Annotated Resource List

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Grades 9-12 Biology & Chemistry

Introduction:

This is the second school year that my district is implementing the Pre-AP Biology curriculum (grades 9-10) from the College Board. This list focuses on our first unit (Ecology). I wanted to find as many resources as possible so that I could begin infusing them into the curriculum sooner rather than later. This unit spans from September to late November. After previewing both the June and August Regents examinations, I now realize that all the spheres should be covered in this unit (according to the NYS Performance Expectations). There was one free-response question on the June exam that asks students to recall ocean acidification, the chemistry behind the process, and use models to describe how carbon is cycled between the biosphere and one other sphere. I chose to center this list primarily around this question since I teach both biology and chemistry and appreciated the interdisciplinary nature of the writing prompt. I did use the annotated resources list provided on the course website to help guide my research.

1.

Title of the resource	Cascades Volcano Observatory
Web Link	https://www.usgs.gov/observatories/cvo
Course and topic	Pre-AP Biology, Ecology—Ecological Succession
3-5 sentence description of the resource	(Biosphere, Lithosphere) This website provides useful information to the public on how to live knowledgeably in areas with well-known volcanoes along the Pacific coast. According to the Cascades Volcano Observatory, “approximately 350 earthquakes have been located at Mount St. Helens by the Pacific Northwest Seismic Network [since February 1, 2024). Over 95% of the earthquakes have been less than magnitude 1.0 and are too small to be felt at the surface.” (USGS, 2024)
3-5 sentences describing how it can be used in a lesson	When teaching about ecological succession, I usually introduce the concept with a video clip of Mount St. Helens and have students discuss the types of life they saw before the disaster before they predict what the aftermath of the disaster would lead to. Students can collaborate as they work through pioneer species all the way up to the most stable climax communities. After completing this activity, I would have students visit this link to an article about detecting small magnitude earthquakes at Mount Rainer.

	They would examine the data provided (magnitude, events per hour, and depth below sea level). Half of the group would research the types of life they would expect to see on land and the other half would research the types of life they would expect to see in the water. They would need to predict the chain of events that would occur in order to reach climax community once again while referencing the type of organisms they researched.
Modifications needed to use this resource in teaching	Perhaps provide students who need the article printed with a paper version.
Other information	https://www.usgs.gov/observatories/cvo/news/monitoring-stations-detect-small-magnitude-earthquakes-mount-rainier-during

2.

Title of the resource	NASA Ames Earth Science Missions List—Viper Mission
Web Link	https://science.nasa.gov/mission/viper/
Course and topic	Pre-AP Biology, Ecology—Characteristics of Life
3-5 sentence description of the resource	(Atmosphere, Biosphere, Hydrosphere, Lithosphere) A NASA mission in which a mobile robot visited the south pole of the Moon. The goal is to teach us about the origin and distribution of water on the Moon that could potentially lead to successful human habitation. We now know that the ice is located at the lunar poles.
3-5 sentences describing how it can be used in a lesson	I would have students try to compare the Moon's landscape with that of Earth. Seeing as we are trying to find another planet to colonize, I would want the students to discuss what is necessary for all living things to thrive. I would begin with presenting the phenomenon—limited space on Earth and the VIPER mission. Give students a card sort activity—classifying items as either biotic or abiotic and then asking them to identify what all the living items need to survive.
Modifications needed to use this resource in teaching	More as an extension activity/project, I could have students follow an engineering design protocol to determine an appropriate solution for powering a moon colony followed by a CER prompt. Students would need to be given constraints for designing their power generator (their power source).
Other information	Inspiration Resource: https://www.teachengineering.org/activities/view/cub_space8_lesson02_activity1

3.

Title of the resource	NOAA—Ocean Acidification Data
Web Link	https://oceanacidification.noaa.gov/ocean-acidification-data/
Course and topic	Pre-AP Biology, Ecology—Human Impact

3-5 sentence description of the resource	(Atmosphere and Hydrosphere) The National Marine Ecosystem Status website was created to provide the status of eight US ecosystem regions. The health status of the US ocean, Great Lakes, and coastal ecosystems can be monitored ultimately keeping us informed regarding food, jobs, security, and overall wellbeing.
3-5 sentences describing how it can be used in a lesson	Students would be provided with a reading on the Kelp Forest System describing how sea otters help to maintain the carbon balance in their ecosystem which keeps sea urchin populations in check. I would then assign each group of four students one of the geographical areas listed on the website (i.e. Aleutian Islands, Beaufort Sea, California Current, Caribbean, Eastern Bering Sea, Gulf of Alaska, Gulf of America). Students would read the descriptions and analyze the data on sea surface carbon dioxide concentrations, sea surface pH, and sea surface omega aragonite. Students would need to provide a CER formatted response for the following prompt: "If these trends in atmospheric carbon dioxide and pH continue, sea urchin populations may be impacted. Describe evidence from the graphs that supports this claim."
Modifications needed to use this resource in teaching	I would need to provide context for what omega aragonite is and how it relates to the sea urchins. Perhaps conduct a mini lesson on important elements that are needed for the human body to maintain homeostasis before relating back to sea urchins and their calcium carbonate shells.
Other information	

4.

