Biology 20-1: Energy and Matter Exchange in the Biosphere

Our Unit Questions

- How are carbon, oxygen, nitrogen and phosphorus cycled in the biosphere?
- How is the flow of energy balanced in the biosphere?
- How have human activities and technological advances affected the balance of energy and matter in the biosphere?

General Learning Outcome: Students will understand the constant flow of energy through the biosphere and ecosystems.			
Unit Goals: Curricular Language		**Student Friendly Language**	
Knowledge	**20–A1.1k** Students will: explain, in general terms, the one-way flow of energy through the biosphere and how stored energy in the **biosphere**, as a system, is eventually "lost" as heat	**Knowledge**	I know how energy is used in a biosphere (stored, transferred, lost)
	20–A1.2k Students will: explain how energy in the biosphere can be perceived as a balance between both photosynthetic and chemosynthetic activities and cellular respiratory activities		I know that energy in different biospheres is balanced and cycles I know how biospheres are interconnected
	20–A1.3k Students will explain the structure of ecosystem trophic levels, using models such as food chains and food webs		I know what an ecosystem is and how it is organized
	20–A1.4k Students will explain, quantitatively, the flow of energy and the exchange of matter in aquatic and terrestrial ecosystems, using models such as pyramids of numbers, biomass and energy		I know how energy moves in an ecosystem I know how to represent the movement of energy in ecosystems using a model
STS	**20–A1.1sts** Students will: explain that the process of scientific investigation includes analyzing evidence and providing explanations based upon scientific theories and concepts	**STS**	I can connect what I am learning about biospheres to real life examples and events
Specific Outcomes for Skills	**Initiating and Planning** **20–A1.1s** Students will: formulate questions about observed relationships and plan investigations of questions, ideas, problems, and issues	**Specific Outcomes for Skills**	I can **initiate** and **plan** by: • by asking questions about what I observe in my environment • by making predicting based on what I observe
	Performing and Recording **20–A1.2s** Students will: conduct investigations into relationships among observable variables and use a broad range of tools and techniques to gather and record data and information perform an experiment		I can **investigate** and **record my observations** by: • using different tools and techniques to gather data • complete an experiment
	Analyzing and Interpreting **20–A1.3s** Students will: analyze data and apply mathematical and conceptual models to develop and assess possible solutions		I can **analyze** and **interpret** by: • looking for patterns in my data to help me understand what is happening • connecting my data to other scenarios and contexts • coming up with some possible solutions or explanations for what is happening • organizing and displaying my data in ways that make sense to me
	Communication **20–A1.4s** Students will: work collaboratively in addressing problems and apply the skills and conventions of science in communicating information and ideas and in assessing results		I can **communicate** my findings by: • using SI units and Sig Digs • presenting my findings so it makes sense to others (modes representation)
Attitudes		**Attitudes**	