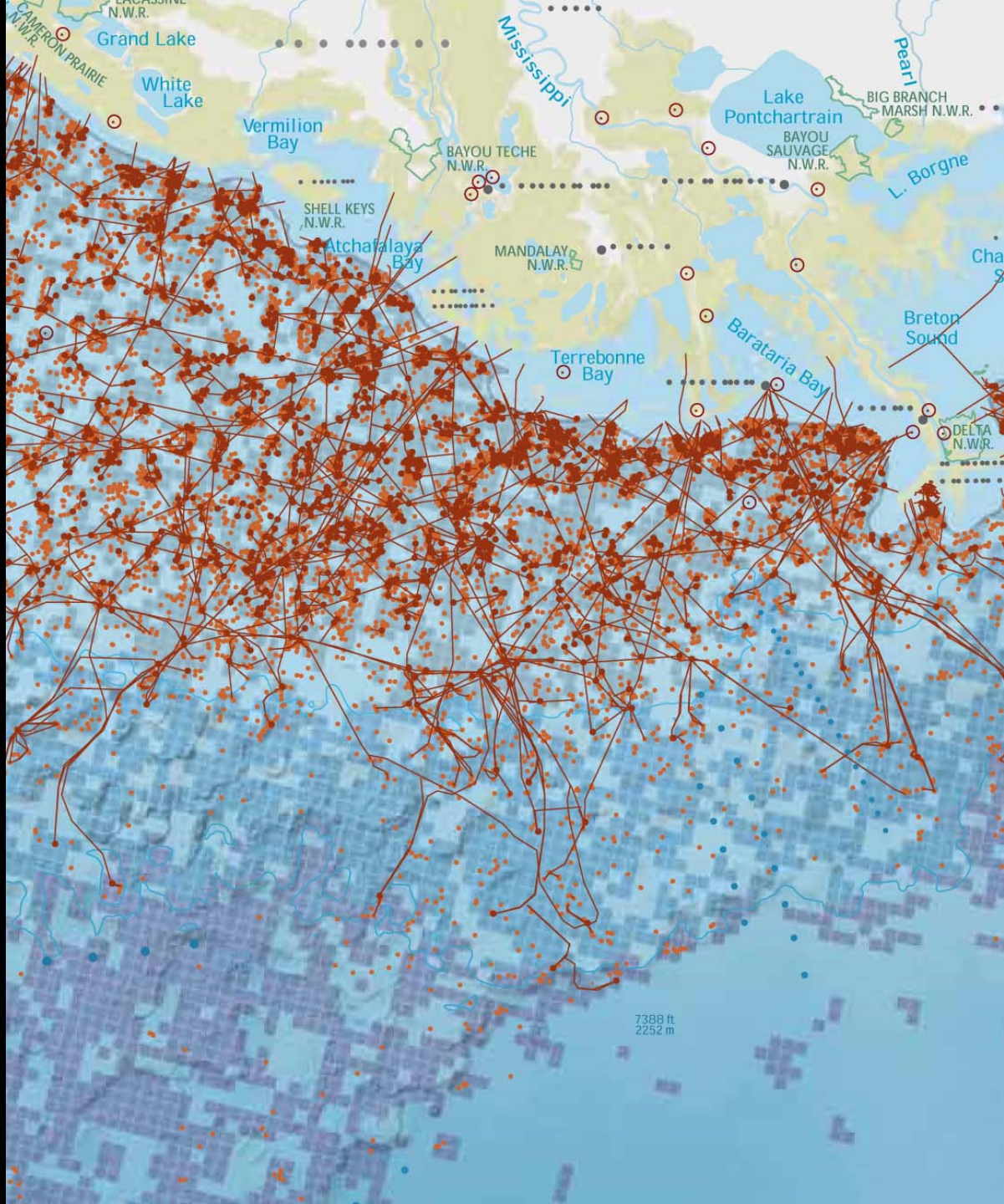
ECONOMY OF THE U.S. GULF

Commodity	Annual Production (Bbl)	Value (\$B)
Oil and gas	62.7	107,000
Exports	38.1	634,000
Commercial fishing	0.7	14,000
Total	101.5	645,000

