FIRE WATER!

http://www.youtube.com/watch?v=4LBjSXWQRV8

Warm Up 3/11

Obj. TSW participate in review activities to review for Topic I (CH 1, 2, 4, 8) in order to prepare them for the Semester Midterm on Friday, pg. 76 NB

- (1) Describe negative and positive feedbacks in the environment. (CH 2)
- (2) Describe a Hadley Cell, list the steps of the cycle. (CH 4)
- (3) Explain the Theory of Plate Tectonics. (CH 8)

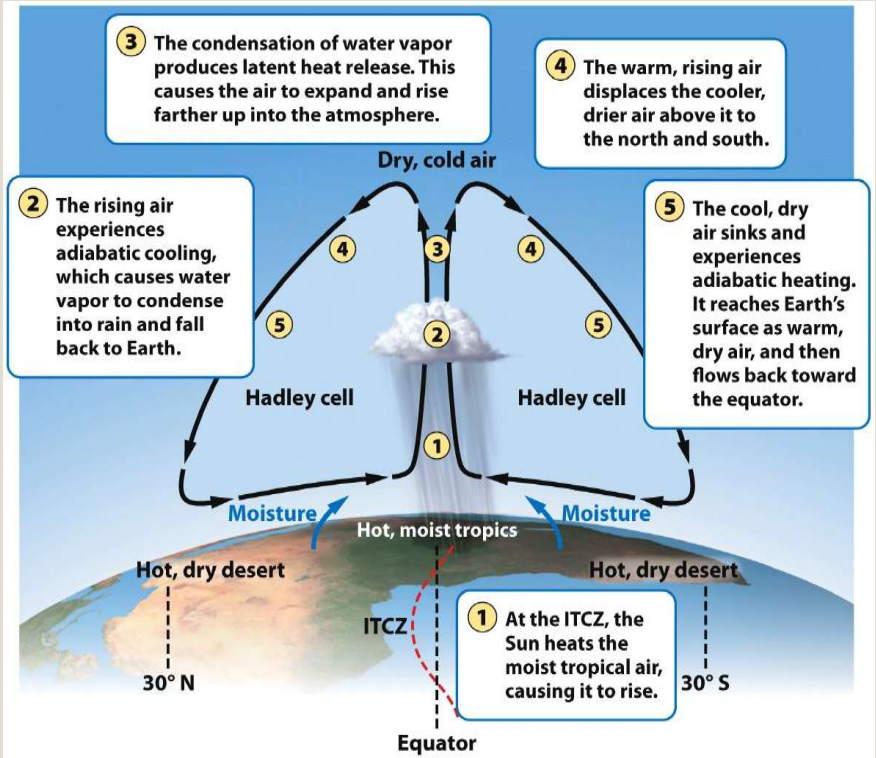


Figure 4.6
Environmental Science

Hadley Cells

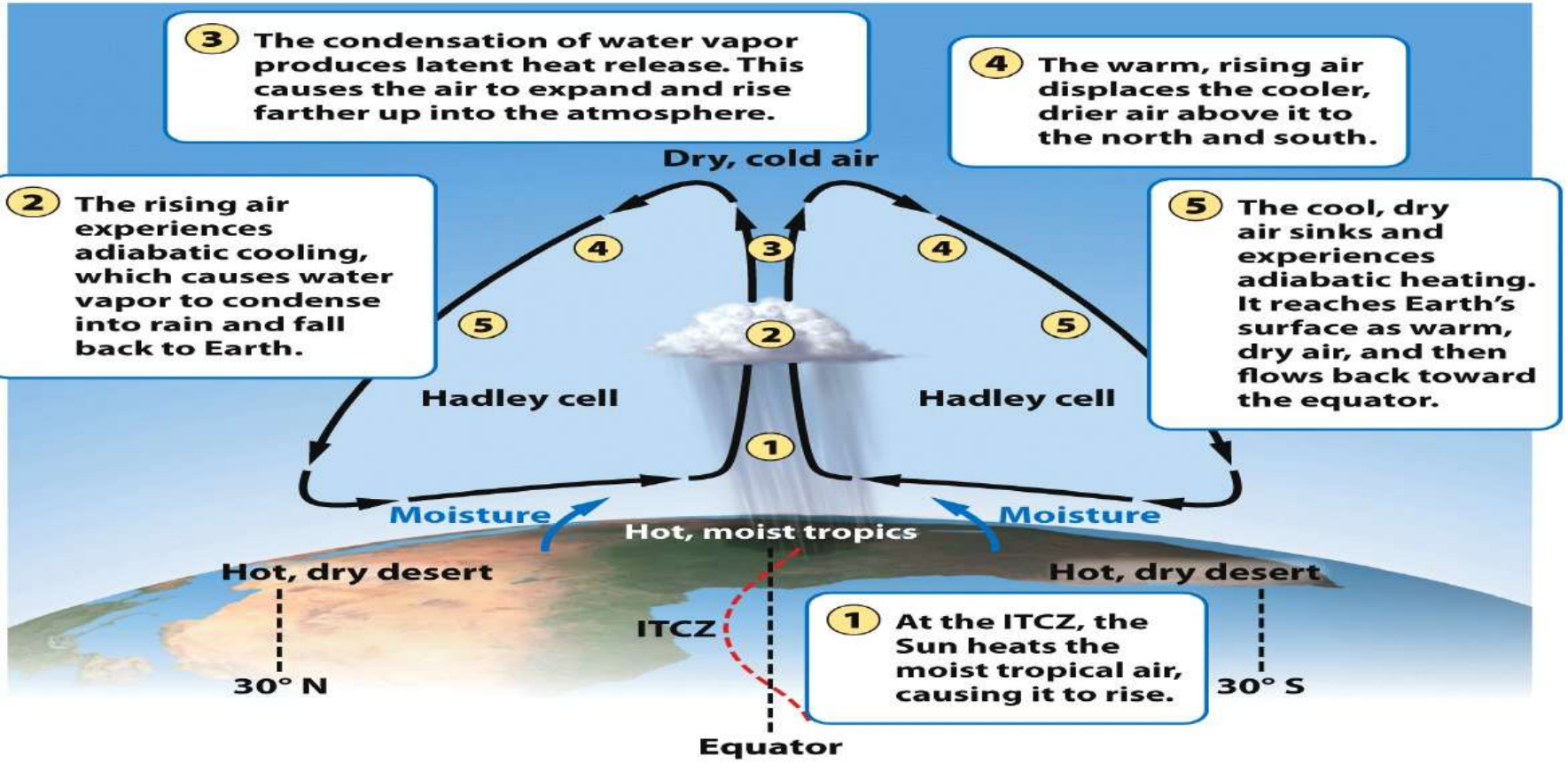


Figure 4.6
Environmental Science

Theory of Plate Tectonics

- Plate tectonics- the theory that states that Earth's lithosphere is divided into plates, most of which are in constant motion.

