Environmental Science

Week 2

UNIT 1 – Understanding environmental science, Agricultural Revolution, Industrial Revolution, Environmental Challenges

8/24 Science & the Environment CH 1
Obj. TSW learn what environmental science is and events that led to it's development. P. 12 NB

Figure 8.28a
Environmental Science

1. Explain the Agricultural Revolution.
2. What three ways did the Industrial Revolution change society?
3. Name 3 Environmental Problems facing us today.

Tragedy of the Commons Activity P. 13 NB

- Materials:
  - Goldfish cracker, Straw, large plate, Small plate, Worksheet (P. 13 NB)
- Procedure:
  - Groups of 4 students/lab station. Each Lab station is a “Nation.” You are catching fish to feed the people of your country.
  - You will have 30 seconds to catch your fish with your straw.
  - You suck on the straw to catch your fish from the Ocean (large plate), to your small plate in front of you.
  - Start with 30 goldfish in the center large plate.
  - You must catch at least 1 fish or you perish.
  - Count your fish and record on your worksheet.

Procedure: Tragedy of the Commons p. 13 NB

- At the end of 30 seconds, count the remaining fish in the large plate.
- Write each members name in the data table.
- Record their total and the remaining total to equal 30 in the last column.
- For every fish you have left in the large plate, add one fish
- Add all the fish on the large plate and write that number in the first column for round 2.

Results: Tragedy of the Commons p. 13NB

- Yes, eat your fish.

1. What happened the first time you went “fishing”?
    1. How does it relate to overfishing?
2. Why have a time limit? What does the time limit represent?
3. How did your group discuss your actions and strategies before each harvest?
4. Mathematically, what is the best strategy for harvesting our natural resources?
5. How is this a model for sustainability?
6. Discuss with your group and write three real world resources that need to be managed sustainably.

Real World Example:

- Easter Island – South Pacific
- Over use of resources
  - Palm trees
- Led to the demise of that civilization

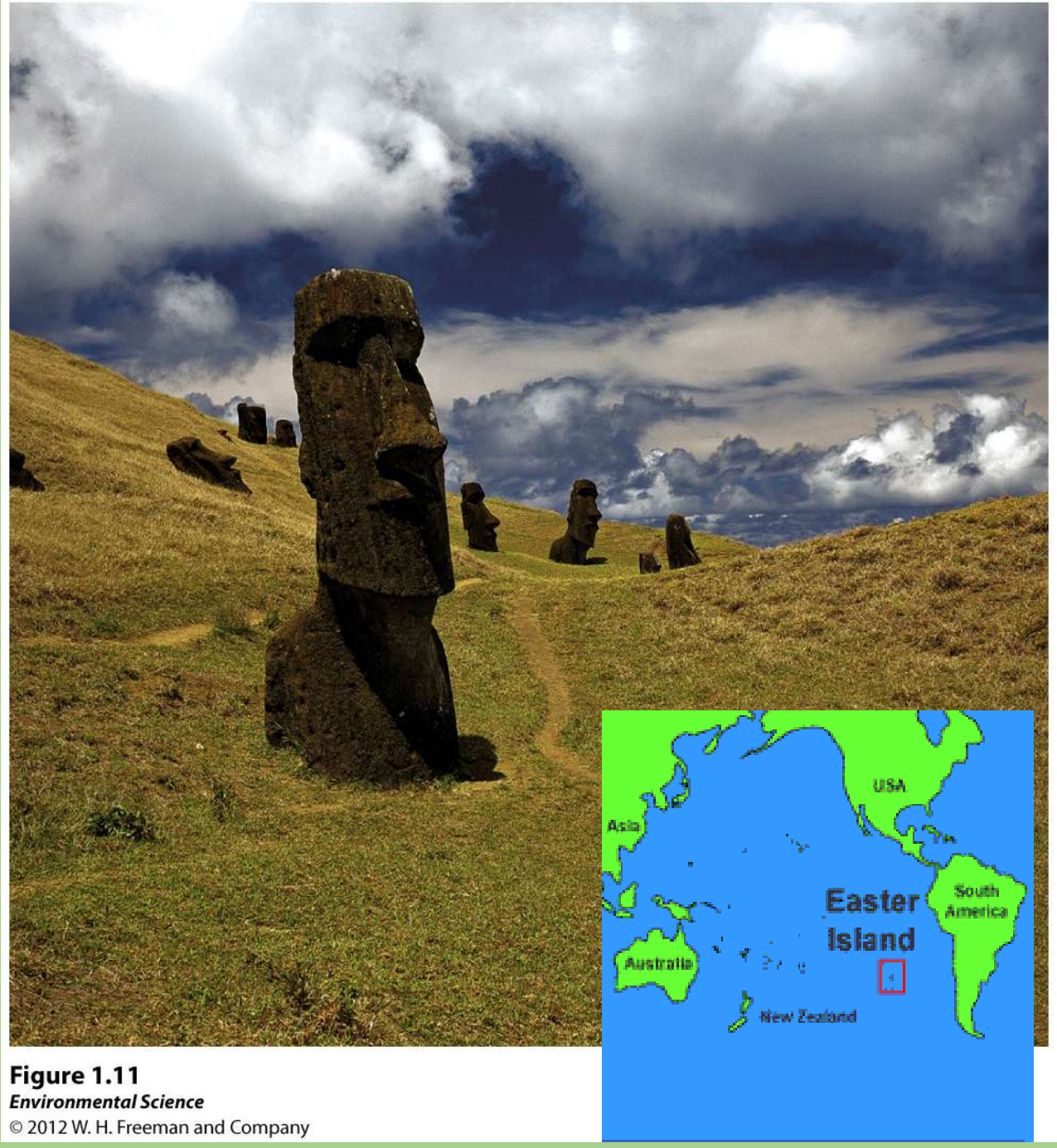


Figure 1.11
Environmental Science

Classroom discussion: Tragedy of the Commons

- What are the Commons?
- What is the logic of the Commons?
- How does the Commons work?
- Why does the Commons continue?
- How is the Tragedy of the Commons a good argument for renewable resources?

The take away…

- Environmental systems must not be damaged beyond their ability to recover.
- Renewable resources (Trees, soil, etc.) must not be depleted faster than they can recover.
- Nonrenewable resources must be used sparingly.
- The main difficulty in solving environmental problems is the conflict between the short-term interests of individuals with the long-term welfare of society.

Works Cited: Friedland and Relyea, Environmental Science for AP 2nd Ed., P. 15.

Resources Activity P. 15 NB

Write on the board a list of nonrenewable and renewable resources.

Nonrenewable

Renewable

Agenda 8/25

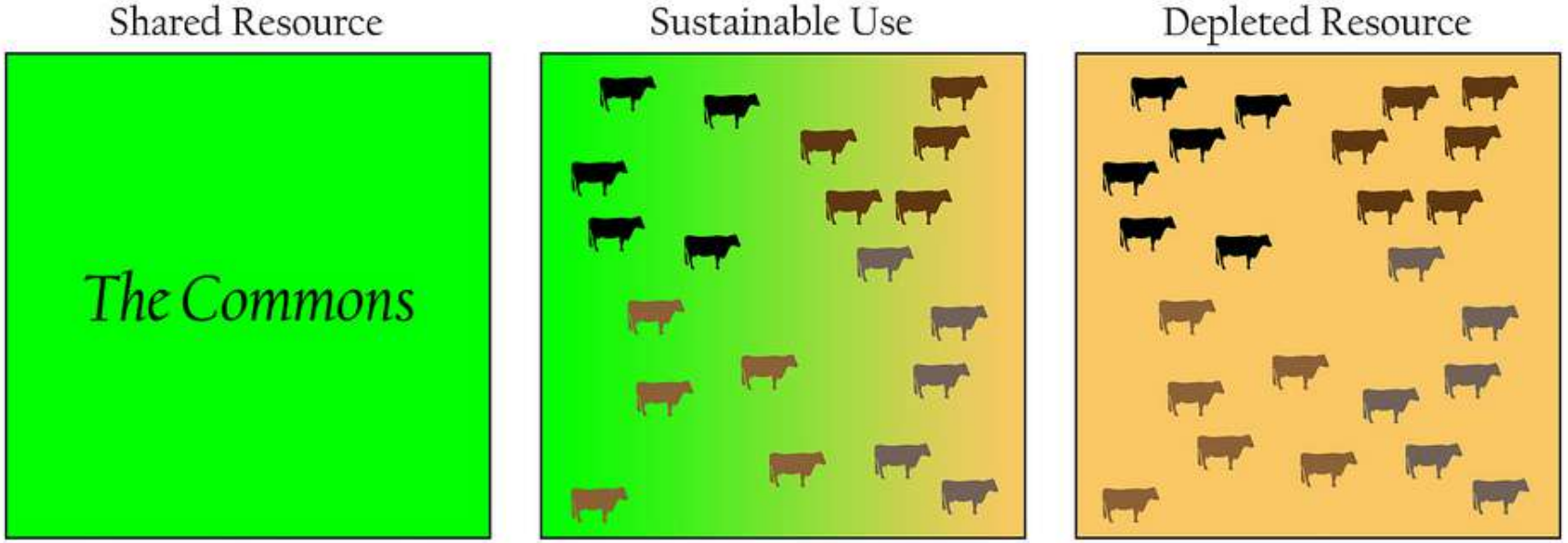
- Collect syllabus
- Warm up
- Collect Books
- Lab - Salinization

