**Topic Review Guide**: Ecosystems (Videos 19-21)

**To Think About**: How do living things use energy and matter to survive in an ecosystem? In what ways do interactions between and within populations influence the amount of local and global ecosystem changes over time? What role does the environment play in sustaining homeostasis in biological systems? What are the consequences of human actions on both local and global ecosystems? In what ways do communities interact within their environments that result in the movement of matter and energy?

**Watch:**

**First:** [Mr. Andersen’s “Environmental Matter Exchange” Video](http://viewpure.com/9b_95wj3wyg)

**Then**: [Mr. Andersen’s “Biogeochemical Cycling” Video](http://viewpure.com/09_sWPxQymA)

**Last**: [Mr. Andersen’s “Ecosystem Change” Video](http://viewpure.com/8976iKm3fYI)

**Read:** Chapter 46, Hillis, Principles of Life, 1st edition (2012).

**Supplementary Resources**: Click the links below for more information to help you learn more about this lesson.

* Kimball’s Biology Pages: [Carbon Cycle](http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/C/CarbonCycle.html)
* Kimball’s Biology Pages: [Nitrogen Cycle](http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/N/NitrogenCycle.html)
* Discover Biology (Sumanas, Inc. animations): [The Phosphorus Cycle](http://www.sumanasinc.com/webcontent/animations/content/phosphorouscycle.html)
* University of California-San Diego: [Greenhouse Effect and Global Warming](http://earthguide.ucsd.edu/earthguide/diagrams/greenhouse/)
* University of California-San Diego: [Lake Eutrophication](http://uccpbank.k12hsn.org/courses/APEnvironmentalScience/course%20files/multimedia/lesson78/animations/5a_Lake_Eutrophication.html)
* Lab Bench: [Primary Productivity](http://www.phschool.com/science/biology_place/labbench/lab12/primary.html)
* McGraw-Hill: [Biological Magnification](http://www.mhhe.com/biosci/esp/2001_gbio/folder_structure/ec/m3/s4/index.htm)

**Listen and Look**: Here is a list of key terms and concepts you will hear about and see during these podcasts and chapter readings. Get to know them! Be able to connect them to one another using a concept map.

**KEY TERMS**

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| Primary productivity | Producers  | Consumers | Biogeochemical cycles |
| Detritivores | Biomass | Limiting nutrient  | Eutrophication  |
| CHNOPS | Nitrogen fixation  | Pyramid of biomass | Pyramid of numbers  |
| Greenhouse effect | Proteins  | Carbohydrates | Nucleic acids  |
| Lipids  | Dead zones  |  |  |

**Recall and Review:** Use the lecture in the video and your textbook reading to help you answer these questions in your BILL.

1. **Create** a graphic organizer that illustrates the relationships between the biogeochemical cycles and each of the biomolecules (carbohydrates, lipids, proteins, nucleic acids) necessary for life. **Describe** the relationship between the cycles and each of these molecules.
2. **Explain** what would happen to the balance of nutrients in an ecosystem and what the effect would be if the following events occurred:
	1. Nitrate-rich fertilizer runoff accumulated in a river or lake
	2. A large quantity of fish were killed due to a [red tide](http://serc.carleton.edu/microbelife/topics/redtide/index.html) that occurred
	3. A coal-burning power plant is built on the outskirts of town
3. It is said that energy flows through ecosystems, while matter is recycled.  **Describe** how the relationships demonstrated in food webs illustrate this idea.
4. **Describe** what your local ecosystem would look like if there were no decomposers. **Explain** how the absence of decomposers would alter the populations of:
	1. The producers
	2. The consumers
5. **Explain** why the accumulation of toxins is greatest at the highest levels of a food web and what effect this has on lower levels of the food web.



1. Using the food web shown above, **explain** what would happen if:
	1. The krill were overfished by humans
	2. The elephant seal population was hunted to near extinction
	3. The population of carnivorous zooplankton experienced a boom
	4. The penguins were struck by a virus that killed half the population
2. **Explain** how the cycling of water is important to the cycling of other materials that are essential for terrestrial and aquatic ecosystems.
3. **Describe** why nitrogen often a limiting nutrient for plant growth, even though it comprises over 70% of the gas in our atmosphere.
4. **Explain** how the warming of the atmosphere acts as a positive feedback loop, and how this affects the world’s ecosystems.
5. **Describe** how global warming has influenced ecosystem richness and biodiversity.

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| Learn More: For more information about ecosystems and the things that affect them, use the links below: * McGraw-Hill: [Self-Quiz over Ecosystems](http://highered.mcgraw-hill.com/sites/0072421975/student_view0/chapter34/multiple_choice_quiz.html)
* Victorian Resources Online: [Nitrogen Cycle](http://vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/soilhealth_nitrogen-cycle)
* University of California: [Phosphorus Cycle](http://uccpbank.k12hsn.org/courses/APEnvironmentalScience/course%20files/multimedia/lesson10/animations/2b_phosphorus_cycle.html)
* Science Daily: [Feeling Hot, Hot, Hot: Climate Shapes Distribution and Movement of Humans as it Does Other Animals](http://www.sciencedaily.com/releases/2012/10/121024175359.htm)
* Harcourt School: [Pyramids of Energy Animations](http://www.harcourtschool.com/activity/science_up_close/314/deploy/interface.html)
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