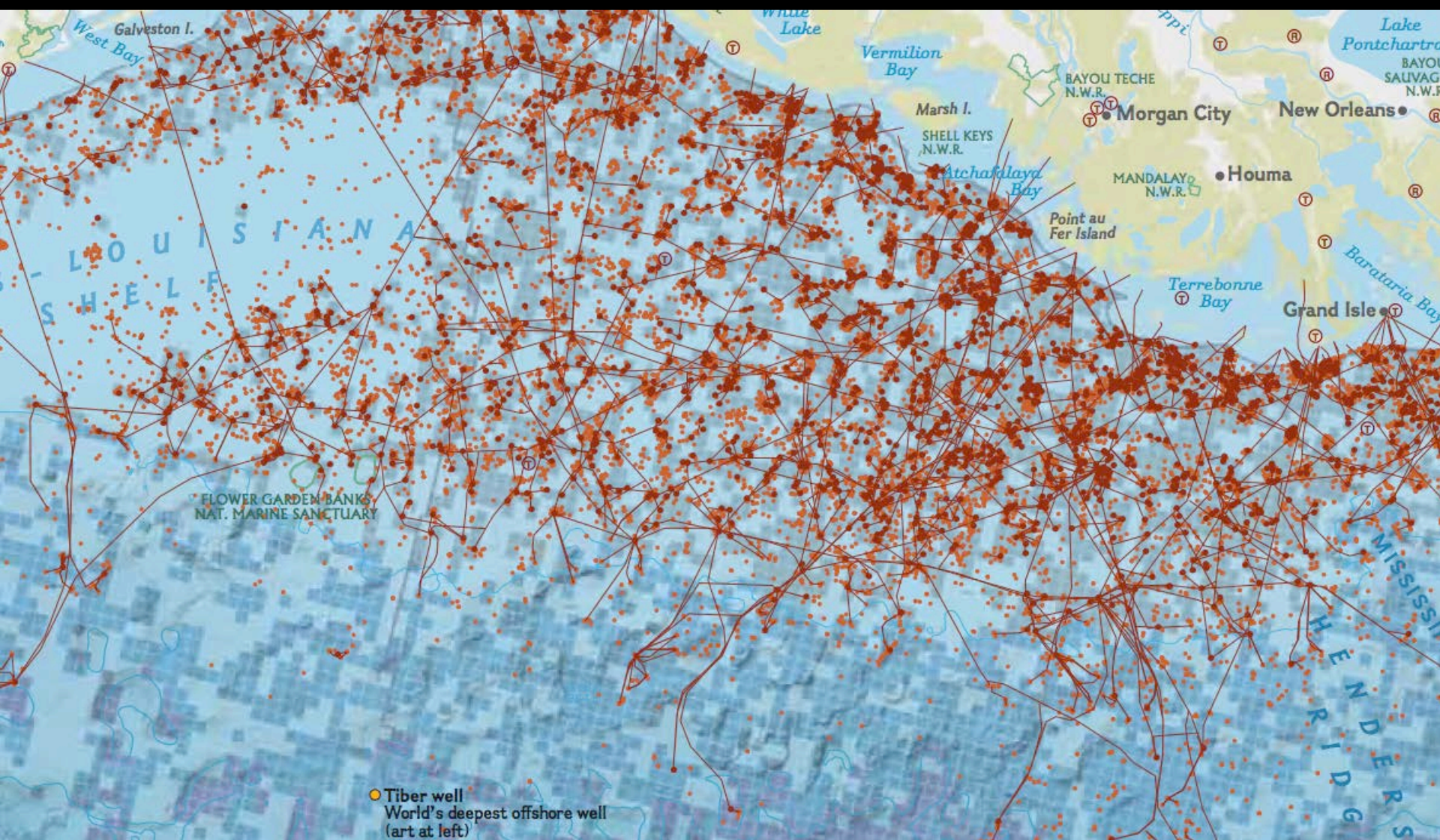
NEW DEPTHS
The U.S. Gulf oil boom has led to the development of new offshore oil fields. These fields are located in deeper waters and are more challenging to drill. The U.S. Gulf oil boom has led to the development of new offshore oil fields.

CUBA'S POTENTIAL
Cuba has significant offshore oil and gas reserves. The U.S. Gulf oil boom has led to increased interest in Cuba's potential. The U.S. Gulf oil boom has led to increased interest in Cuba's potential.