8/25 The Environment & Society CH 1.2
Obj. TSW explain the tragedy of the commons and how it relates to sustainability. P. 14 NB

1. Describe the Tragedy of the commons.
2. Analyze the chart in Figure 2.4 “Indicators of development for the US, Japan, Mexico, and Indonesia. Write 3 facts from the chart in complete sentences.
3. Explain sustainability.

The Tragedy of the Commons

Imagine an open pasture shared by multiple cattle owners. Each owner increases their herd to maximize their benefit. With an unregulated resource this is "logical" since the benefit is enjoyed by the individual and the impacts are shared by all. This leads to the ultimate overgrazing of the pasture.



The Tragedy of the Commons applies to numerous environmental, economic and social phenomena and has particular relevance to greenhouse gas regulation related to global warming.

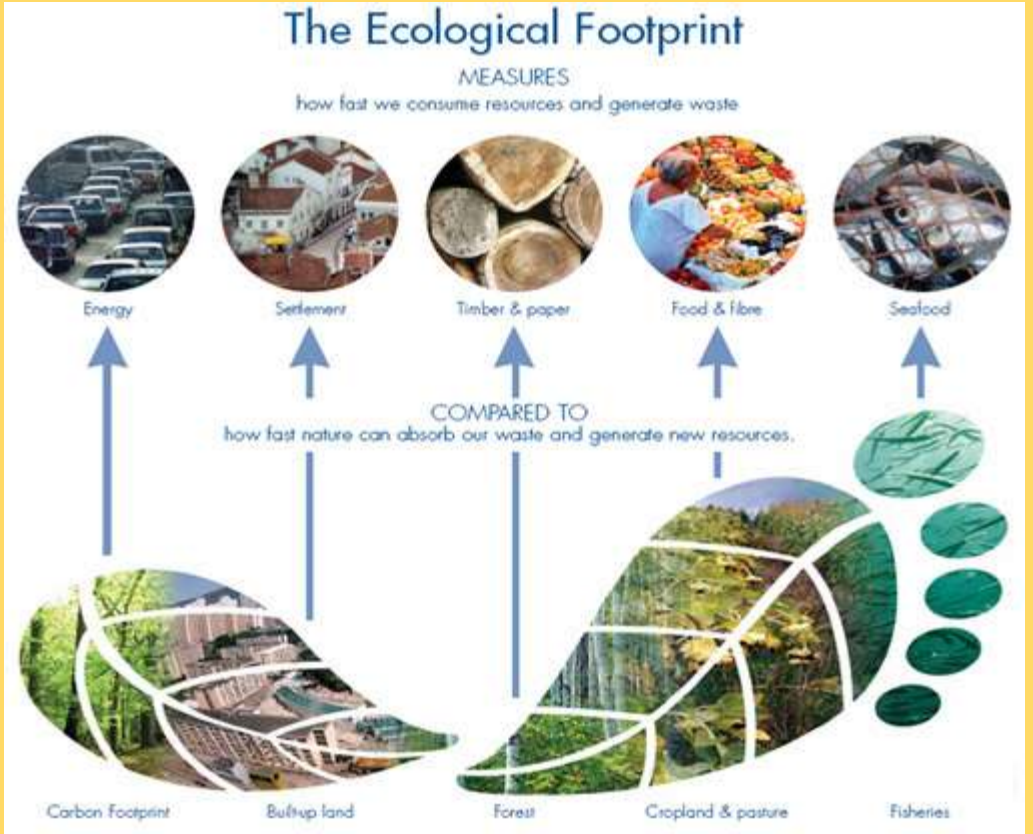
Hardin, G. (1968-12-13) "The Tragedy of the Commons" Science 162 (3859) : 1243-1248
The "commons" dimensions and formulae are for illustrative purposes only.

Stephens Planning & Design LLC
May 18, 2013

Indicators of Development for Four Countries

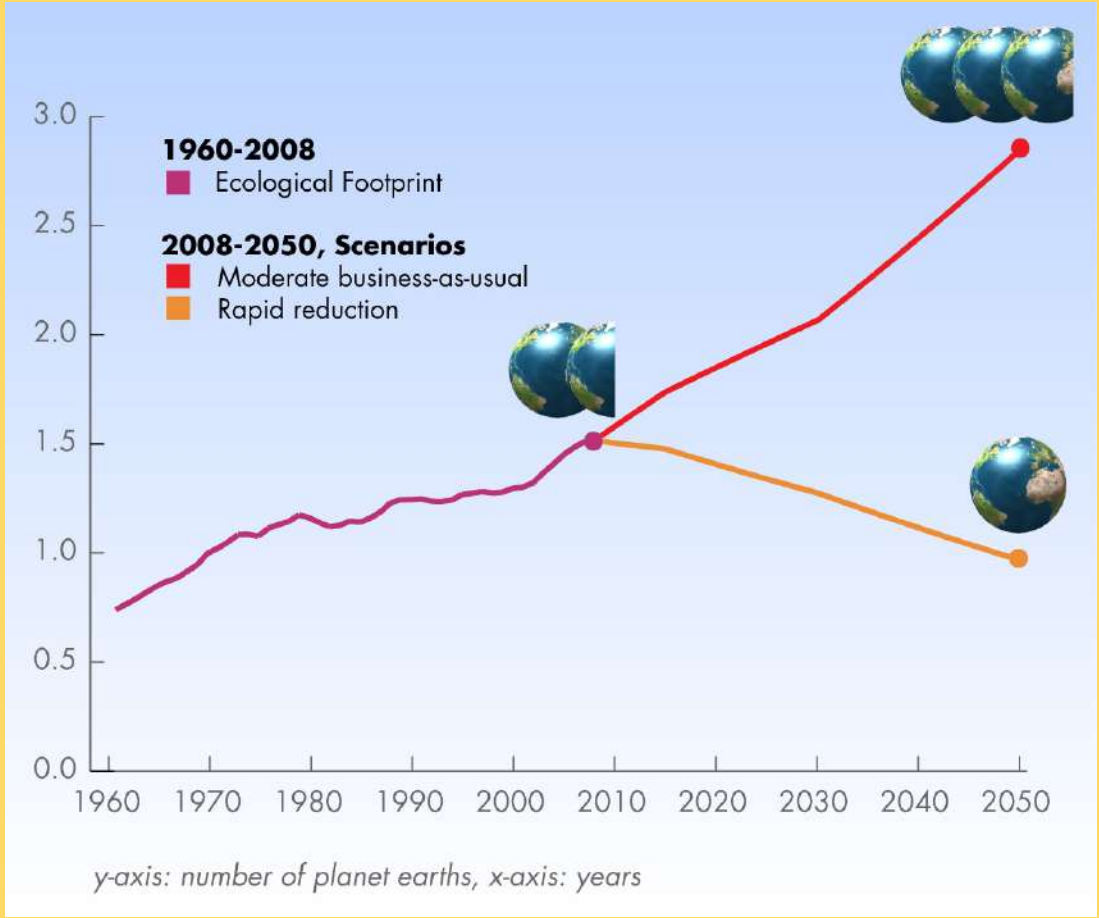
- Health
- Population Growth
- Wealth
- Living Space
- Energy Use
- Pollution
- Waste

- Which Countries are doing the best in each category?



A Sustainable World

What does it mean to be sustainable?

