Lesson 2

Biogeochemical Nutrient Cycles

Introduction

Several key Biogeochemical cycles are constantly at work in our watersheds, moving critical nutrients from the earth and through the ecosystems using an incredible variety of processes. Human activities can influence these cycles, for positive or negative.

In this lesson, you will choose one of the most common nutrient cycles, become familiar with it by drawing out the various components, and hypothesize how human activity might positively or negatively affect the cycle you choose to learn about.

Time: 30 mins

Materials: Internet access, blank paper, ruler, pencil, lined paper for answering questions.

Instructions

Choose one of the following three nutrient cycles to become an expert on:

- Carbon cycle
- Nitrogen Cycle
- Phosphorus Cycle

1. On your computer, look up images related to your chosen cycle. Khanacademy.org is a great place to start. You should easily find a range of illustrations that detail the various stages, forms, and components of each cycle.
2. Sketch out the various components of your cycle, including different forms of the element found throughout the cycle, and what BIO, GEO, or CHEMICAL process are at work to help the cycle along.
3. Be sure to include at least one human influence on your diagram, and add one short sentence to your diagram noting whether this human influence would be POSITIVE (help the cycle stay in balance), or NEGATIVE (throw the cycle out of balance by depleting the nutrient or adding too much of it at once in the wrong location). For example large areas of cultivated land that require fertilizing (lawns, golf courses, orchards) might lead to too much nitrogen or phosphorus in the watershed, which in turn might lead to more algae growth in the rivers and lakes, which can block light and oxygen from reaching deeper waters and really impact the local food chain. Large forest fires in your watershed might send up large amounts of carbon dioxide, impacting the carbon cycle. Large areas of forest kept intact might help use up carbon dioxide, helping fight climate change.

Note: this is NOT an art project, and there is no 'correct' way to illustrate your cycle. As long as you can clearly label the various components and better understand the cycle you have chosen to study, you have succeeded!

Summary

All the critical ingredients for life are part of one BioGeoChemical cycle or another, and require a balance of natural processes to remain within healthy boundaries. Too much of one nutrient or too little of another can tip the balance of a healthy ecosystem, and many human activities can have either positive or negative affects on these cycles, and as a result, on our ecosystems or even on our entire planet, in the case of the carbon cycle and global warming.

Nutrient Cycles continued

Extensions

For added learning, pick a second nutrient cycle and repeat the activity above, but this time add in some details that are specific to your local watershed. You may need to do some research or look on Google Earth or Google Maps to get some ideas of the human activities that might be affecting the nutrient cycles in your watershed.

Here are a few questions that might apply to most Columbia Basin Watersheds:

1. How might large-scale agriculture affect your local watershed and what nutrient cycles might be directly impacted?
2. How might a large forest fire affect your local watershed, and what impacts do increasing fires have on which nutrient cycles?
3. What might be some of the impacts of common urban influences on watersheds, like large fields of green grass, large areas of lawn, or large paved spaces?

Resources

All the information you need can easily be found online with a short Google search.

A note of caution: As with most things you might be researching, there is a seemingly bottomless pit of Youtube videos, diagrams, and websites on each and every nutrient cycle. Pick the fist one that is laid out in a fashion that makes sense to you, and start there. Then you can potentially visit a few more resources to fill in some blanks or add more detail.