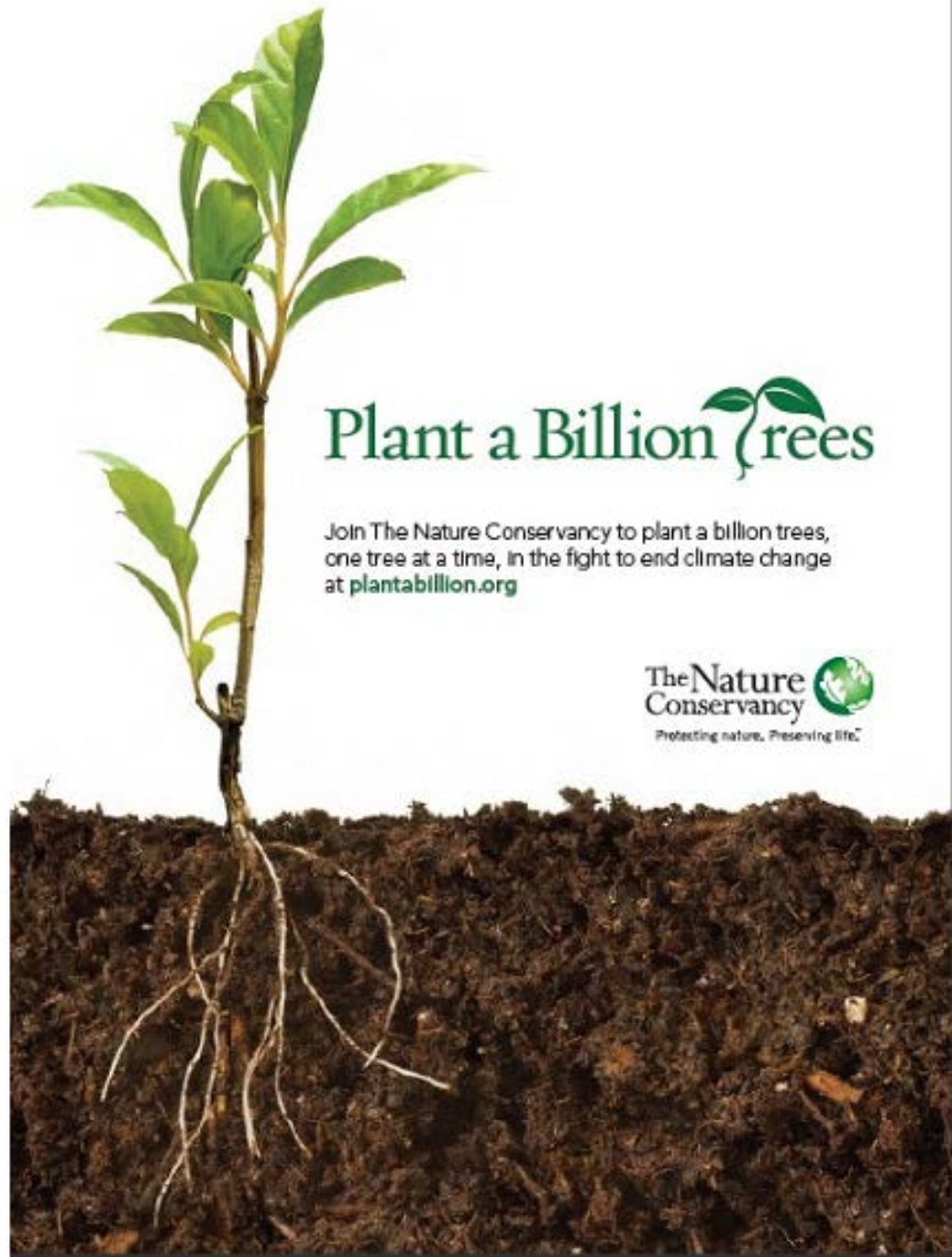
Atmosphere



Atmosphere



Hope and action



Plant a Billion Trees

Join The Nature Conservancy to plant a billion trees, one tree at a time, in the fight to end climate change at plantabillion.org

The Nature Conservancy 
Protecting nature. Preserving life.™

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Hope and action



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SERVE

PARTNER

CONNECT

GIVE

Choosing a Program

Benefits of Serving

Youth (< 18 yrs)

Young Adult (18 yrs +)

Meet a Recruiter

Field Leaders



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