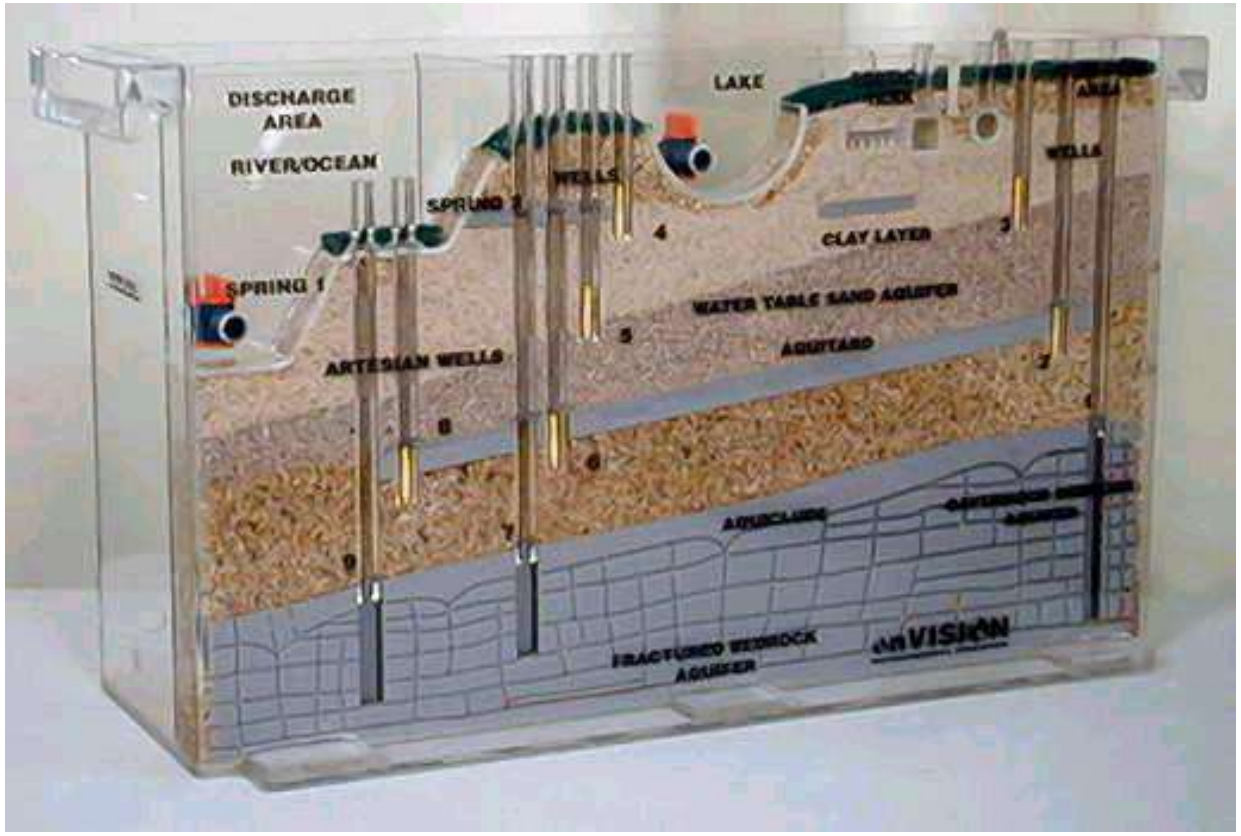


Salinization Lab

Salt buildup is an existing or potential hazard on almost all of the 42 million acres of irrigated farmland in the United States. Much of the world's unused land is in arid and semiarid regions where irrigation will be necessary. Excessive salinity is presently costing the U.S. billions of dollars in lost food crops. This is becoming a huge problem in our own Central Valley, running from Bakersfield, CA to Fresno, CA.

Ground Water Water Model Demonstration

- Salt water intrusion to field crops along the central valley.



	100 ml H_2O	300 ml H_2O	Germination #	% Germination
Dates	% NaCl	% NaCl	1 – 10 seeds	
8/25 8/26 8/27	0 %			
8/25 8/26 8/27	0.5%			
	1%			
	1.5%			
	2%			
	2.5%			
	3%			
	3.5%			
	4%			

1.0 % = 1 g NaCl

Calculate the % [NaCl] in 300 ml H_2O

Salinization

- Irrigated water contains salt. The ground where the crops are planted increases in salt concentration.
- Evaporation
- In our Lab, what is the control? 0% [NaCl]
- Independent Variable: [NaCl] (what you changed)
- Dependent Variable: Germination Rate

Groundwater

Salt water intrusion

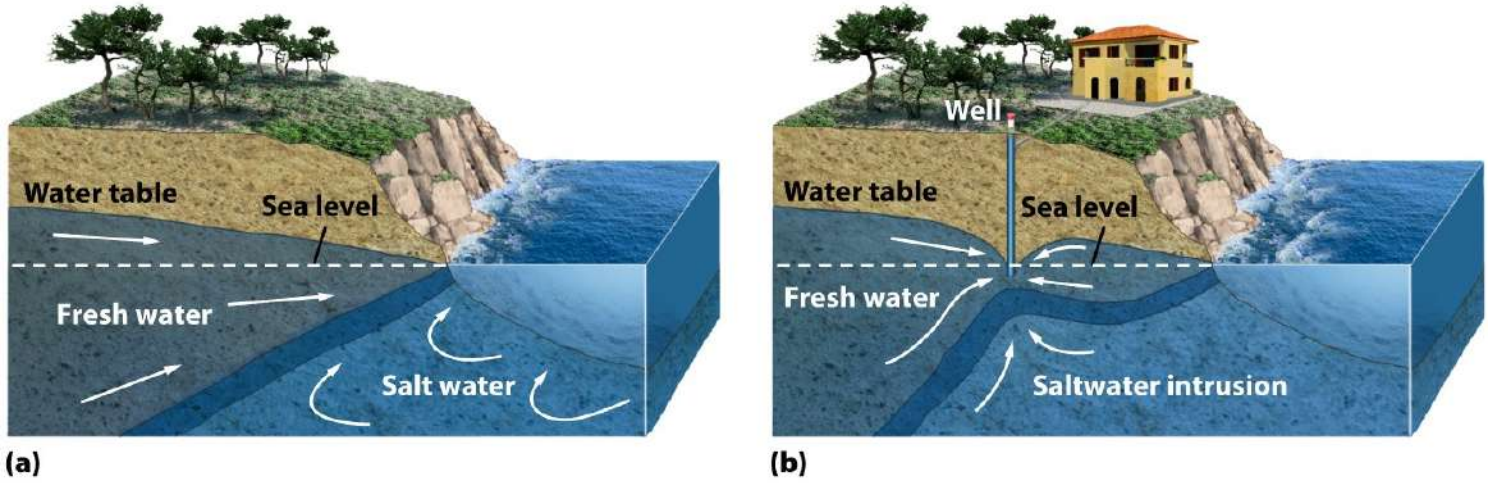


Figure 9.6
Environmental Science

8/26 Agenda

- Warm up
- Gather Data on Petri Dishes – Write on boards and share with the group next to you.
- Log onto the computers
- Learn how to create a Title Page for a scientific paper.

8/26 Scientific Methods CH 2.1 – 2.2

Obj. TSW apply their knowledge of the experimental method to a real world problem for the Salinization lab. P. 16 NB

1. Write the steps to the scientific method.
2. Why is the control in an experiment important?
3. What is a variable in an experiment?

1. Experimental Parts of a lab

- Observation
- Hypothesis
- Experiment
  - 2. Control group – the part of the experiment that you are testing against.
  - 3. Experimental Group (Variable) – the part of the experiment that we have changed
- Analysis
- Conclusion

Scientific Paper – Create a Title Page p. 19 NB

Salinization Lab

Student's First and Last Name

August 26th, 2015

Mrs. McAllister

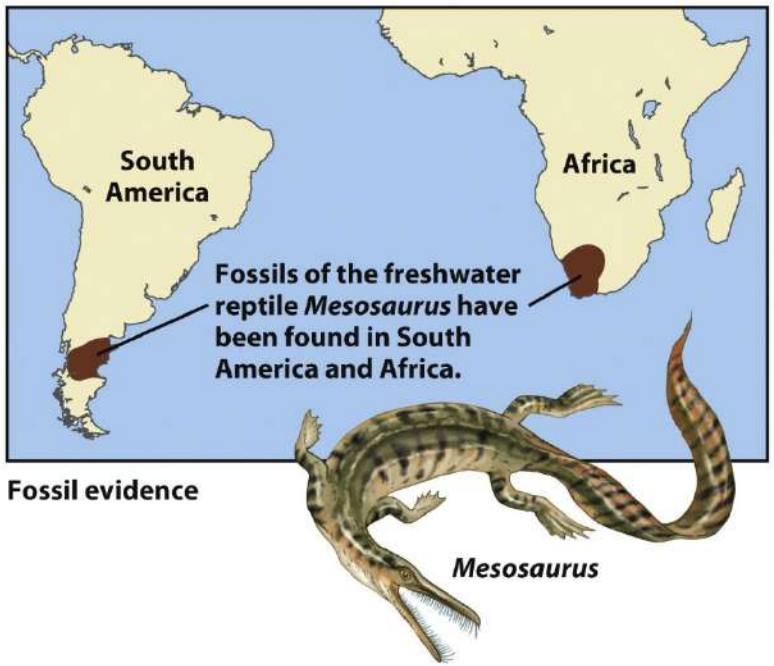
Environmental Science

NO page number on Title page, top right on every other page.

