

Chapter 7: Environmental Systems and Ecosystem Ecology

Vocabulary words to know:

Hypoxia	Feedback loop
Negative feedback	Positive feedback
Dynamic equilibrium	Homeostasis
Emergent properties	Atmosphere
Lithosphere	Hydrosphere
Biosphere	Ecosystem
Gross primary production	Net primary production and productivity
Nutrients	Landscape ecology
GIS	Biogeochemical cycles
Sulfur cycle	Residence time
Sinks	Reservoir
Carbon cycle	Nitrogen cycle
Phosphorous cycle	Hydrologic cycle
Sediment	Nitrogen fixation
Nitrification	Ammonification
Denitrofication	Nitrogen-fixing bacteria
Ammonium	Nitric oxide
Nitrogen dioxide	Nitric acid
Carbon dioxide	Runoff
Water table	Aquifer
Groundwater	Transpiration
Precipitation	Evaporation
Rock cycle	Igneous rock
Sedimentary rock	Metamorphic rock
Plate tectonics	Crust
Mantle	Core
Plate boundaries	Convergent
Transform	Convergent

The Gulf of Mexico's "Dead Zone"

1. What does the term hypoxia mean?
2. Fully oxygenated water contains how many parts per million (ppm)?
3. What happens at 2 ppm?
4. At 1.5 ppm?
5. When does the "dead zone" appear?
6. What has caused this "dead zone" at the mouth of the Mississippi?
7. What does this nutrient pollution come from?

Earth's Environmental Systems

8. What is a system?

9. What is a negative feedback loop?
10. What is a positive feedback loop?

11. How is population growth a positive feedback? Explain.

12. How is erosion a positive feedback? Explain.

13. When do positive feedback loops become common in natural systems?

14. What affect does the increase of nitrogen have on the growth of phytoplankton?

15. What happens as phytoplankton flourish in an aquatic system?

16. What happens when bacteria flourish?

17. What happens to oxygen levels in the water?

18. What happens to life that depends on oxygen in the water?

19. What is this process called?

Define the following:

20. Lithosphere?

21. Atmosphere?

22. Hydrosphere?

23. Biosphere?

Ecosystems

24. What happens to the matter that makes up organisms when they die and decay?

25. Where does energy input begin in most ecosystems?
26. What is gross primary production?
27. What is net primary production?
28. What is secondary production? Example?
29. An ecosystem has plants which convert energy very quickly into biomass is said to have?
30. Examples of such ecosystem with high net primary productivity
31. What are macronutrients? List examples.
32. Micronutrients? List examples.
33. Where is primary productivity greatest in oceans and why? (Look at Figure 7.7)
34. What are ecotones?
35. Read "Landscape-level Planning in the Sonoran Desert" on pages 186 - 187.
What problems arose due to the increase in human development in the area?
36. How was GIS used in planning?

Biogeochemical Cycles * YOU MUST LEARN THESE NUTRIENT CYCLES!

37. What is a pool?
38. What is residence time?
39. What is a sink?

Carbon Cycle* Make sure to check out Figure 7.12.

40. What organisms pull carbon out of the atmosphere?
41. What happens to the carbon in carbon dioxide in photosynthesis? Remember your equation?

42. What does that carbon get attached to in this process?
43. What happens to the glucose produced?
44. What processes returns the carbon in the glucose back to the atmosphere?
45. When organisms die and get buried under sediments (sedimentary rocks form from accumulated sediments and pressure) they become trapped. What is the largest reservoir of carbon?
46. How is this carbon in sediment returned to the atmosphere?
47. How does this carbon become fossil fuels - oil, coal, and natural gas?
48. What is the second largest reservoir of carbon?
49. How does carbon get into the ocean?
50. Where do carbonate and bicarbonate ions originate from?
51. The rate at which the ocean absorbs carbon depends on what factors?
52. What does combustion mean? What is released when you combust fossil fuels?
53. So that is one way in which humans add carbon dioxide to the atmosphere. Is the transfer of carbon dioxide out of the atmosphere back into the ocean and lithosphere keeping up pace?
54. Why is deforestation a problem in carbon dioxide input to the atmosphere?
55. Burning fields?
56. What is the "missing sink"?
57. What is the fear of using the "missing sink" for fossil fuels?

Phosphorus Cycle *Make sure to check out Figure 7.13.

58. Where is P found?
59. Where most of the earth's P found?
60. How is it released and into what?
61. How is it transported in the atmosphere? Is that gaseous?

62. Why is P often a limiting factor for plant growth?

63. In what form is P available to plants?

64. How do consumers pass P to soils?

65. How do humans influence the P cycle?

66. What do detergents have to do with P?

Nitrogen Cycle * Make sure to check out Figure 7.14.

67. What part of the atmosphere is nitrogen?

68. In what things do we find nitrogen?

69. Because it is inert what problem does that create in its cycling?

70. Where is the element scarce?

71. What happens when nitrogen gas is "fixed"?

72. What forms when it combines with hydrogen? Learn these!

73. How do plants take this nitrogen up?

74. What is nitrogen fixation?

75. In what 2 ways does nitrogen fixation occur?

76. What kinds of plants do nitrogen fixation?

77. What organism is accomplishing this change for the plant?

78. What kind of relationship is this?

79. What happens in nitrification?

80. Can plants use the nitrogen in this form? How do they get it?

81. Where do you get your nitrogen? What macromolecule do you need it for?

82. How do decomposers play a role here?
83. What is denitrification?
84. Where does that nitrogen end up?
85. Is this the start of the cycle again?
86. How has the Haber-Bosch process impacted the nitrogen input to natural systems?
87. What happens to nitrogen when we burn fossil fuels?
88. What does nitrogen react with in the atmosphere?
89. What molecule does this form?
90. What problem does it lead to?
91. What does this extra nitrogen do in aquatic systems to plants and algae?
92. What are some of the efforts being made to reduce the impact of excess nitrogen?

Hydrologic Cycle * Make sure to check out Figure 7.17.

93. Where is most water on the planet? %?
94. Fresh water?
95. What percent is readily usable? Hmmm!!!
96. You know what evaporation is ... but what is transpiration?
97. You know what precipitation is ... but what is runoff?
98. What is an aquifer?
99. What is groundwater?
100. What is the water table?

101. List four ways in which humans have impacted the water cycle.

Rock Cycle *Check out Figure 7.18.

102. How does the rock cycle occur?

103. Differentiate between the following:

Igneous rock -

Sedimentary rock -

Metamorphic rock -

Plate tectonics

104. What are plate tectonics?

105. Differentiate between divergent, transform, and convergent plate boundaries.

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106. What is subduction?