Title of the resource	US Climate Resilience Toolkit—Coral Reef Watch
Web Link	https://toolkit.climate.gov/tool/coral-reef-watch
Course and topic	Pre-AP Biology, Ecology—Human Impact
3-5 sentence description of the resource	(Atmosphere, Hydrosphere) The toolkit provides its reader with information on climate risk and then discover ways to address it. Several different types of people use the toolkit, including conservation groups and climate service practitioners. The resource provides climate data that can be accessed to help build resilience.
3-5 sentences describing how it can be used in a lesson	This site provides access to several case studies. One that stood out to me was A Coral Bleaching Story With an Unknown Ending. I though that students could read and annotate the case study. Ocean conditions are changing, and the locals are fighting to protect these delicate ecosystems. I would like to have students access the Coral Reef Watch tool as well as have them read the Corals as Climate Recorders article. Lastly, I would have them apply

	this knowledge to a CER question, like one that appeared on the June Regents exam which bridges biology and chemistry discussing calcium carbonate exoskeleton shells becoming less resilient due to ocean temperatures rising.
Modifications needed to use this resource in teaching	Perhaps provide students who need the article printed with a paper version.
Other information	https://toolkit.climate.gov/case-study/coral-bleaching-story-unknown-ending https://toolkit.climate.gov/sites/default/files/2025-06/Corals-as-Climate-Recorders-Factsheet.pdf

5.

Title of the resource	HHMI Earth Viewer
Web Link	https://media.hhmi.org/biointeractive/earthviewer_web/earthviewer.html
Course and topic	Pre-AP Biology, Ecology—Carbon Cycle
3-5 sentence description of the resource	(Atmosphere, Lithosphere) This site offers several views of Earth including Ice Age, Paleo, Ancient, and Warming Earth. A timeline is provided as well as atmospheric concentrations of carbon dioxide and oxygen. Teachers are provided with access to models and bits of content-based information that could be used alongside each view of Earth.
3-5 sentences describing how it can be used in a lesson	I would have students access the Warming Earth view. Students can access the window on the geologic carbon cycle and think back to the rock cycle and make connections. After reading about greenhouse gases, they could then discuss the trends in both carbon dioxide and oxygen concentrations over the course of the last century. I would like to provide students with a CER prompt asking them the following: "Using provided temperature data and information on greenhouse gases, explain what is causing Earth's global temperature to rise."
Modifications needed to use this resource in teaching	Due to the fact that the provided data only spans to the year 2012, I may need to find a more current resource that can provide students with the data they are missing.
Other information	

6.

Title of the resource	Earth Observatory
Web Link	https://earthobservatory.nasa.gov/
Course and topic	Pre-AP Biology, Ecology—Human Impact

3-5 sentence description of the resource	(Atmosphere, Biosphere, Lithosphere) An interactive website that provides scientific information and satellite imaging to the public. There are stories about Earth's climate and environmental changes. The viewer can analyze several global maps taken from NASA's Earth observing satellite offering real-time and current data.
3-5 sentences describing how it can be used in a lesson	I would use these maps before teaching photosynthesis. Students would analyze both maps (Total Rainfall & Chlorophyll) and try to determine their trend. Students would use this information to determine the inputs and outputs of photosynthesis. I would then introduce harmful algal blooms and the relationship between phytoplankton and ocean surface temperature.
Modifications needed to use this resource in teaching	I found this lesson that I would like to modify seeing as it is geared towards middle school level. If you scroll to the very bottom, there are satellite images of the Mississippi River Delta and the Yangtze River. I like how these images incorporate early civilizations that my students would have learned in their Global Studies classes. Perhaps see if an interdisciplinary lesson could be created with the social studies department? https://coralreefwatch.noaa.gov/satellite/education/docs/3_Phytoplankton_Ocean_Color.pdf
Other information	https://earthobservatory.nasa.gov/global-maps/GPM_3IMERGM/MY1DMM_CHLORA