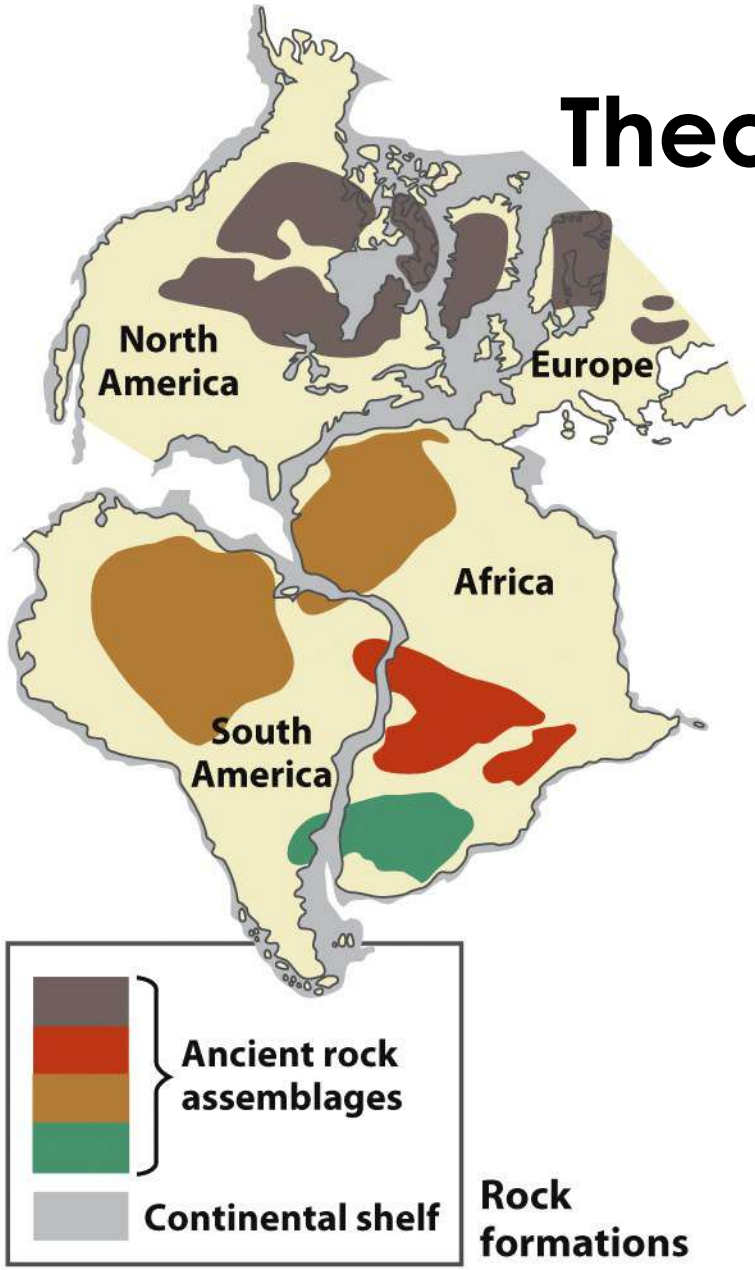


Figure 8.3a
Environmental Science

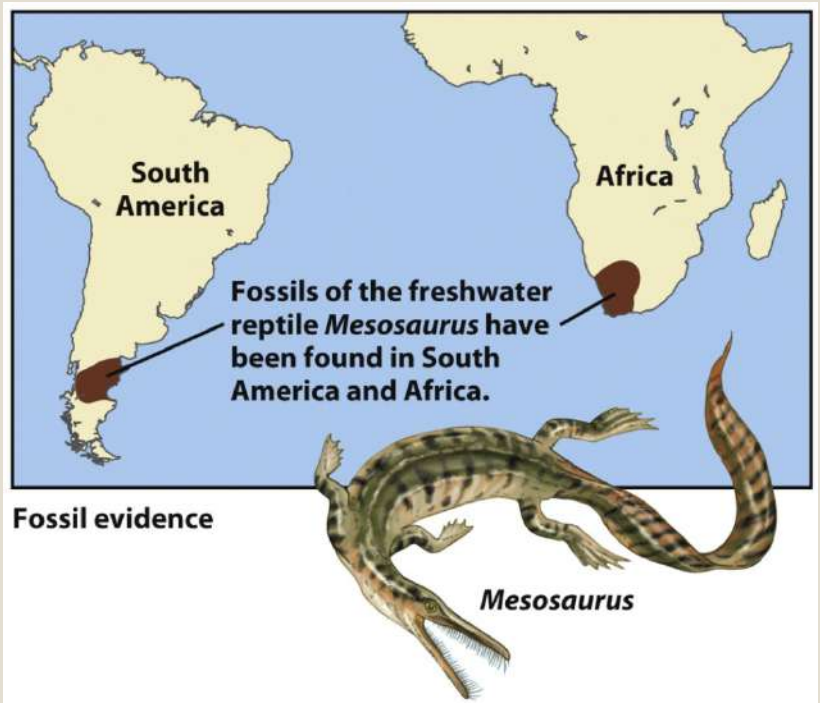


Figure 8.3b
Environmental Science

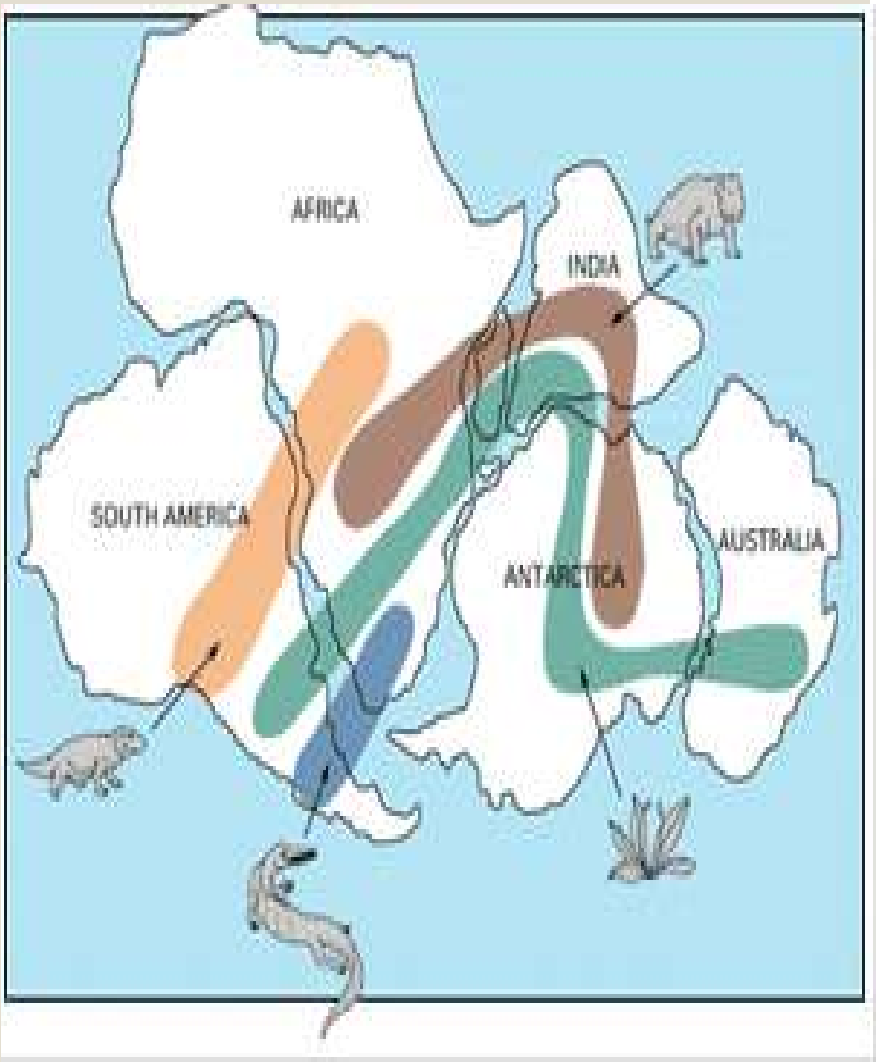
Evidence #1: Sea Floor: Fit of Continents

- 1915: Alfred Wegener= Pangea hypothesis
  - Puzzle Pieces: Continents fit together like pieces of a jigsaw puzzle
- Hypothesis was questioned
  - Shorelines= continually modified (due to erosion)
- 1960s: Sonar technology used to map the seafloor
  - Better view of continental shelf seen→ fit together like a puzzle

Evidence #2: Fossil Evidence

Wegener considered <u>fossil record</u>

- Land connection necessary to explain existence of identical fossils on widely separated landmasses
- Ex. That supported Pangea/Evidence for plate tectonics

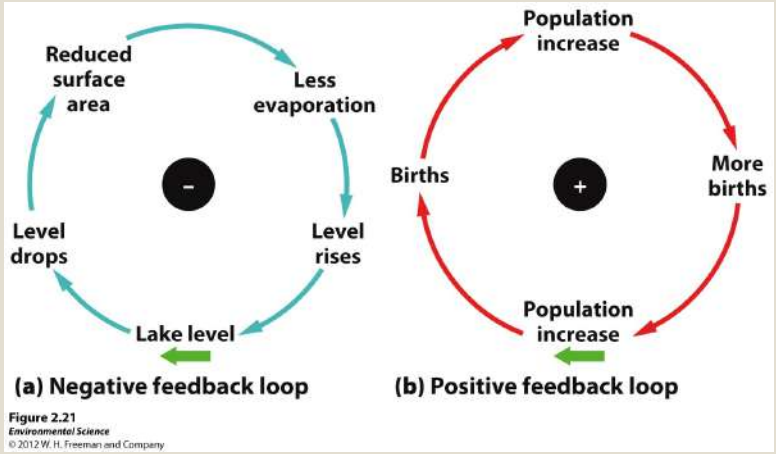


Evidence #3: Rock Types

- Wegener→ Rock types on continents
- Rocks found in particular region in one continent should closely match in age/type with those of adj. continent
  - Ex: Rocks found in Africa also in Brazil
- Mountain belts appear at the end of one coastline→ reappear again on the landmass across the ocean

Negative Feedback

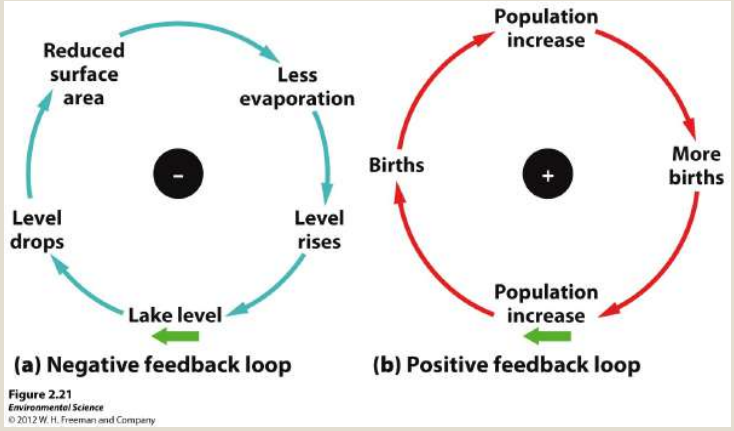
- A system responds to a change by returning to its original state
- **Decreasing** the rate at which the change is occurring
- **Mono Lake**
  - When the water level drops= lake surface area reduced= evaporation decreases
  - Result= Decrease in evaporation= lake level rises again



