CAN YOU REALLY OVERLOAD ON TOO MANY NUTRIENTS? NUTRIENT ENRICHMENT VS. OXYGEN DEPLETION

GRADES 5 - 8

JANIECE MISTICH

TIME ALLOTMENT:

Introductory Activity: 30 minutes
Learning Activity: 50 minutes
Optional Hands-on Activity: 30 minutes every other day for approximately 1 - 2 weeks
Culminating Activity: 50 minutes

OVERVIEW:

Nutrients are chemical substances used by plants and animals for maintenance and growth and are critical for survival. Plants require these nutrients to grow, reproduce, and protect against diseases. In aquatic environments, nitrogen and phosphorus are of particular interest because their availability can limit the growth of aquatic plants. The addition of additional nitrogen or phosphorus into a water body can cause an explosive growth of phytoplankton, or algae. These nutrients can enter a water body from several sources—both natural and manmade. Nitrogen can enter a water body when organic matter decomposes or animal waste enters a stream following a storm. Manmade sources include runoff from agricultural fertilizers, livestock wastes, effluent from wastewater treatment plants, and car exhaust, to name a few. Phosphorus can also enter a water body from animal and plant wastes, agricultural fertilizer runoff, water treatment plants, sewage, and soils.

In this lesson, students will learn how excess nutrients enter a body of water and the harmful effects they have on aquatic organisms.

SUBJECT MATTER:

Environmental Science

LEARNING OBJECTIVES:

Students will be able to:

- Define nutrient, eutrophication, phytoplankton, zooplankton, anoxia, and hypoxia.
- Explain that excess nutrients enter a water body from different sources.
- Explain the relationship between nutrient enrichment and oxygen depletion in water bodies.
- Utilize scientific equipment and/or chemicals to determine the oxygen levels in a sample of water.
- Explain how nutrient enrichment and oxygen depletion create dead zones in water bodies.

STANDARDS:

National Science Education Standards
http://bob.nap.edu/html/nses/html

Content Standard B: Properties and changes of properties in matter

Content Standard E: Understanding about science and technology

Content Standard F: Populations, resources, and environments and science and technology in society

Louisiana Science Frameworks:
State Standards for Curriculum Development
http:www.doe.state.la.us/doe/assessment/standards/SCIENCE.pdf

SE-M-A7: Demonstrating knowledge of the natural cycles, such as the carbon cycle, nitrogen cycle, water cycle, and oxygen cycle;

LS-M-C2: Modeling and interpreting food chains and food webs; 5-8;

LS-M-C4: Explaining the interaction and interdependence of nonliving and living components within ecosystems;

LS-H-D4: Exploring how humans have impacted ecosystems and the need for societies to plan for the future;
SE-M-A1: Demonstrating knowledge that an ecosystem includes living and nonliving factors and that humans are an integral part of ecosystems;
SE-M-A2: Demonstrating an understanding of how carrying capacity and limiting factors affect plant and animal populations;
SE-M-A3: Defining the concept of pollutant and describing the effects of various pollutants on ecosystems;
SE-M-A4: Understanding that human actions can create risks and consequences in the environment;
SE-M-A5: Tracing the flow of energy through an ecosystem and demonstrating a knowledge of the roles of producers, consumers, and decomposers in the ecosystem;
SI-M-A5: Developing models and predictions using the relationships between data and explanations;
SI-M-A7: Communicating scientific procedures, information, and explanations.

MEDIA COMPONENT:

Video:

Enviro-Tacklebox™ , *Hypoxia: The O_2 Blues*—an **LPB** Production—investigates the effects of nutrient enrichment and the development of hypoxic conditions in coastal waters, especially the Gulf of Mexico. Students learn about phytoplankton, zooplankton, algal blooms, oxygen depletion, hypoxia, and anoxia and their effects on the fishing industries of coastal Louisiana.

Web site:

Algae: the Green Plague and the Planted Tank http://www.theaquarians.net/ArticlesandWallpapers/article_algae.htm This Web site provides students with information about the origin of algae, what it needs to grow and reproduce, and how to keep it from taking over an aquarium.

Water Pollution http://edugreen.teri.res.in/explore/water/pollu.htm This Web site provides information about the various sources of water pollution, how algae blooms occur, and what effects algae blooms have on organisms living in the water body.

