

Name \_\_\_\_\_

Date \_\_\_\_\_

## Nitrogen in Ecosystems- Experimental Design

During this lab, you will design and carry out an experiment that investigates the effects of increased nitrogen on an aquatic or a terrestrial ecosystem. This will be done in 'microcosms', that is, models of a real ecosystem.

**Step 1:** Imagine that you just added nitrogen to your aquatic or terrestrial ecosystem. Draw an arrow next to each variable, predicting whether each of these levels will increase or decrease in the next few weeks.

### Aquatic Ecosystem

DO \_\_\_\_\_

NO<sub>3</sub> \_\_\_\_\_

Water temp \_\_\_\_\_

Water pH \_\_\_\_\_

Dry plant mass \_\_\_\_\_

Visible plant growth \_\_\_\_\_

### Terrestrial Ecosystem

Amount of Soil \_\_\_\_\_

NO<sub>3</sub> \_\_\_\_\_

Soil temp \_\_\_\_\_

Soil pH \_\_\_\_\_

Dry plant mass \_\_\_\_\_

Visible plant growth \_\_\_\_\_

### Step 2: Your Design

Now that you have an understanding of the role of nitrogen in an ecosystem you will choose 1 or more "independent variable(s)" to test, and design an experiment to test it(them). Your experiment may require you to add a specific amount (ex. 5 mL, 10 mL) of a specific form of nitrogen (ex. nitrate fertilizer solution, commercial fertilizer solution). Your experiment may test the affects of the added nitrogen on an **aquatic**, **terrestrial**, or **both ecosystems**. Be sure that your experimental design allows you to collect data which will eventually help you SUPPORT or REFUTE your hypothesis!

Which ecosystem will you test? (Aquatic, terrestrial, both) \_\_\_\_\_

What is your Independent Variable? (Ex. 1 control jar with no added fertilizer and 5 test jars with increasing amounts of fertilizer)

\_\_\_\_\_

What is your Dependent Variable? (Ex. increasing DO in an aquatic ecosystem)

\_\_\_\_\_

Hypothesis

\_\_\_\_\_

Which method will you use to determine whether or not the dependent variable is changing? (Ex. test kit, sight)

\_\_\_\_\_

How often will you test whether or not the dependent variable is changing? (Ex. daily, weekly) \_\_\_\_\_

\_\_\_\_\_

How long will you run your experiment? \_\_\_\_\_

\_\_\_\_\_

Check your experimental process with your teacher before setting it up.

**Aquatic Ecosystem:** How much nitrogen will be added to each jar? You may use as many (or few) jars as you want. Also, be sure to set up a control! Use the jars below to diagram the set up for your experiment. Write what will be included in each jar.

CONTROL				

**Terrestrial Ecosystem**

CONTROL				

**Part 2: Data collection**

Create a data table to collect your results.

**Part 3: Analyze results**

Share your data with your classmates. In your final lab report, include answers to the following questions:

1. What happened to your ecosystem with the addition of excess nitrogen fertilizer?
2. Which treatment had the greatest impact on your ecosystem?
3. Explain the impact of excess nitrogen on aquatic and terrestrial ecosystems.
4. Imagine you are managing a local watershed. You need to insure that the reservoir within your watershed remains viable as a drinking water source. What measures would you take throughout the watershed to maintain this level of water quality?