Negative= resists changes

Positive Feedback

- When a system responds to change by **increasing** the rate at which the change is occurring.
- Population Growth
  - Members of a species reproduce= create more offspring= offspring will reproduce= cycle that increases the population size



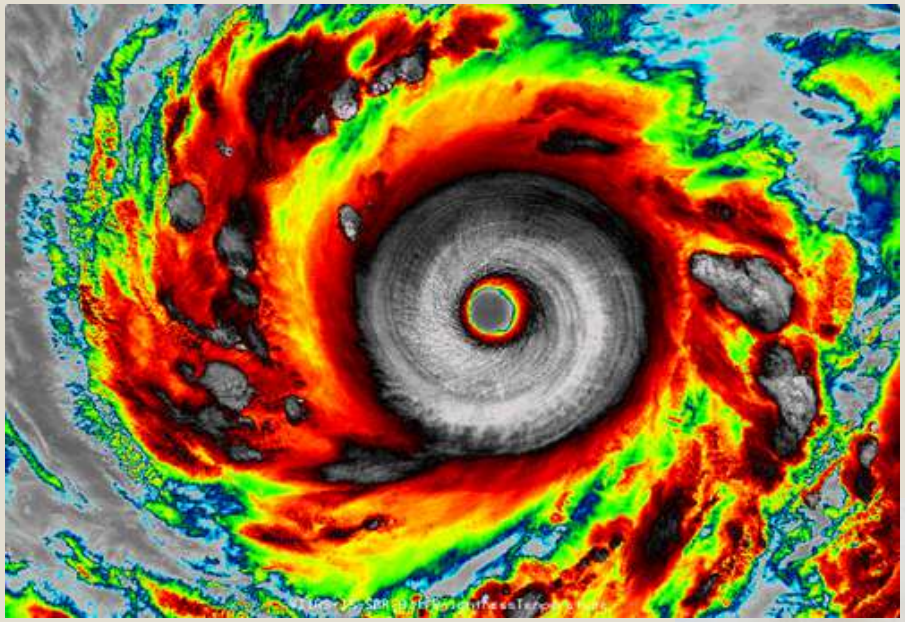
Positive= Amplifies Changes

In the News…

Fukushima safety measures tightened, 500 flights cancelled and 59 injured as typhoon Vongfong sweeps up the Japanese coast

- **Vongfong, Japan's second typhoon in a week, is sweeping north towards the capital city of Tokyo**
- **Fukushima operators increase the water transfer and storage capacity to prevent radioactive overflow**
- **Baseball game in Osaka between the Orix Buffaloes and the Hokkaido Nippon-Ham Fighters also postponed**

According to the Japan Meteorological Agency, Vongfong surpassed Genevieve for the most intense western Pacific typhoon of 2014 by estimated central pressure (900 millibars) on October 7. On the JMA typhoon intensity scale, Vongfong is the third "violent typhoon" of 2014, following Genevieve and Halong.

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Warm up 3/15

Obj. TSW participate in review activities to review for Topic II (CH 3, 4, 5, 6) in order to prepare them for the Semester Midterm on Friday, pg. 80

- (1) Draw a trophic pyramid, label each level, and label which direction energy flows. (CH 3)
- (2) Compare & Contrast geographic and reproductive isolation. (CH 5)
- (3) Describe the 4 types of symbiotic relationships. (CH 6)

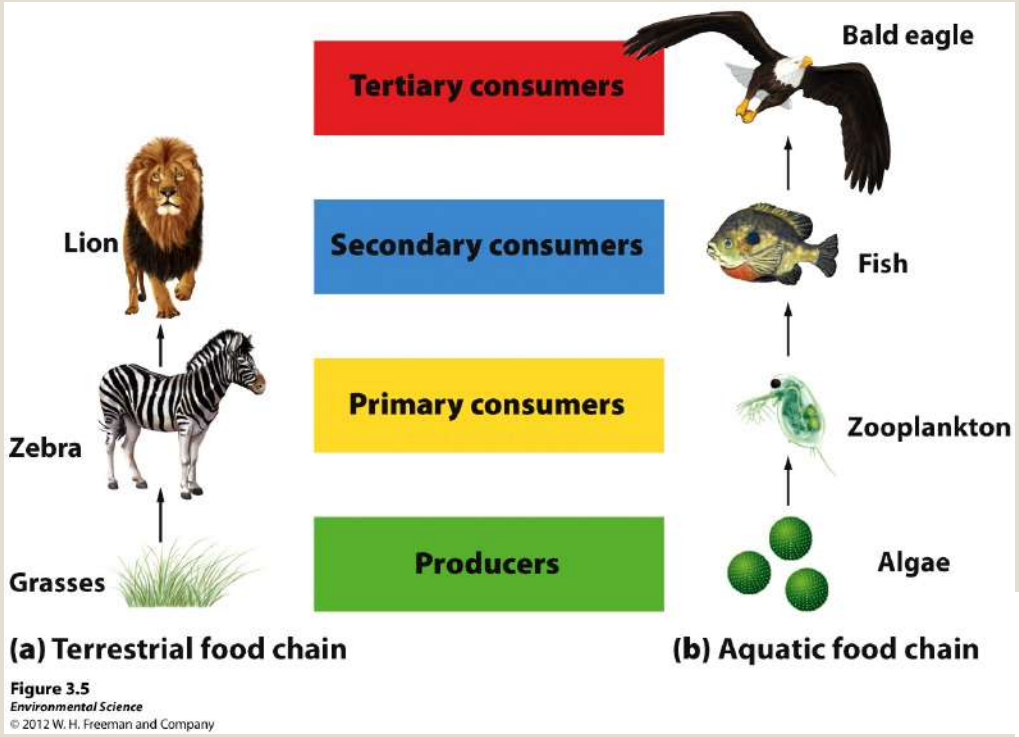
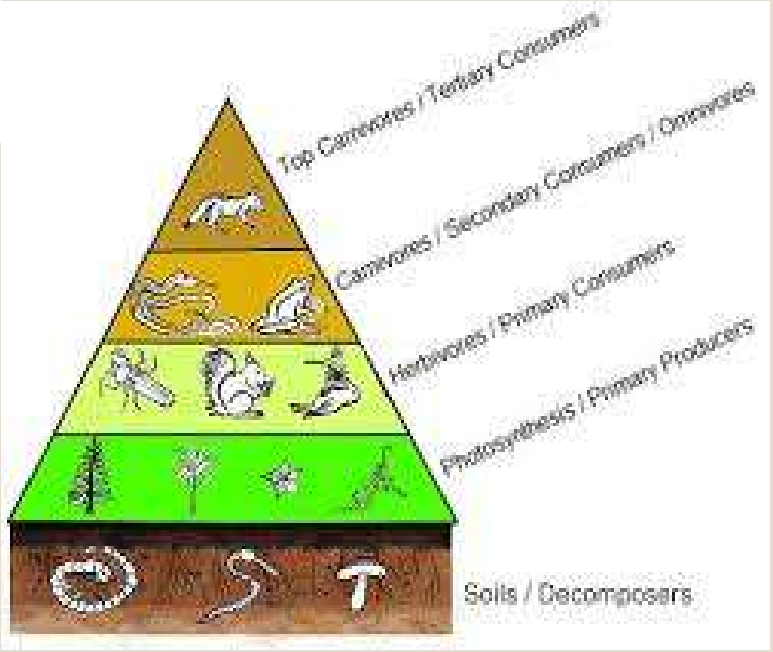


Figure 3.5
Environmental Science



Trophic Levels

- ***Trophic Structure:*** Shows the feeding relationships b/t organisms that influence the structure and dynamic of the ecosystem
- ***1) Producers***: Autotrophs, Photosynthetic organisms, get energy from sun, EX: Plants, algae
- ***2) Primary Consumers:*** Herbivores, get energy from eating other plants, EX: Zebra, Horse
- ***3) Secondary/ Tertiary Consumers:*** Carnivores, feed on primary consumers, EX: Snakes, frogs
- ***4) Decomposers & Detritivores***: Consume ONLY dead organisms; feed on decomposing organic matter, EX: Worms, slugs