MATERIALS:

Per Group:

- Handout or transparency of two aquarium pictures
- Chart paper or chalk board to record suggestions

Optional Hands-on Activity

Per Class:

- Two large clear tubs
- Four gallons of pond water with algal growth
- 100 ml graduated cylinder (graduated in 10 ml increments)
- Ferti-lome Root Stimulator and Plant Starter Solution (found in nurseries or garden departments)
- ***or** a similar fertilizer that is transparent in color (Generic)
- Gallon of distilled water

Per Group (of 4 students):

- Copy of the label from the fertilizer container showing ingredients
- Thermometer for each group
- Watch with a second hand
- Dissolved Oxygen TesTabs and test tubes from Watershed Tour Kit or Pondwater Tour Kit (can be ordered through Carolina Biological Supply Company at 800-334-5551 or online through http://www.earthforce.org/green/DO Dissolved Oxygen/BOD Replacement Kit Catalog # 5889
- Latex gloves and antibacterial hand soap

PREP FOR TEACHERS:

1. Prior to teaching the lesson, view ***Hypoxia: The O_2 Blues*** and determine where to cue each segment.

2. **CUE** the video to the beginning of the tape.

3. Make copies of handouts for two web search activities and answer keys.

4. Determine and assign group arrangements for students.

5. Prepare a large sheet of bulletin board paper for suggestions or use chalkboard.

6. Copy the e-mail response sheet for the culminating activity.

7. Make color copies of the aquarium page (***Activity Sheet 1***) for use by students or make a color transparency of each.

8. *When using media, provide students with a **FOCUS FOR MEDIA INTERACTION**, a specific task to complete and/or information to identify during or after viewing of video segments, Web sites, or other multimedia elements.*

INTRODUCTORY ACTIVITY:

Guide students to discuss what they know, but do not give them any information that they should be learning during the activity. The answers provided are for your information at this point.

1. Ask students if any of them have or have ever had an aquarium with fish. Ask if the water has ever been cloudy or green. Ask students if they know what caused the cloudiness or green growth.

2. Have students look at the pictures of a crystal clear fish tank and the same one that is cloudy or filled with algae. Ask them what differences they notice between the two pictures. Ask students if they have ever seen a fish tank that is cloudy and full of algae?

3. Ask students, “Was the algae something bought and placed in the tank when it was being set up? If not, how did it get in the tank? What caused the cloudiness?” (The cloudiness is from **bacterial growth** that occurs when you have a lot of decomposition going on in the tank. The algae spores are always present in the water, but are dependent upon nutrients for their growth. **Algae** growing in the tank contribute to the cloudiness, also.)

4. Ask, “What could have happened to increase the amount of algae that was present in the water to the level that it could be easily seen?” (Students may respond that the algae reproduced and grew because they found the nutrients they needed in the water supply.)

5. Ask, “Where did the nutrients come from? Did the person that set up the fish tank add nutrients on purpose? If not, how did they get into the water supply?” (Students may suggest that the nutrients are present in the food that is fed to the fish. Fish excretion also adds nutrients to the water. Animals and plants that die also decompose, providing the water with a new nutrient supply.)

6. Ask, “What happens to the excess food that is left after fish finish feeding?” (It sinks to the bottom of the tank and is decomposed by bacteria. The released nutrients are used by the algae to grow in numbers large enough to see with the naked eye.)

7. Ask, “How does the excess algae affect the fish in the tank?” (The algae produce oxygen during the day, but at night they respire, using the oxygen in the water. This depletes the oxygen supply for the fish and eventually the fish die.

8. Ask students what they can do to eliminate the cloudiness and algae blooms found in their fish tanks? (Students with fish tanks may suggest: kill and remove the algae regularly from the tank, replace some of the water each week, reduce the amount of food being fed to the fish on a daily basis, reduce the amount of time the aquarium light is on).

9. Ask students, "Where else might this problem occur, besides in fish tanks?" (in bodies of water such as streams, lakes, rivers, the Gulf, and oceans—anywhere where excess nutrients can be deposited).

10. Ask, "Can we solve similar problems occurring in these water bodies the same way as we can with an aquarium?" (No, but we can recognize the source of the problem (excess nutrients) and try to reduce or eliminate it.) Have students suggest possible ways to reduce the problem in real water bodies. Record suggestions on the board or chart paper for future discussion.

11. **Tell students that they will be learning more about the effects of excess nutrients in water bodies and how they affect the organisms living there.**

LEARNING ACTIVITIES:

1. *Provide students with a **FOCUS FOR MEDIA INTERACTION**, asking them: "What factors cause an aquarium to become cloudy?"* **PLAY** the video, pausing it when you hear the words, "Let's step outside. I want to show you something, " and you see the group walking away from the aquarium. Ask students what were some of the possible causes mentioned for the water's cloudiness? (Bacteria, fungi, or microscopic organisms using up a lot of the oxygen in the water; the temperature could also have gotten too warm, reducing the water's ability to hold oxygen). Ask students why they think the fungi and bacteria are present. (They are a part of nature's recycling system. They break down or decompose dead organisms, thereby releasing nutrients back into nature to be used again.) **Ask students, "Have you ever seen "green stuff" other than plants growing in aquariums.? What is this "green stuff" called and how did it get into the water?** (The green stuff is algae.)