Biodigestion Videos

- Week of September 8th – 11th
- Farm to Fork Festival September 26th.
  - Service Learning Credit

8/27 Geosphere & Atmosphere CH 3.1 & 3.2
Obj. TSW describe Earth's tectonic plates, earthquakes and the layers of the atmosphere. P. 18 NB



Fossil evidence

Figure 8.3b
Environmental Science

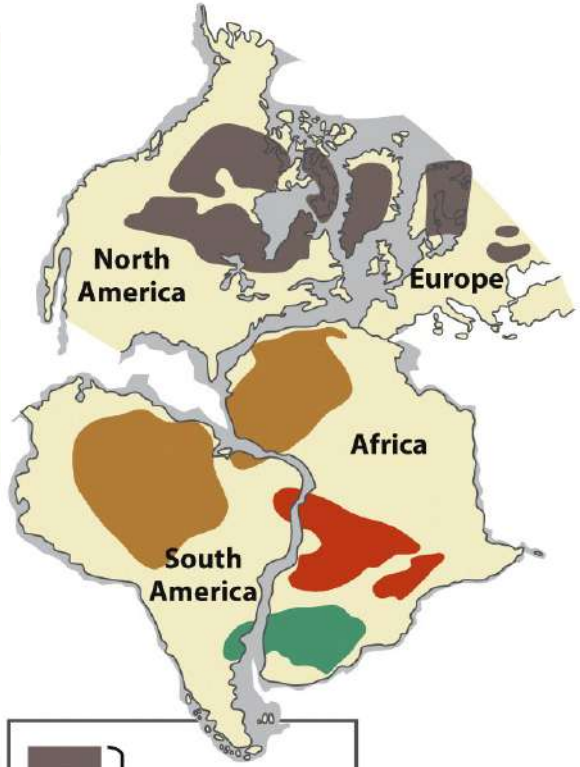


Figure 8.3a
Environmental Science

1. Explain how the movement of tectonic plates can cause earthquakes.
2. Write the five layers of the atmosphere in order.
3. Explain the Greenhouse Effect.