Geographic Isolation

*Type of Allopatric Speciation

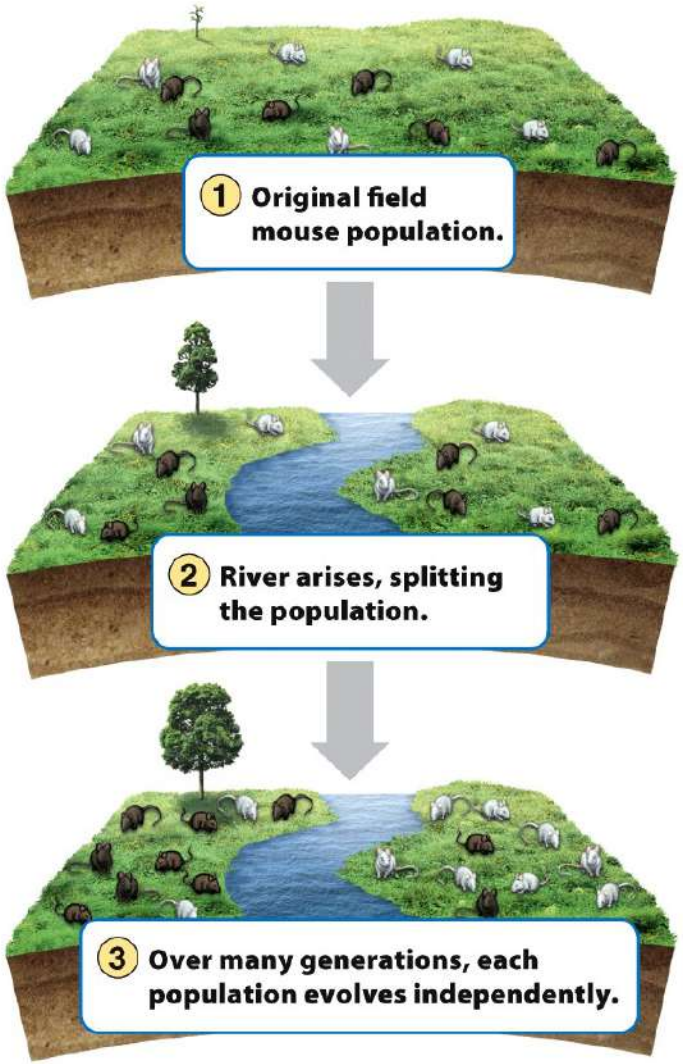


Figure 5.13 part 1
Environmental Science

Happens when pop. are divided geographically, Geographic barriers split populations, Different selective pressures from the environment may create two distinct populations.

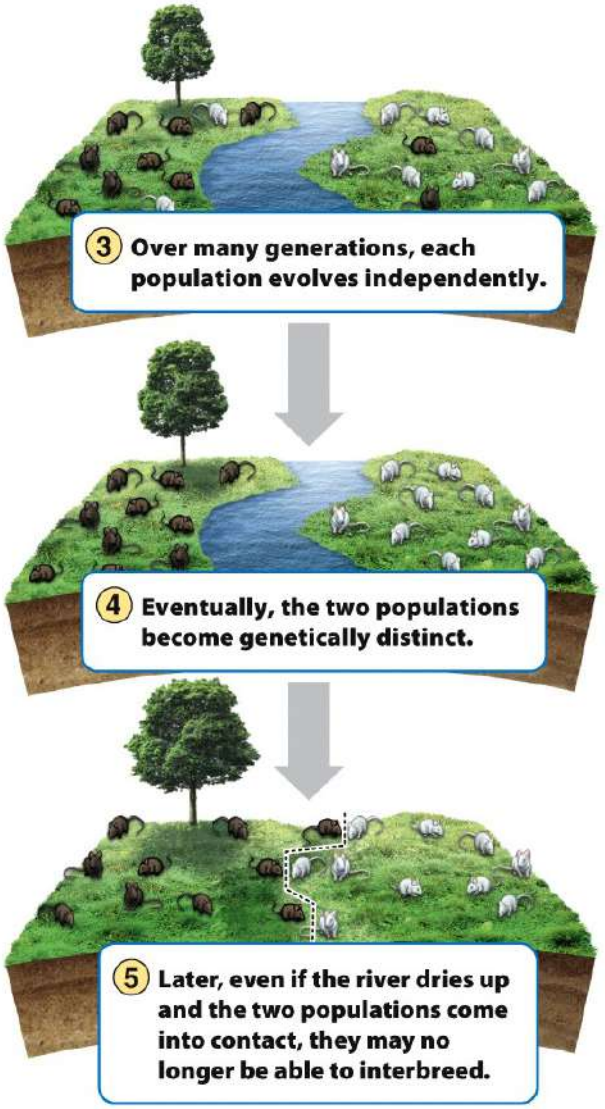


Figure 5.13 part 2
Environmental Science

Reproductive Isolation

*Type of Sympatric Speciation

- **Sympatric Speciation**: The evolution of one species into two species in the **absence** of geographic isolation
- Geographic isolation can lead to reproductive isolation= species becomes so different that even if the physical barrier were removed= could not interbreed

(EX) Frogs that have different mating calls= don't mate

Predation

- **Predation**- the use of one species as a resource by another species.
- **True predators-** kill their prey= Lion
- **Herbivores**- consume plants as prey= Gazelles
- **Parasites-** live on or in the organism they consume; host is harmed= Tapeworm
- **Parasitoids-** lay eggs inside other organisms= species of flies, wasps

Competition

- Struggle of individuals to obtain a limiting resource .
- When paramecium were grown separately they both achieved high numbers in their population.
- However, when they were grown together, P. aurelia out competed P. caudatum, who declined to extinction.

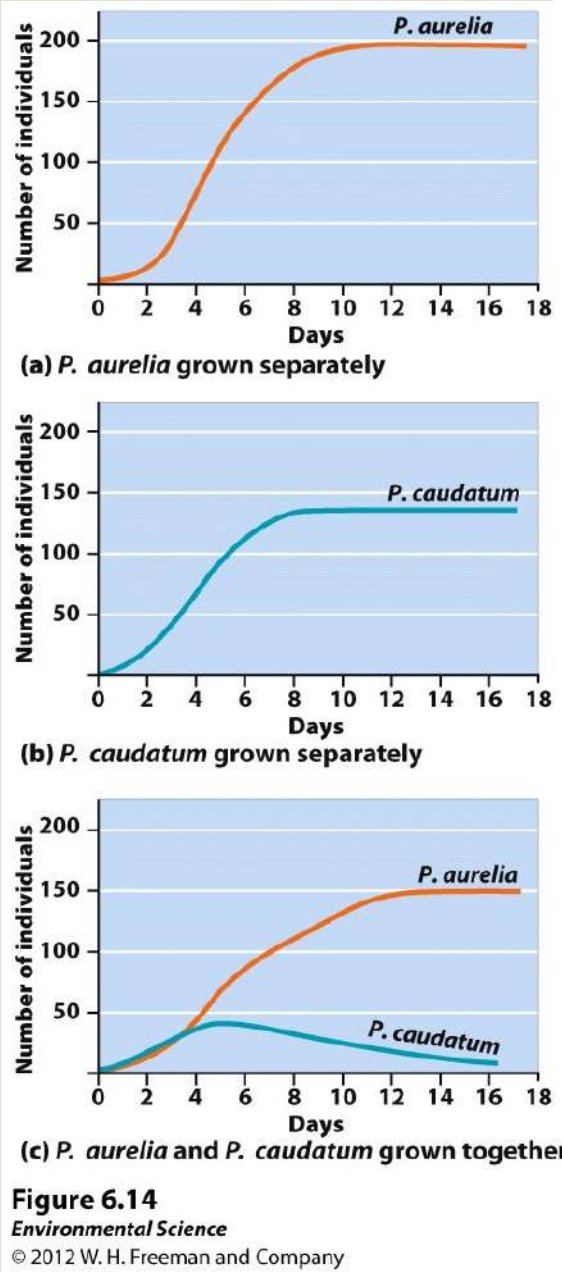
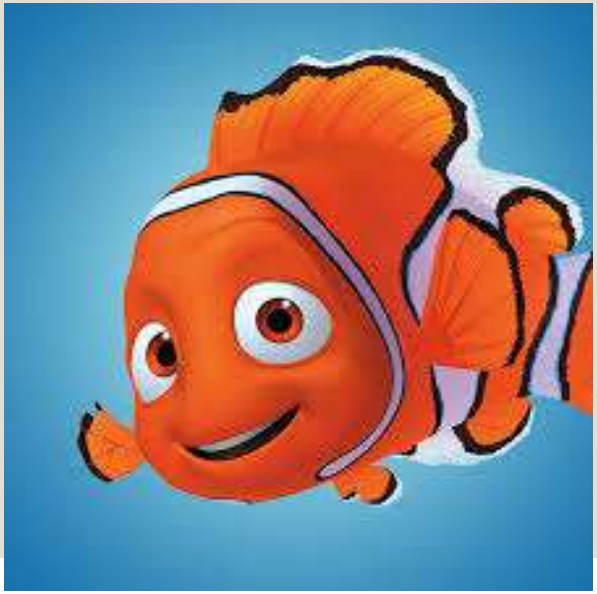


Figure 6.14
Environmental Science

Mutualism

- A type of interspecific interaction where both species benefit.
- "The feeling is mutual…."

