

Teacher Notes for the Hudson River as an Ecosystem PowerPoint

Slide #	Notes	Additional Notes
1	Photo courtesy of Kali Bird (Cary Institute).	
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3	<p>Ecosystem: a biological community and its physical environment</p> <p>Biological community is made up of the living things</p> <p>For example: all the living organisms in a pond—the phytoplankton, cattails, fish, frogs, dragonflies, etc.</p> <p>Physical community is the non-living component</p> <p>For example: sunlight, which the plants depend on for photosynthesis</p> <p>Water, minerals, air</p>	
4	In the picture, we see several ecosystems within this portion of the Hudson River watershed—forest ecosystems and the river ecosystem (as well as the pond ecosystem now covered by the graphic).	
5	Ecosystem ecologists have to define the size of the ecosystem they are working on, as well as measure the inputs and outputs, rate of cycling, pools and fluxes.	
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8	You may want to view the watershed module from http://www.meted.ucar.edu/broadcastmet/watershed/ to help students visualize a watershed. Registration is required, but registration and the resources are free.	
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12	The salt front is where the last measureable amount of salt is found in the river on any given day. It depends on tides, currents, wind, and rainfall.	
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14	<p>Ecologists like to talk about the productivity of ecosystems, that is, the amount of solar energy that is stored in living organisms. Some ecosystems are more efficient at storing energy than others. Because primary producers make oxygen and consume carbon dioxide, we can estimate primary production by measuring the amount of oxygen that is produced (or carbon dioxide that is consumed) in a bottle or in a section of the river. Alternatively, we can add a little carbon-14 (^{14}C), which is radioactive, to a bottle of water, and measure the amount of radioactivity that is picked up by phytoplankton. Secondary production by bacteria is also estimated by measuring the uptake of radioactive nucleic acids or amino acids.</p>	

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16	Primary producers: algae	
17	Primary producers: aquatic macrophytes (i.e. plants that live in the river); Left: cattails; top-right: water chestnut (invasive); lower-left: water celery (native)	
18	Consumers: Zooplankton like rotifers and the cladoceran <i>Bosmina</i> , consume primary production, in creating biomass (themselves), they contribute to the ecosystem's secondary production.	
19	Consumers	
20	Consumers	
21	Consumers	
22	River flow: too much water Light: not enough, and they can't grow Predators: grazers Every part of the food web will have different controls	
23	The Hudson River is very turbid from all of the sediments that are sloshed around, remaining suspended in it, so light does not penetrate very far into the water. Ask: How might the availability of light in the river affect the plants and animals?	
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26	...which might look something like this in the Hudson River (...though remind the students that really, it's a food web, not a food chain!) Ask: Energy is always conserved; so what happens to the energy after the eagle uses it? (Answers: detritivores & scavengers consume/use it, heat is dissipated in the process.)	
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28	Decomposers also need energy Get it from nonliving organic matter—still energy in bonds Break down organic matter via cellular respiration Release energy, water and carbon dioxide Trophic levels: an organism's feeding position in an ecosystems For example: primary producer, primary consumer, secondary consumer	