Name _____ Date _____

Exploring the Nitrogen Cycle

Part 1: During this activity you are a nitrogen atom, discovering the different locations that nitrogen exists in ecosystems. For each step along the journey, write down where you start, what happened to you, where you went, and the chemical formula. Each person in the class will follow a different route. Sometimes, you will get 'stuck' at a particular station and you will remain there for one turn. Write down everything that happens so that you have an accurate record of your journey.

The first line is an example.

Trip	Starting location	What happened?	Where you went:	Formula and name:
Ex	*Dead plants and animals*	*The wood burned and I was released into the atmosphere*	*Atmosphere*	*N_20* *Nitrous oxide*
1				
2				
3				
4				
5				
6				
7				
8				

KEY:

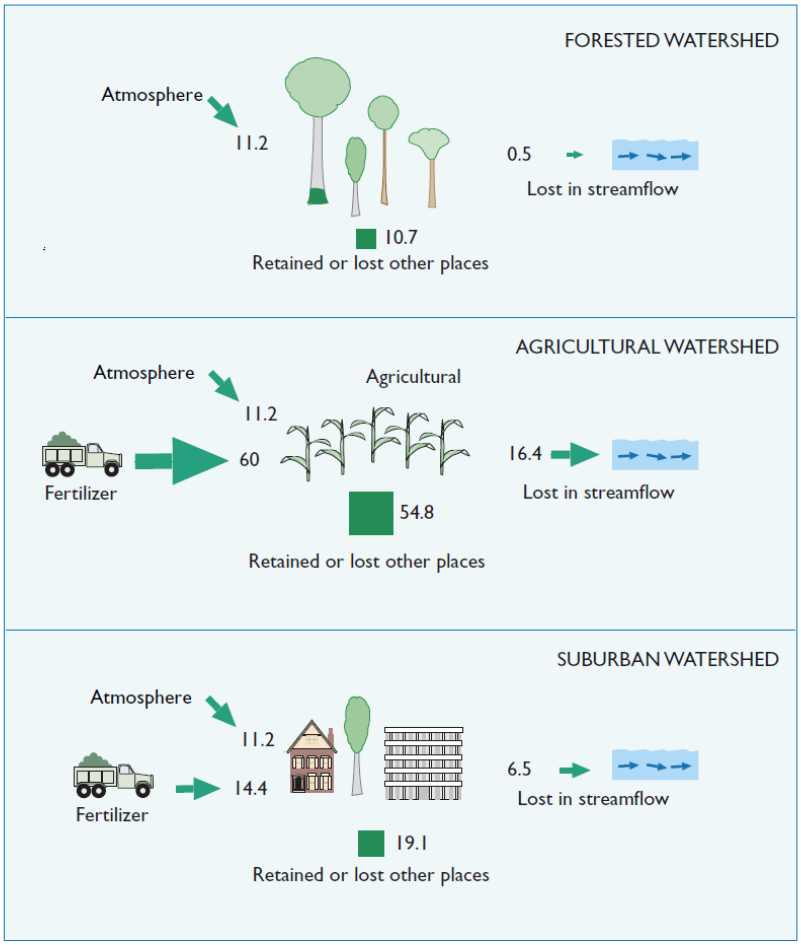
N_2 = nitrogen gas	NH_3 = ammonia	NO_3 = nitrate
N_2O = nitrous oxide	NH_4 = ammonium	NO_2 = nitrite

Part 2

1. Summarize the processes you took as a nitrogen atom (use the bottom or the back of the next page). It may be helpful to draw your journey as well.