- In exchange for getting food→ fish clean the anemones



Commensalism

- A relationship in which one species benefits but the other is neither harmed nor helped.
- Examples:
  - Birds using tress as perches/nests.
  - Fish using Coral Reefs as places to hide from predators.

Warm Up Populations Topic III 3/10

Obj. TSW participate in review activities to review for Topic III (CH 6, 7) in order to prepare them for the Semester Midterm on Friday, pg. 74

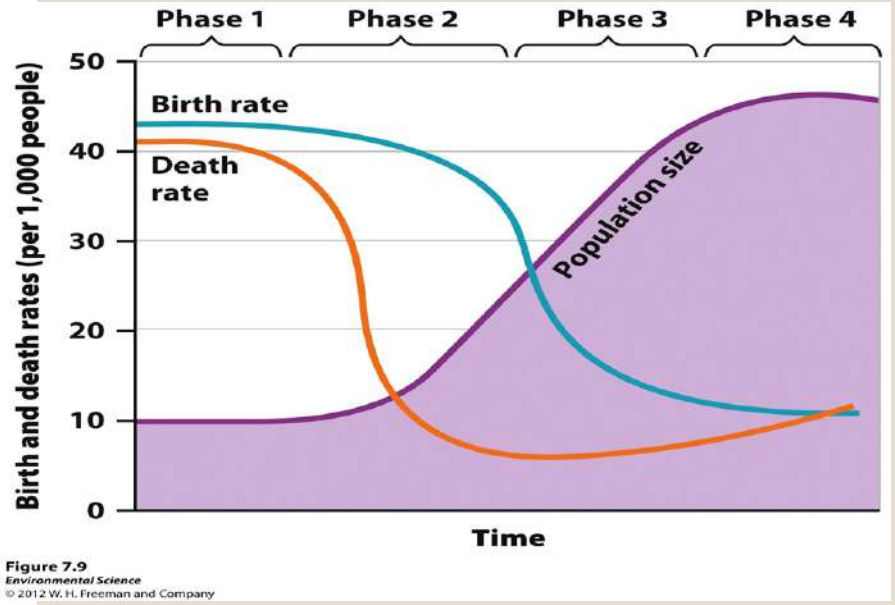


Figure 7.9
Environmental Science

1. Draw the Demographic Transition graph. Label the Stages, and describe countries with an explanation of how & why the growth is predictable.
2. Relate the Survivorship curves to the Reproductive strategies.
3. Draw and ID the Age structure graphs include countries, and characteristics.

Demographic Transition Graph

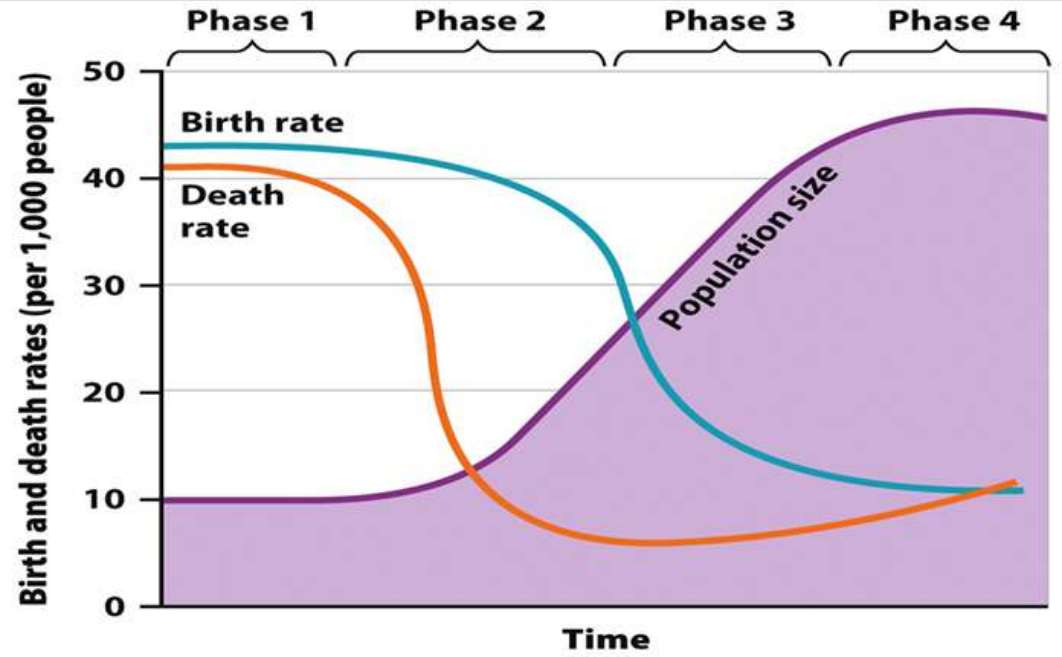


Figure 7.9
Environmental Science

Survivorship Curves

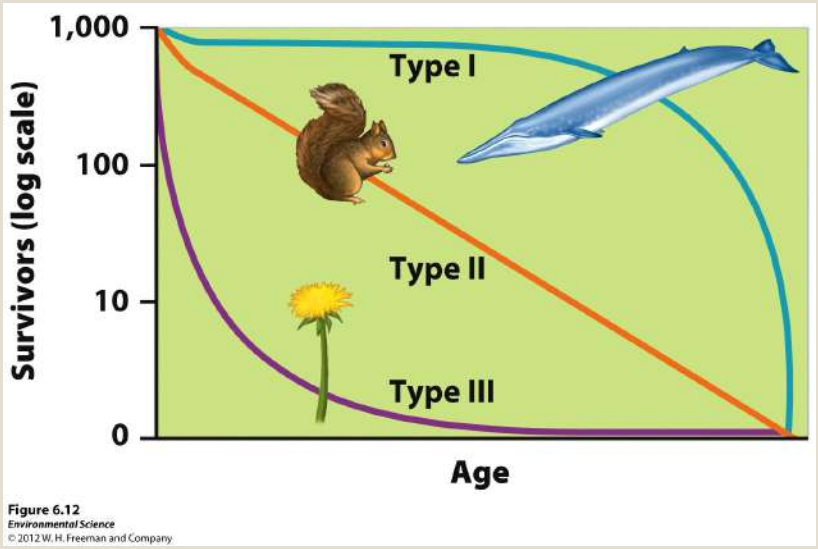


Figure 6.12
Environmental Science

Type I survivorship – Has excellent survivorship until old age. **K – selected species.**

Type II survivorship – Exhibiting a relatively constant decline in survivorship over time.

Type III survivorship – Has low rates of survivorship early in life. **r-selected species**

Age Structure Graphs

- (a) India (2)= (Developing countries) Pyramid shape= **Growing populations**, more births than deaths
- (b) US (3) = Rectangular shape= **Stable**, similar number of individuals in each age group, deaths and births equal each other, slow population growth
- (c) Germany (4)= **Declining populations**, Narrower at the bottom than at the top, more deaths than births
- (d) China**= Early stages of a declining population**→ pop. control

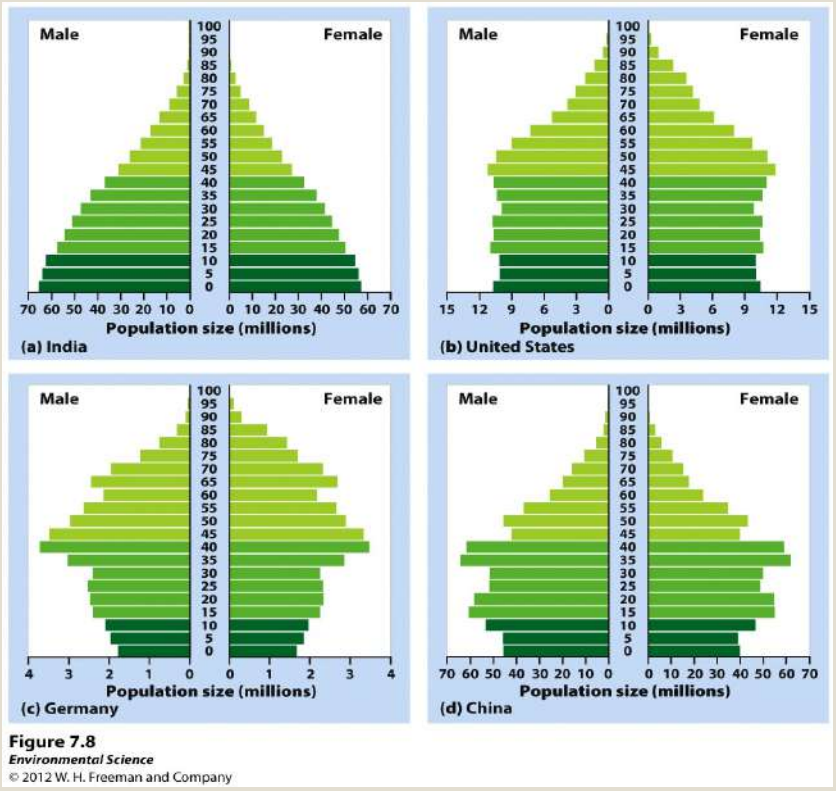


Figure 7.8
Environmental Science

3/15 Eutrophication & Cycles in Nature Topic II Obj. TSW demonstrate how molecules of Nitrogen cycle through the biotic and Abiotic factors in an ecosystem P.80