How the Earth is heated

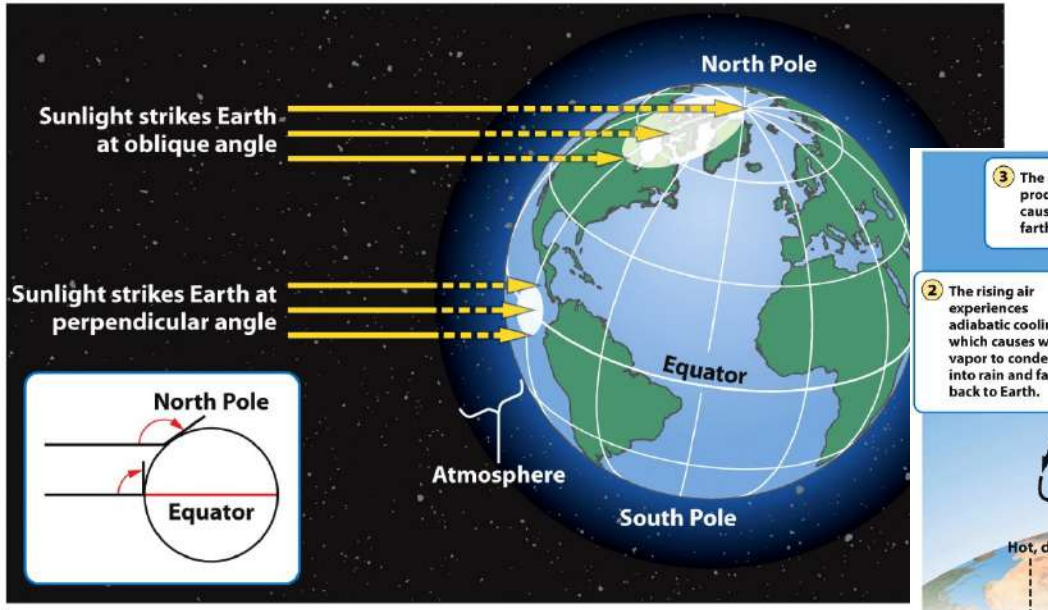


Figure 4.3 part 1
Environmental Science

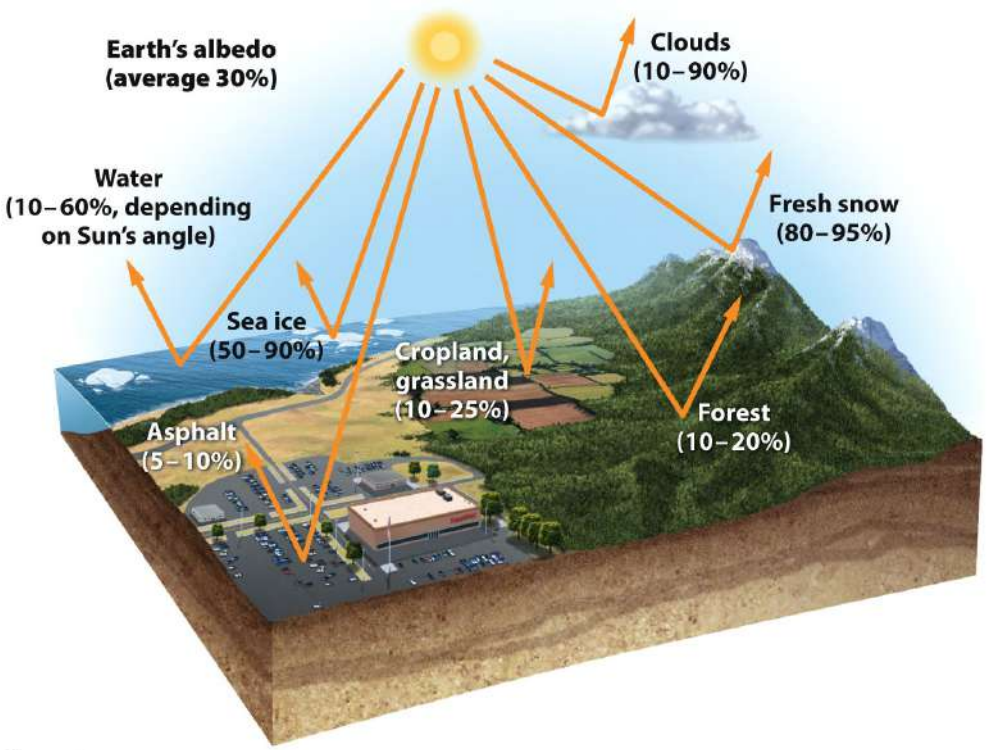


Figure 4.4
Environmental Science

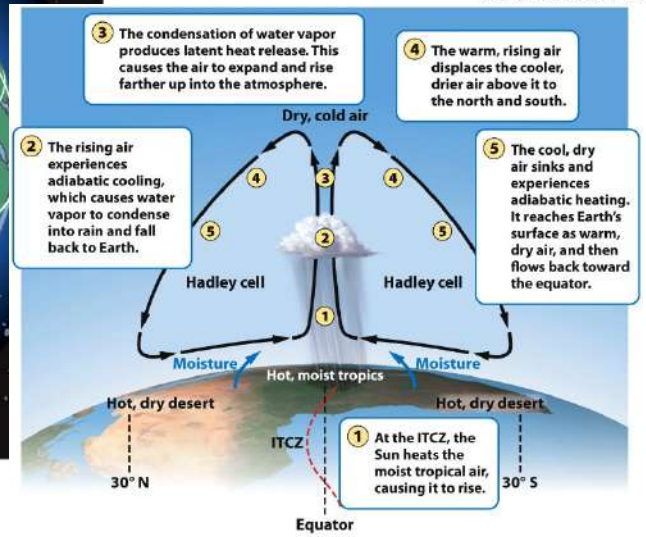


Figure 4.6
Environmental Science

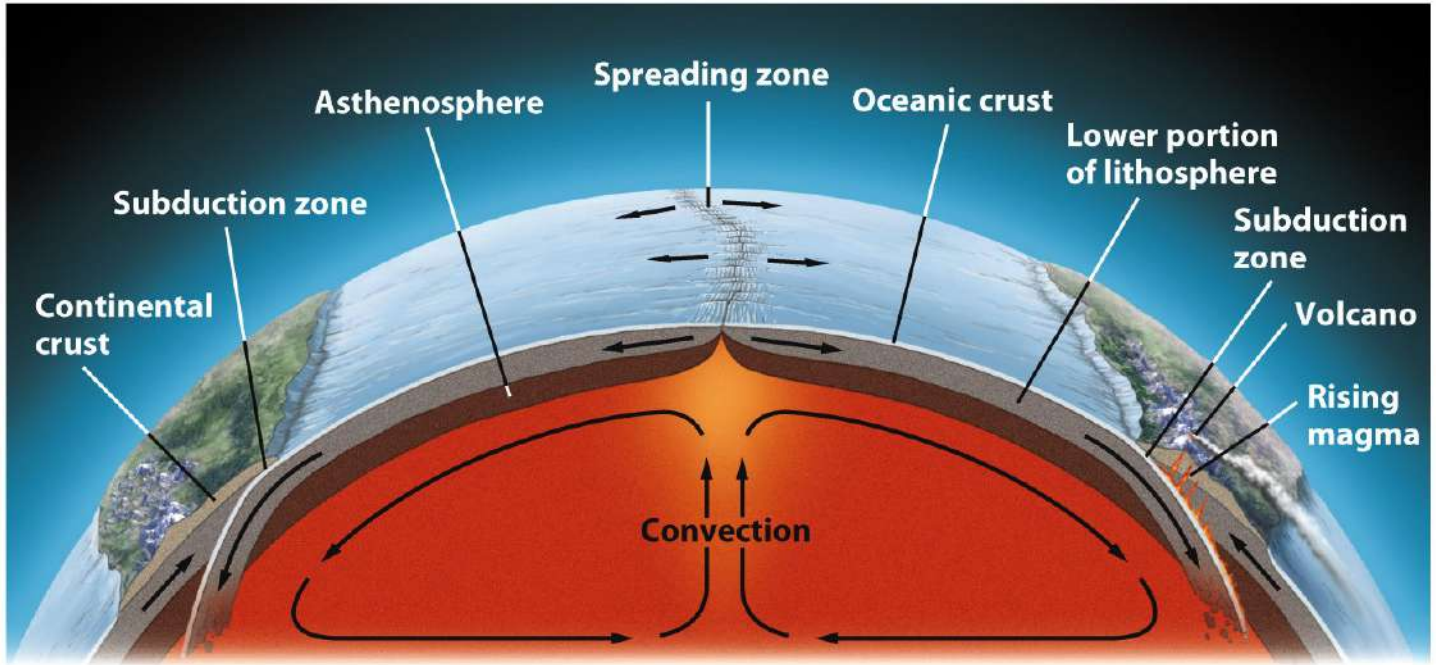


Figure 8.5
Environmental Science

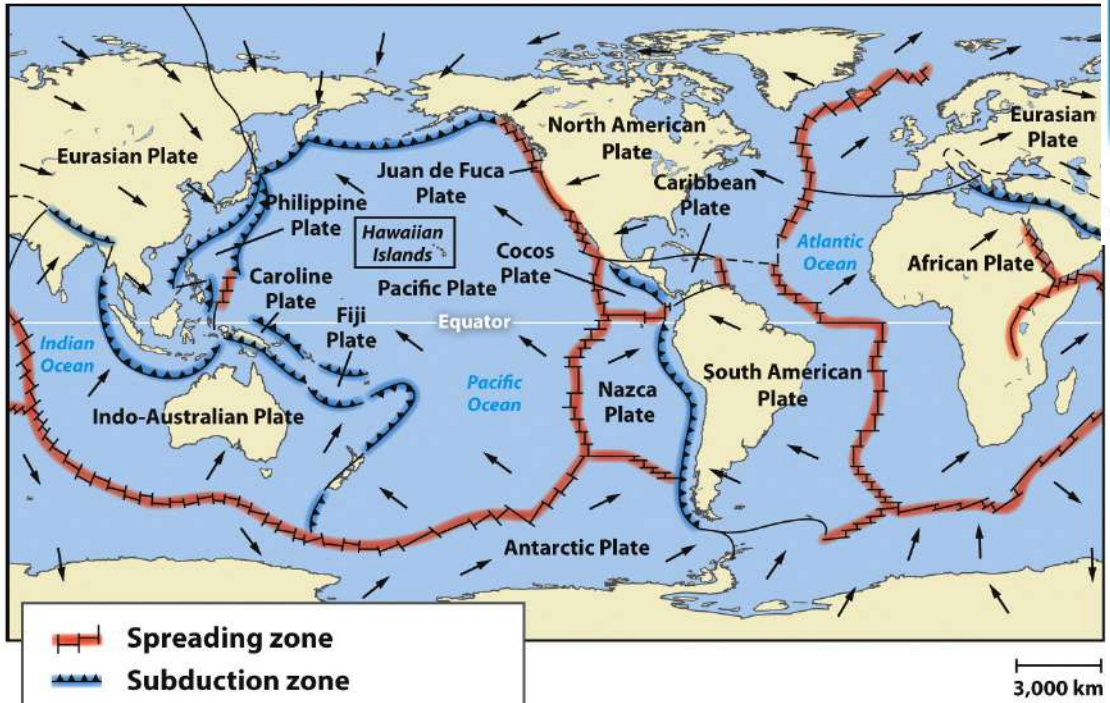


Figure 8.4
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Tectonic Movement

- Which one is the San Andreas Fault?

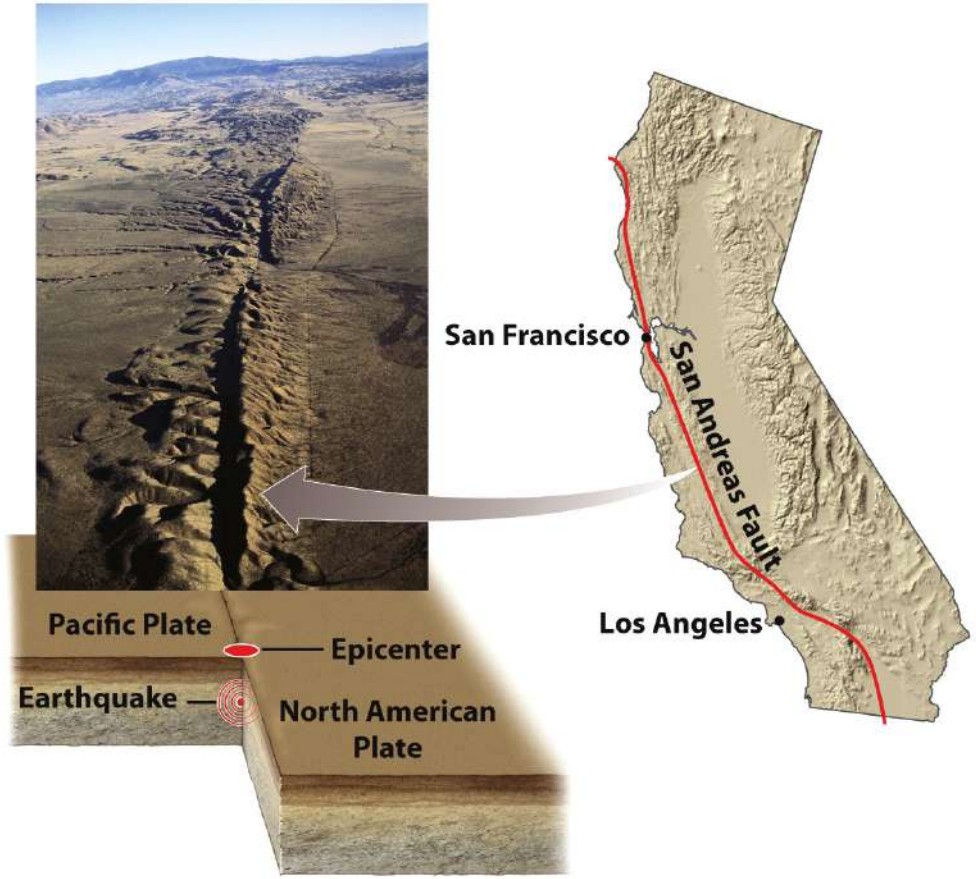
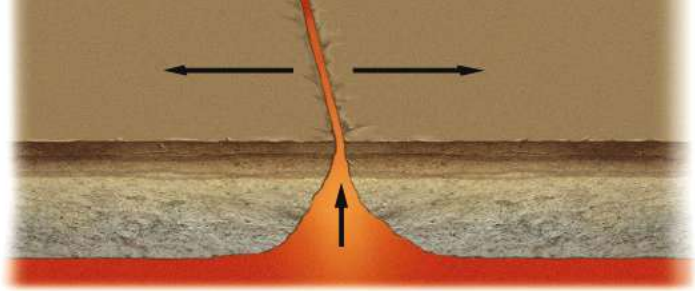
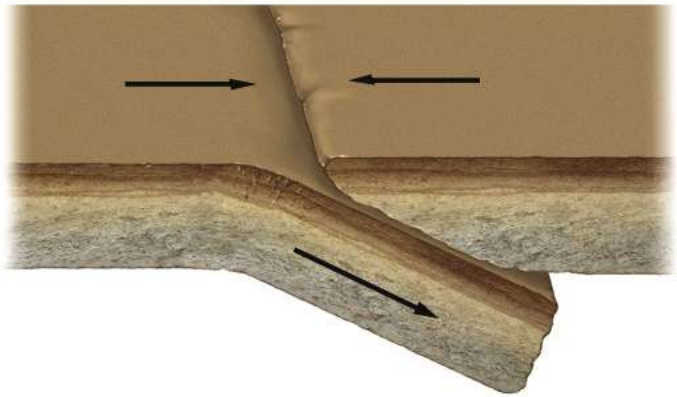


