

### **Teaching the Nitrogen Cycle Using Fish as a Teaching Tool**

**Standard(s):** 3.1, 3.2, 3.3, 3.4, 4.6

**Objective(s):**

1. Students will understand how fish, bacteria, and plants work together in the ammonia/nitrogen cycle which can be used in aquaponics.
2. Students will analyze and describe the effectiveness of systems to solve specific problems.
3. Students will perform, understand, and describe the results of chemical tests that relate to the nitrogen cycle.

**Procedure:**

1. Lecture/Discussion:
  - a. Briefly define aquaponics
  - b. Discuss ammonia/nitrogen cycle
2. Use the textbook, internet, or various other sources to find information on the following topics relating to aquaculture:
  - a. water quality in aquaponics
  - b. dissolved oxygen
  - c. temperature
  - d. pH
  - e. alkalinity and hardness
  - f. health problems
  - g. treatment of health problems
  - h. draw & label parts of a fish (fins, gill cover, lateral line)

Find the definitions to the following aquaculture vocabulary:

- a. aquaculture
  - b. hydroponics
  - c. ecology
  - d. cycle
  - e. nutrients
  - f. horticulture
  - g. symbiosis
  - h. equilibrium
  - i. system
3. After the textbook, internet, or various other sources research is completed we will have a class discussion on what we have found

**Follow-up Activities:**

1. A classroom aquaponic experiment (terraqua column) will be setup by the students.
2. Jar aquariums can be made by the students.