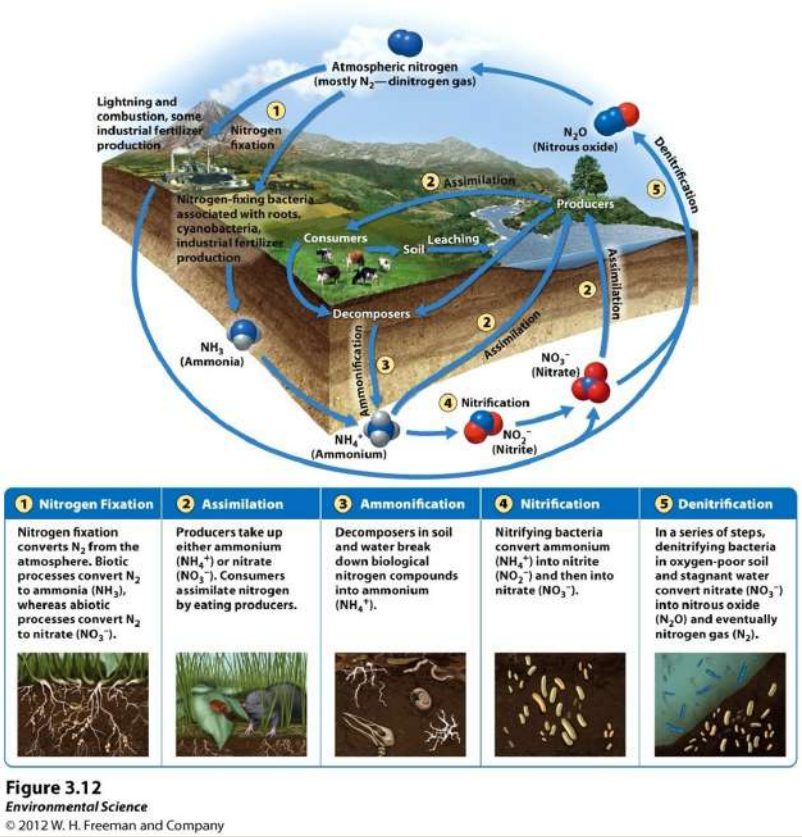
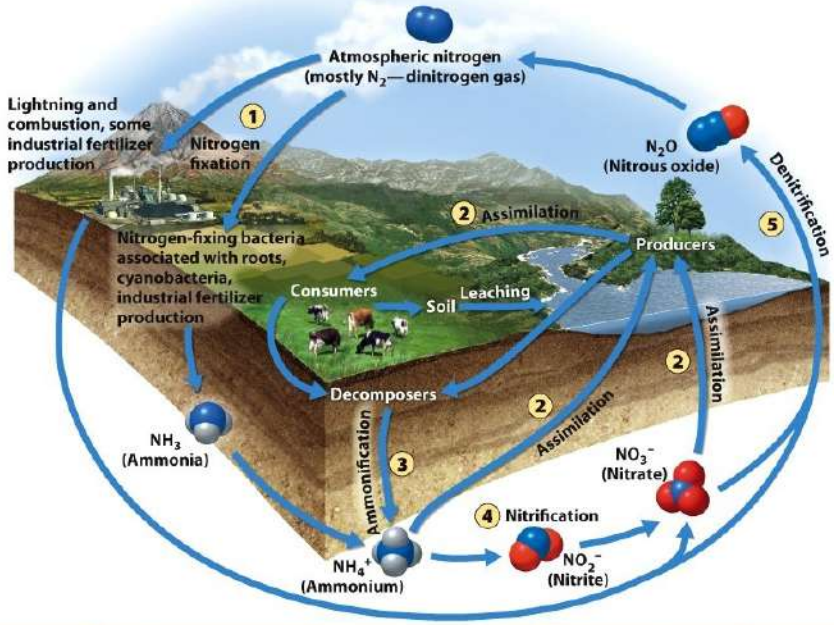


Figure 3.12
Environmental Science

1. Write the five processes of the Nitrogen cycle. Explain how bacteria is part of the cycle.
2. Explain the process of Eutrophication, ID the nutrients involved.
3. Discuss two ways Eutrophication happens, and offer two solutions.

The Nitrogen Cycle



1 Nitrogen Fixation	2 Assimilation	3 Ammonification	4 Nitrification	5 Denitrification
Nitrogen fixation converts N_2 from the atmosphere. Biotic processes convert N_2 to ammonia (NH_3), whereas abiotic processes convert N_2 to nitrate (NO_3^-).	Producers take up either ammonium (NH_4^+) or nitrate (NO_3^-). Consumers assimilate nitrogen by eating producers.	Decomposers in soil and water break down biological nitrogen compounds into ammonium (NH_4^+).	Nitrifying bacteria convert ammonium (NH_4^+) into nitrite (NO_2^-) and then into nitrate (NO_3^-).	In a series of steps, denitrifying bacteria in oxygen-poor soil and stagnant water convert nitrate (NO_3^-) into nitrous oxide (N_2O) and eventually nitrogen gas (N_2).
				

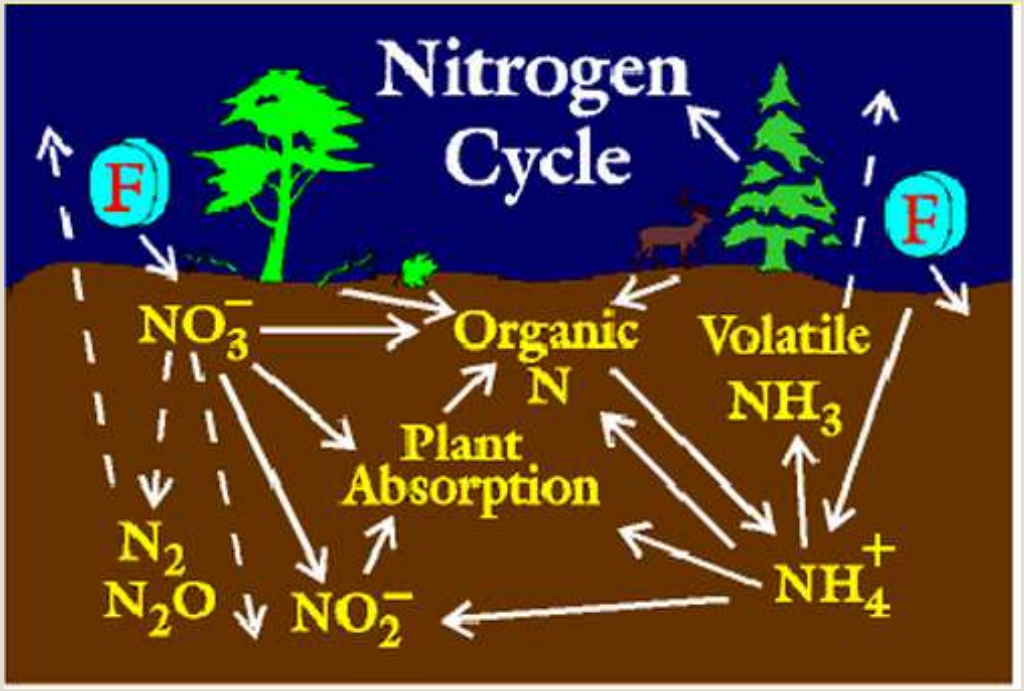
Figure 3.12
Environmental Science

PROCESS	PRODUCT
Fix – Nitrogen Fixation	**A**mmonia
Nitrification	**N**itrates
Assimilation	**P**roteins
Ammonification	**A**mmonia
Denitrification	**N**itrogen

Why should I care?