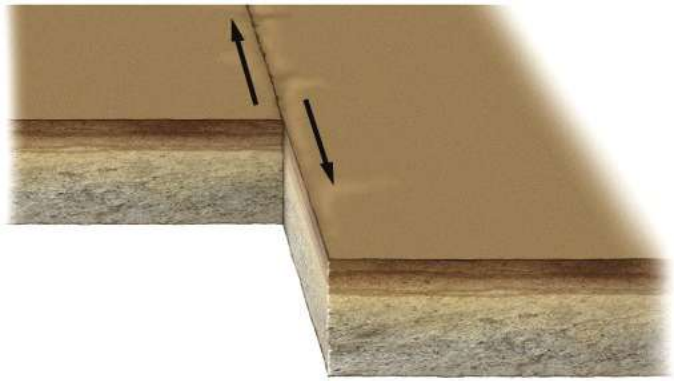
Figure 8.10
Environmental Science



(a) Divergent plate boundary



(b) Convergent plate boundary



(c) Transform fault boundary

Figure 8.8
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Layers of the Atmosphere

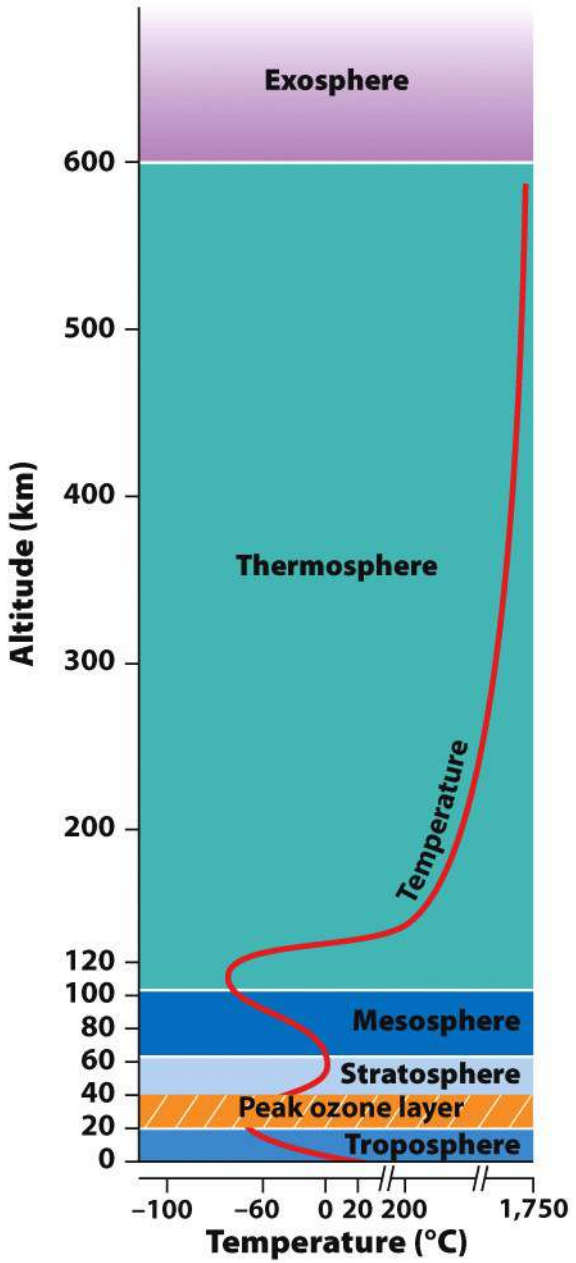


Figure 4.1
Environmental Science

8/28 Hydrosphere and Biosphere
Obj. TSW examine details of the hydrosphere and the biosphere. P. 20 NB

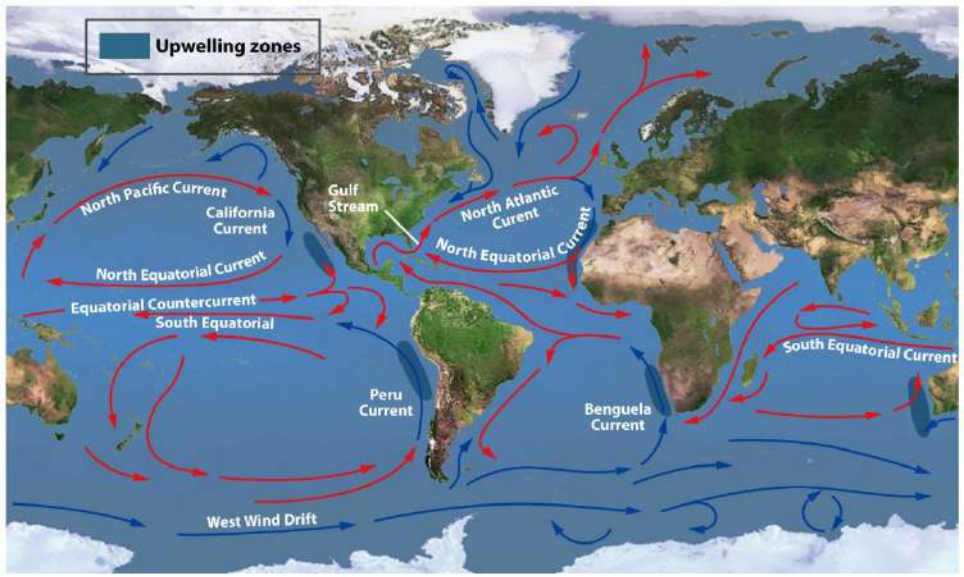
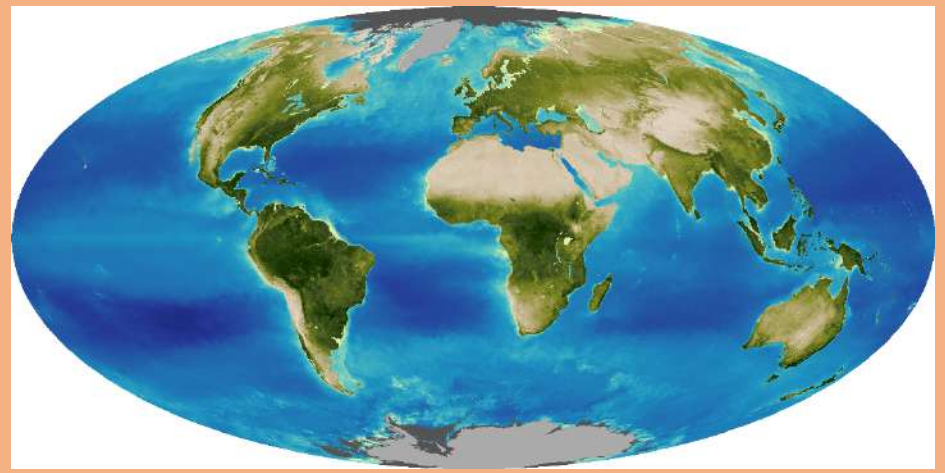


Figure 4.11
Environmental Science

1. Explain how the ocean regulates Earth's temperature.
2. Discuss the factors that confine life to the biosphere.
3. Explain the difference between open and closed systems.