2. Using the visual, answer the questions that follow. These data are from sampling sites in and around Baltimore, MD.

NITROGEN FLOWS IN THREE WATERSHEDS



Numbers are kilograms of nitrogen per hectare per year

Data are from: Groffman et al. 2004. Nitrogen fluxes and retention in urban watershed ecosystems. Ecosystems, 7:393-403.

   a. Which watershed had the highest amount of nitrogen input?
      ___ Forest ___ Agriculture ___ Suburban
   b. Which watershed 'lost' the most nitrogen to the stream?
      ___ Forest ___ Agriculture ___ Suburban
   c. Which watershed retained the most nitrogen?
      ___ Forest ___ Agriculture ___ Suburban

3. Where did the excess nitrogen come from?

_____

_____

4. Are there sources of nitrogen missing from this diagram? Explain.

_____

_____

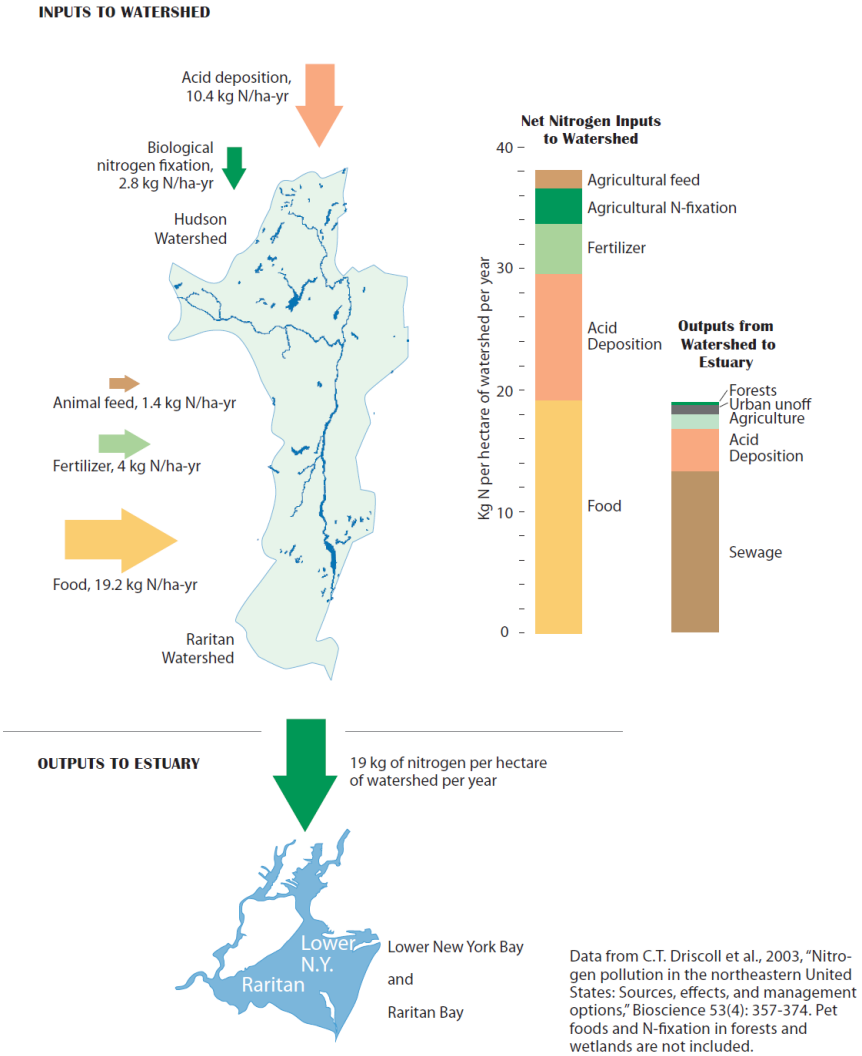
5. Where does the excess nitrogen in a watershed ultimately go?

_____

_____

_____

6. Compare the graphic above from a forest, agricultural field, and suburban area with data from the Hudson River watershed below.



a. What is the source of the largest input of nitrogen to the Hudson River watershed?

___ acid deposition ___ biological nitrogen fixation

___ animal feed ___ fertilizer ___ food

b. How is this different from the diagram of the forest/field/suburbia?

c. What is the source of the largest output from the watershed to the estuary?
___ forests ___ urban runoff
___ agriculture ___ acid deposition
___ sewage

d. In which system is more nitrogen lost, or exported, to the ecosystem?
___ forest ___ agricultural field
___ suburbia ___ Hudson River watershed

e. Describe how the nitrogen cycle is different in these two places.

7. Based on these data and the game, how do people affect the nitrogen cycle?