- N_2 found in several locations (reservoirs)
- Most prevalent in sediments, rocks then atmosphere
- Nitrogen is important to life
  - Key part of what goes in to creating amino and nucleic acids
  - Important part of ATP, basic energy molecule for living things

- Cycle within the Biosphere:
  - Atmosphere
  - Hydrosphere
- Lithosphere
- Involves five major steps:



Nitrogen Fixation
N_2, NH_4^+, NO_3^-

- Neither plants or animals can obtain nitrogen directly from the atmosphere
- Key players:
  - Known as nitrogen-fixing bacteria
  - Legumes and Symbiotic Bacteria
- Bacteria convert nitrogen to Ammonia or Nitrate
  - Fix nitrogen through metabolic process
  - Plants can then take up that ammonia
  - Fertilizers → N2 can be converted to forms that plants can use

Assimilation NH_4^+, NO_3^-

- Producers take up:
  - Ammonium (NH_4^+)
  - Nitrate (NO_3^-)
- Consumers take up:
  - Nitrogen by eating producers

Ammonification NH_4^+

- Decomposers (bacteria/fungi) in soil and water:
  - Break down organic form of nitrogen into ammonium
  - Can be used by plants

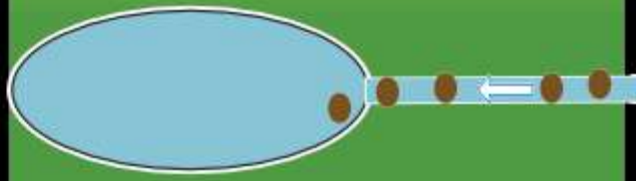
Nitrification
NH_4, NO_3

- Ammonium → Nitrite→ Nitrate
- After nitrogen has been fixed:
  - Other bacteria convert it into nitrate
  - Nitrate is consumed by the plants
  - Oxygen is needed→ takes place on top layers of soil and flowing water

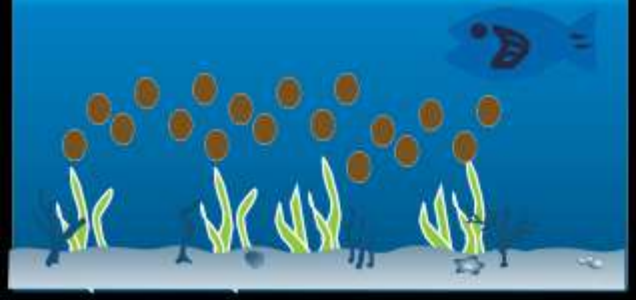
First, the fertiliser is spread on the land.

Then it gets washed away by the rain and absorbed into the soil.

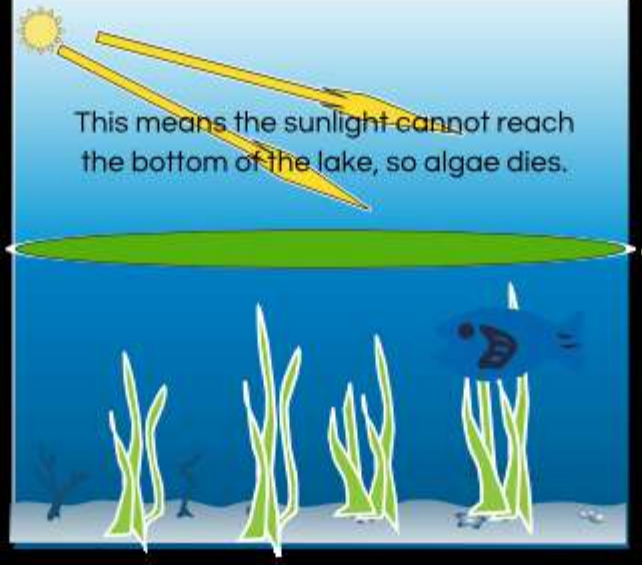
Then the fertilser is transported to a lake by an underground river.



The fertiliser causes overgrowth of aquatic plants and algae in the lake.

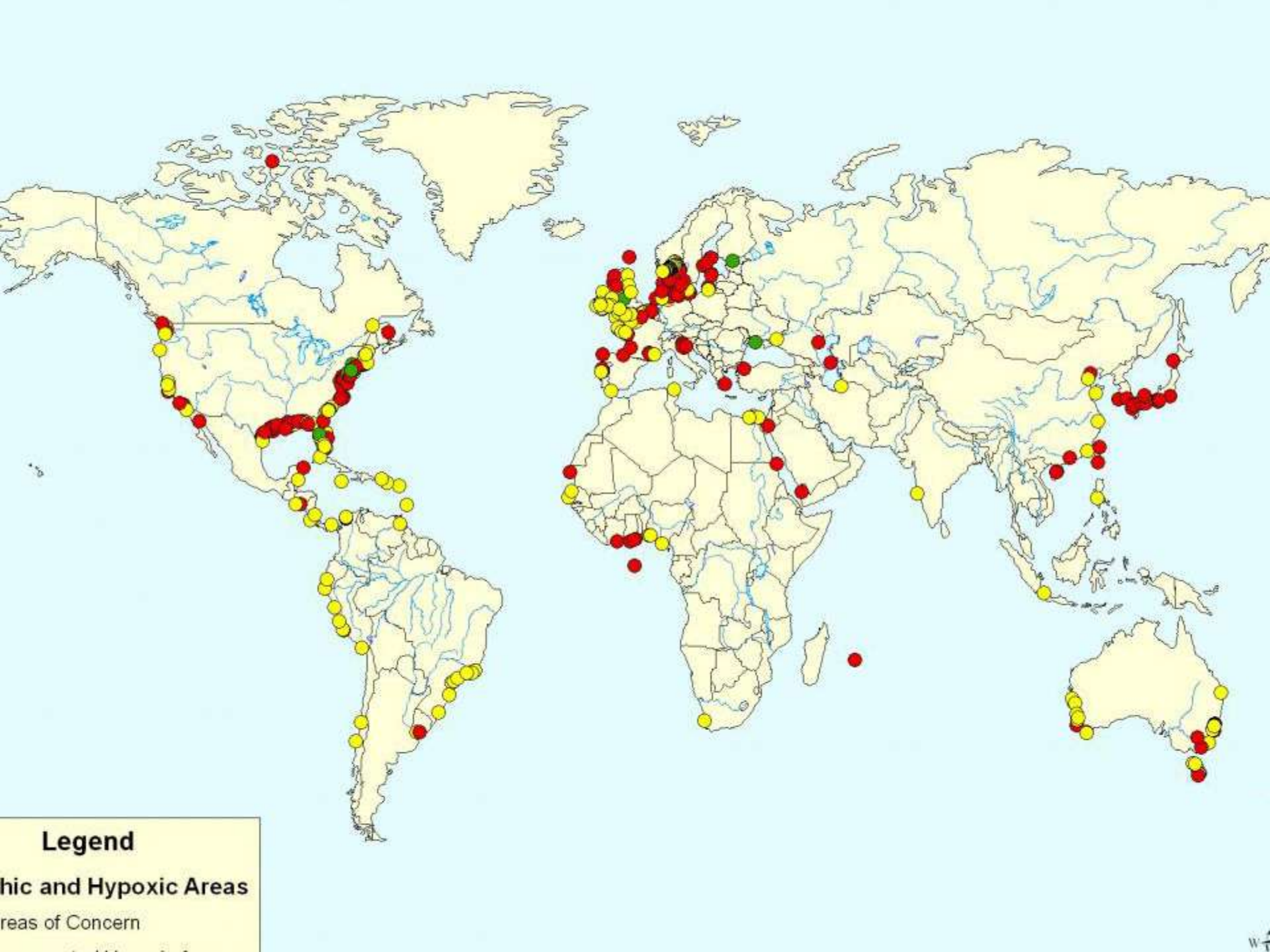


This means the sunlight cannot reach the bottom of the lake, so algae dies.



The bacteria decomposes the algae, taking up all the oxygen, making the lake anoxic.

This causes other organisms in the lake to die.


Legend
hic and Hypoxic Areas
reas of Concern

3/16 Ocean Acidification & Cycles in Nature Topic II Obj. TSW demonstrate the molecules of Carbon cycle throught the biotic and abiotic factors in an ecosystem p.82