Ocean Circulation

1. Warm water flows from the Gulf of Mexico to the North Atlantic, where some of it freezes and evaporates.
2. The remaining water, now saltier and denser, sinks to the ocean bottom.
3. The cold water travels along the ocean floor, connecting the world's oceans.
4. The cold, deep water eventually rises to the surface and circulates back to the North Atlantic.

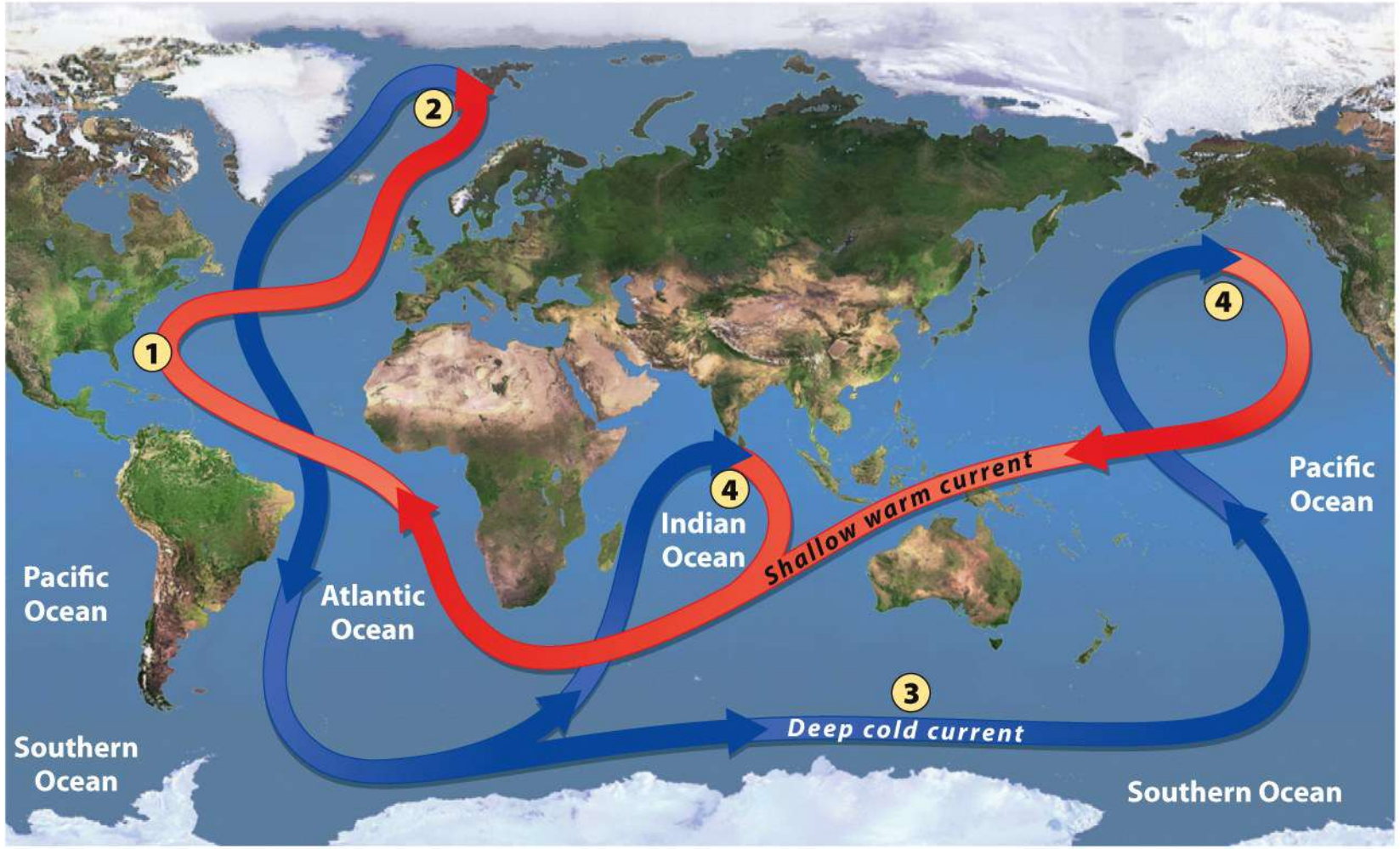
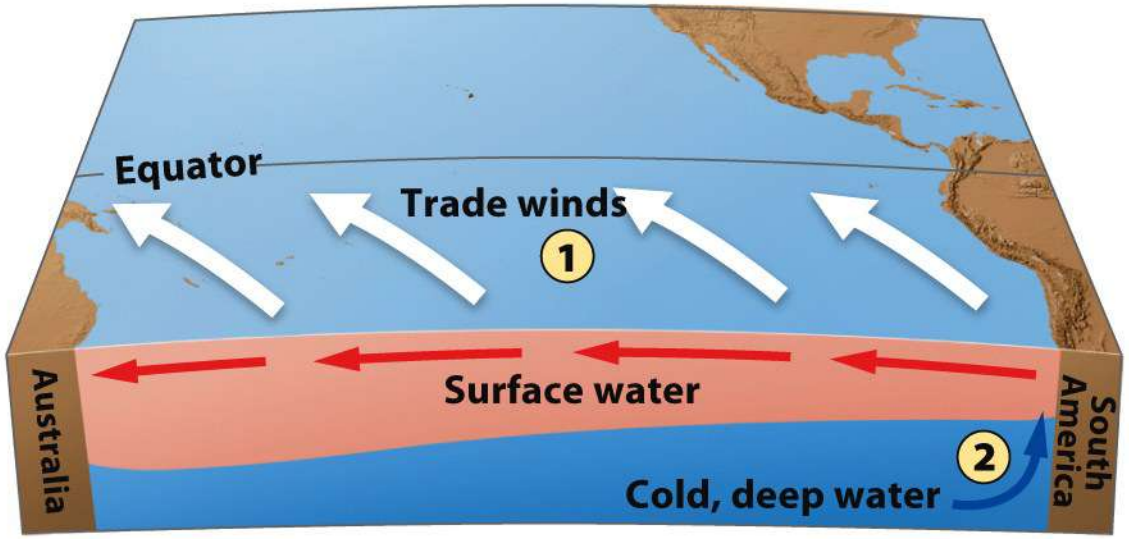
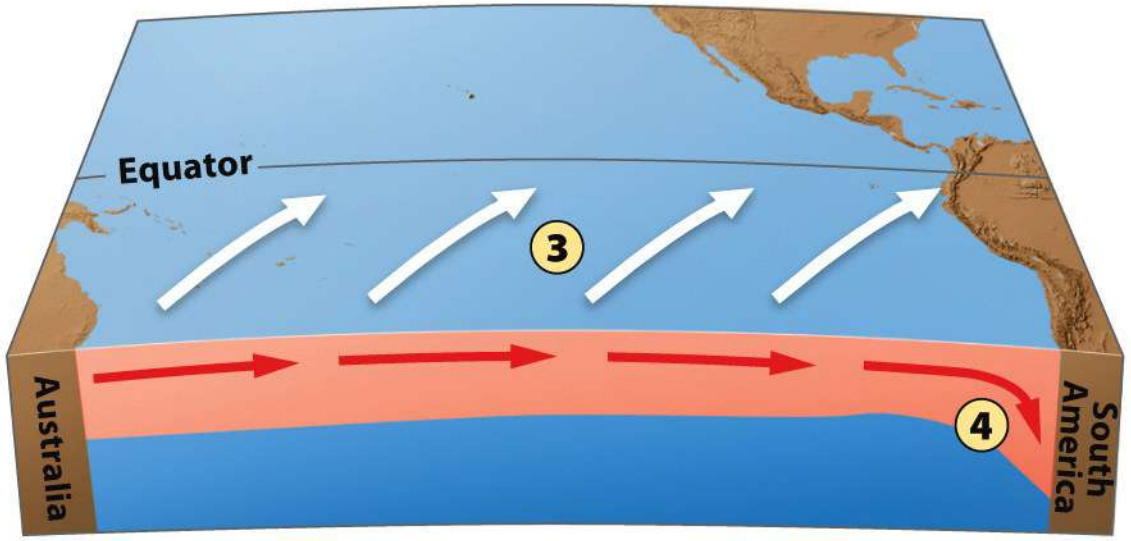


Figure 4.12
Environmental Science

El Nino



(a) Normal year



(b) El Niño year

1. During most years, trade winds push surface water from east to west.
2. Deep water moves upward (upwelling) to replace surface water that has moved westward.
3. During El Niño years, trade winds weaken or reverse direction; warm surface water moves from west to east.
4. The warm surface water builds up along the coast of South America and prevents upwelling of the deep cold water.