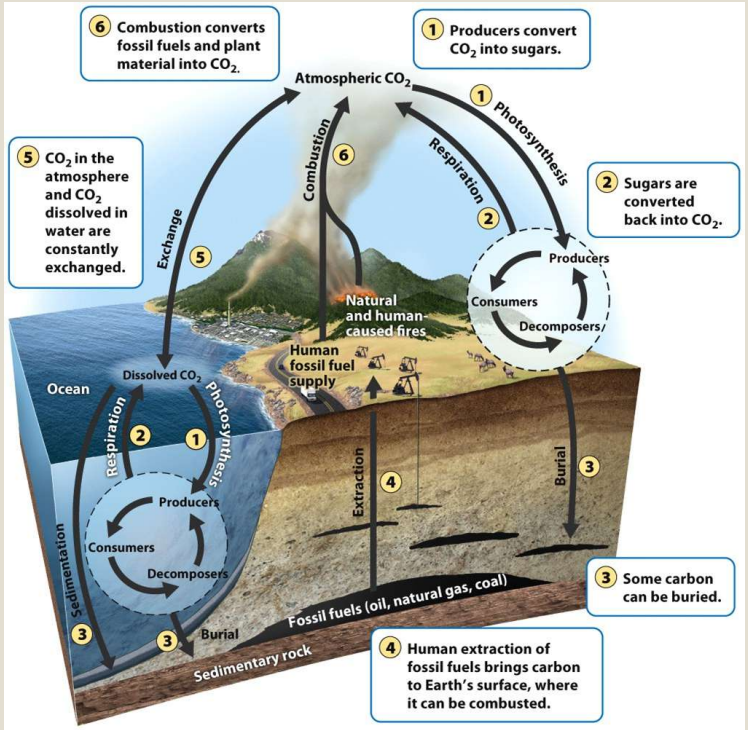
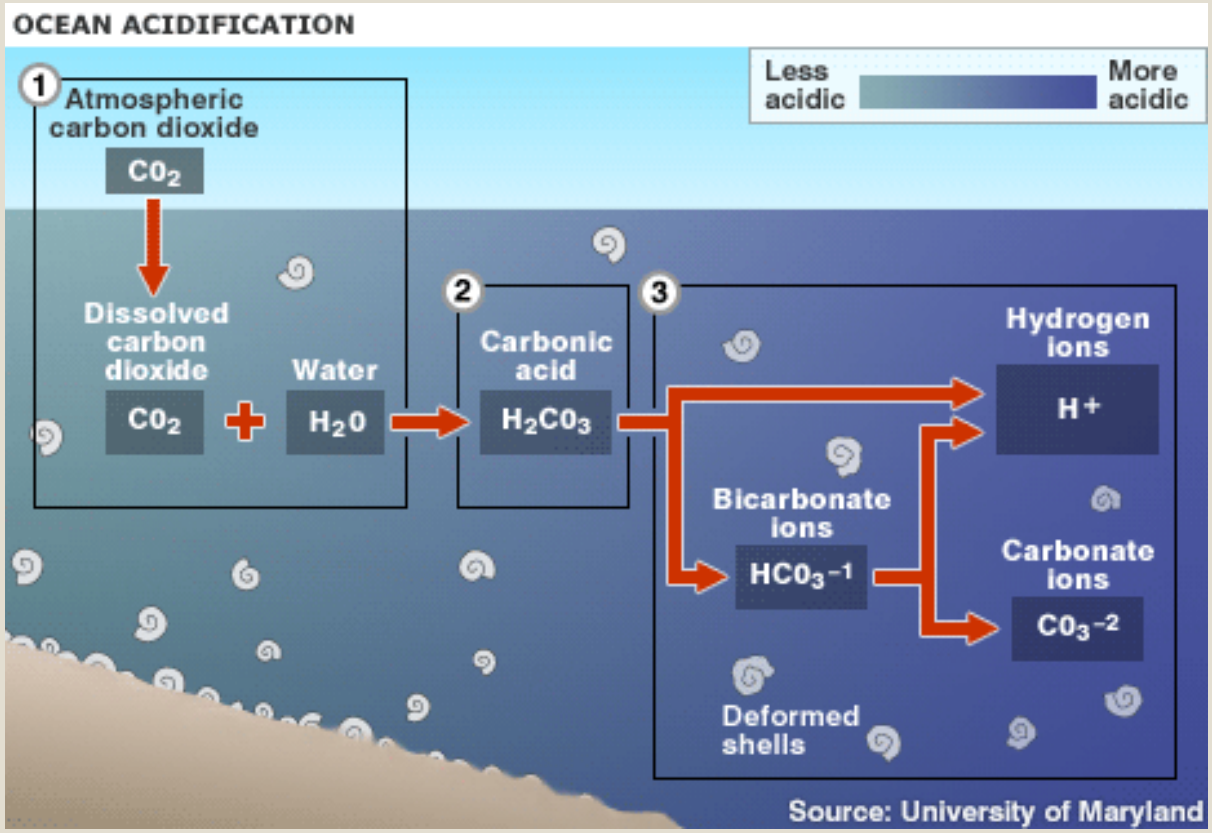


Figure 3.11
Environmental Science

1. Explain how the Carbon Cycle is related to Acid Oceanification.
2. ID the 6 processes of the Carbon Cycle.
3. Explain how carbon is cycled through those 6 processes.

The Chemistry of Ocean Acidification p. 53 NB



(1) CO2 reacts with H2O to **produce Carbonic Acid (H2CO3)**

-Releases (+) charged **Hydrogen Ions (H+)**

(2) Extra ions= cause problems!

-Bind with **dissolved carbonate ions (CO_3^{-2})** to form **bicarbonate (HCO_3^{-1})**

-Fewer free **carbonate ions**= Organisms cannot build shells and skeletons

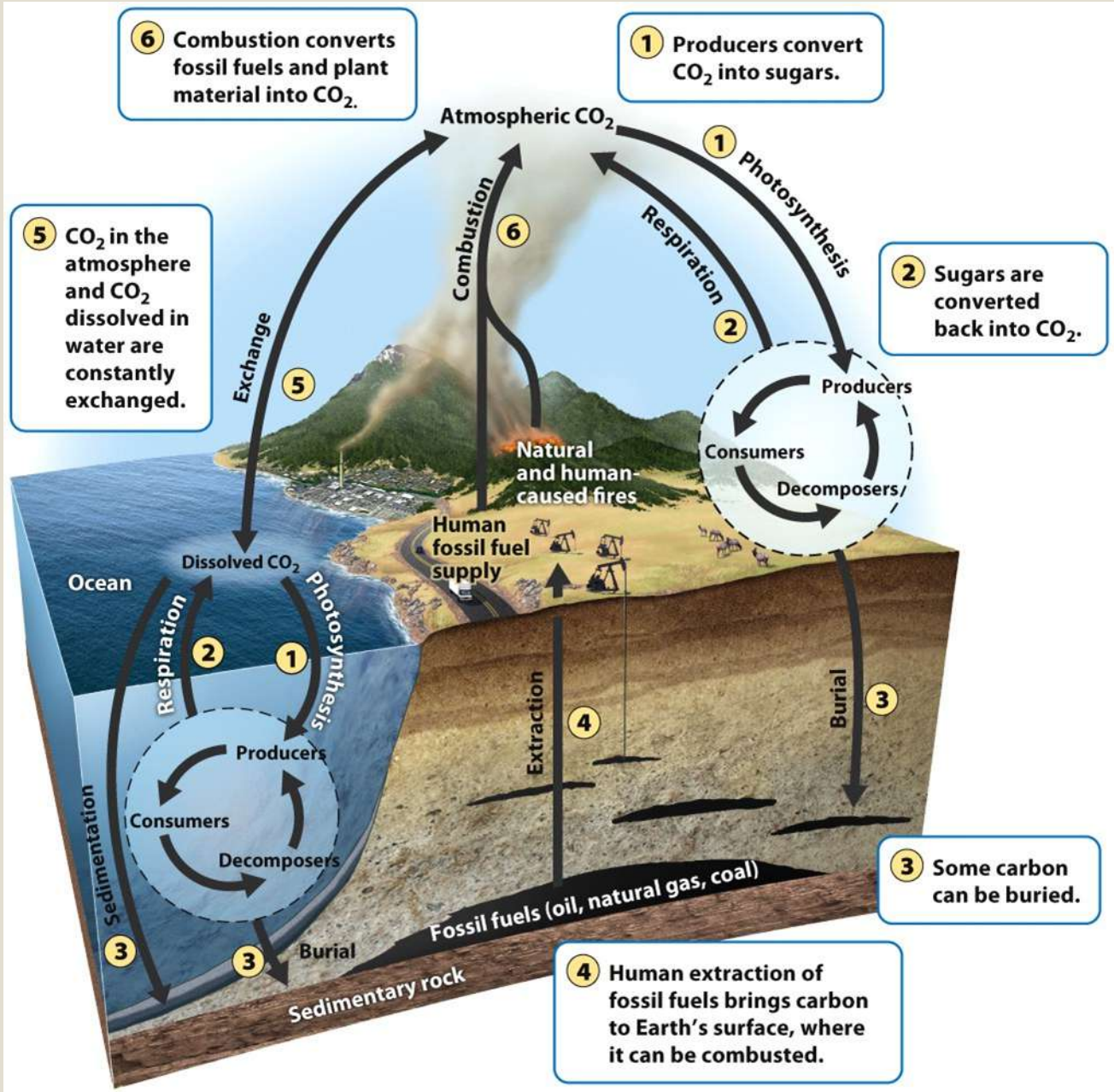


Figure 3.11
Environmental Science

The Chemistry of Ocean Acidification

When CO2 is added to seawater, it undergoes an acid-base reaction

- Increase in hydrogen ions in to the water
- Lowering the pH of the seawater.
- Most pH change happens in shallower surface waters.

$$CO_2 + H_2O \quad H_2CO_3 \quad H^+ + HCO_3^-$$

$\longleftrightarrow$ $\longleftrightarrow$