Figure 4.13
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Rain Shadow Effect

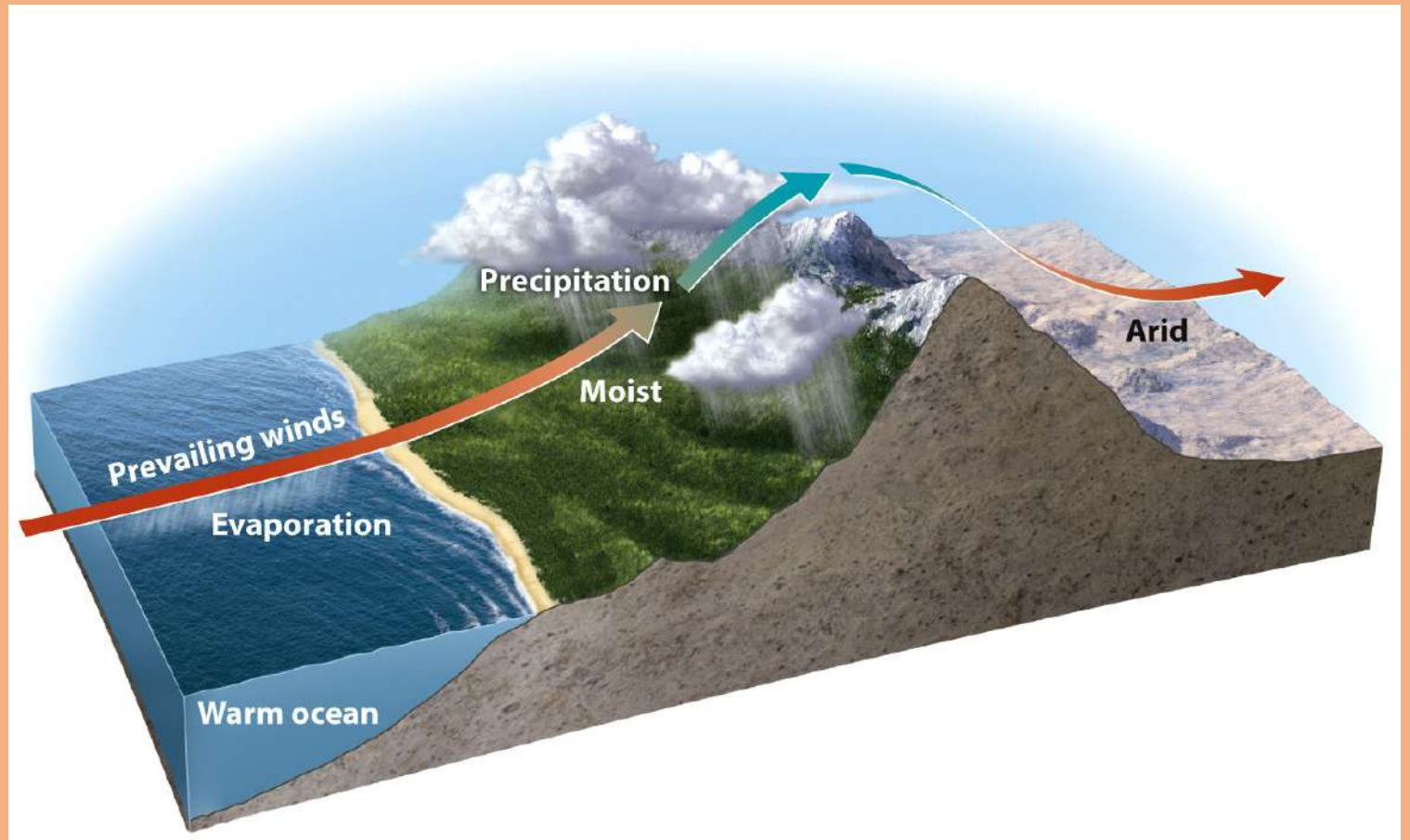

Figure 4.14
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Open & Closed Systems

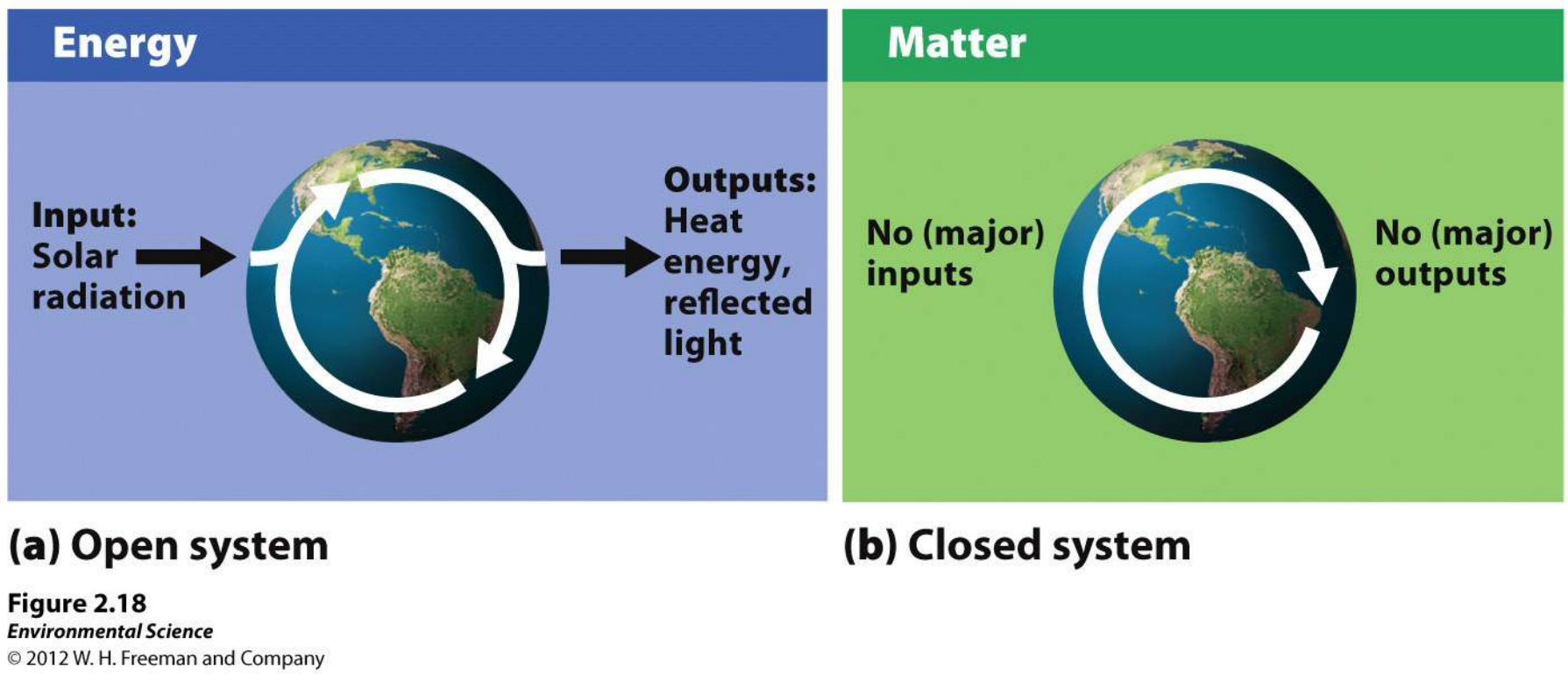

Figure 2.18
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