2. Have students form groups to do web research. *Provide students with a **FOCUS FOR MEDIA INTERACTION,** telling them to find out why algae becomes a problem in aquariums and how to prevent or eliminate algae growth in the tank.* Provide students with ***Learning About Algae*** Web Worksheet to guide their search of the Web site: http://www.theaquarians.net/ArticlesandWallpapers/article_algae.htm. Review answers with students, emphasizing the effect of nutrients on algae growth.

3. Tell students that what happens in an aquarium can be viewed as a model of what happens in larger water bodies, such as ponds, rivers, lakes, the Gulf of Mexico, and even oceans. *Provide students with a **FOCUS FOR MEDIA INTERACTION,** asking them, "How do excess nutrients get into larger bodies of water and what problems do they cause?* Provide students with ***Algae as Water Pollution*** Web Worksheet to guide their search of the Web site: http://edugreen.teri.res.in/explore/water/pollu.htm. Review answers with students, relating how nutrients in larger bodies of water cause algae blooms and affect the organisms living there in a similar way to what happens in aquariums.

4. *Provide students with a **FOCUS FOR MEDIA INTERACTION,** telling them to view the video to understand how excess nutrients can cause algae to grow in a water body such as a river, lake, or stream.* **RESUME** playing the video until you hear the words, "It might be fun to take a closer look. Let's do a eutrophication magnification," and see Greg Grandy turn toward the water with a magnifying glass. **PAUSE the video, asking them: "How did the extra nutrients get into the pond in the video?"** (Excess fertilizers from the nearby golf course mixed in with rain water and ended up in the pond through run off.) Ask students if their parents use fertilizer on their own lawns. Why? How can these fertilizers from their lawns get into a nearby water body? (When it rains or the lawn is watered, excess fertilizer is carried into storm drains and eventually dumped into a water body.) Remind

students of what happened when excess nutrients were in the fish aquarium. **Ask**, "What do you think happens to organisms when extra nutrients in a pond, lake, river, or larger body of water cause algae blooms?"

5. *Provide students with a **FOCUS FOR MEDIA INTERACTION,** telling them to view the video to find out what happens to fish and other organisms when too many nutrients enter a body of water.* **RESUME PLAY** until you see fish turning upside down and floating at the top of the water and hear the words, "Once the oxygen level drops below a certain point, then the fish can no longer effectively breathe." **PAUSE** the video and ask, " What caused all of the fish to die? (low levels of dissolved oxygen). What caused the oxygen in the water to become depleted? (The excess nutrients created algae blooms. When the algae died, they sank to the bottom of the pond and were decomposed by bacteria and fungi. These organisms require oxygen to decompose the dead algae, thereby depleting the available oxygen in the water.) Remind students that the students at the beginning of the video were asking what was causing the cloudiness in the aquarium. Explain that the cloudiness was caused by bacteria, fungi, and other microorganisms that are decomposing the decaying algae. **FAST FORWARD** the video almost to the end, **right after** you hear the words, "The idea behind regulating nutrients and controlling their input into the bay is to improve the water quality which will reduce the amount of low oxygen bottom in the bay and open that bottom up for use by crabs and fish and other organisms all year round."

6. *Provide students with a **FOCUS FOR MEDIA INTERACTION,** asking them to view the end of the video to determine what these students learned about improving the water quality in their fish tank.* **RESUME PLAY** with Greg Grady looking through the fish tank and right before he says, "We've learned that there is an important relationship between what goes in our water and the conditions that follow." **Ask students, "What is the relationship between what goes into our water and the conditions that follow?"** Have students explain what they learned from the web search and the video. (Knowing about and controlling the nutrient levels that enter the water will help avoid the water becoming anoxic or hypoxic.)

7. **Ask students, "Can we use any of the methods of removing algae from aquariums to help remove algae from larger bodies of water?" (**Students should respond that decreasing the amount of nutrients entering the water is the only way to reduce the algae blooms because the other methods are already being done by nature or can't be done with large water bodies. Ask students to suggest ways that nutrients entering water bodies can be reduced.) Refer students back to the suggestions they made in the Introductory Activity (Step #9). Compare their new suggestions with the ones made then to determine what they learned from the lesson.

Optional Hands-on Activity—Studying the Effects of Excess Nutrients on Dissolved Oxygen Levels in Water Part I

1. Ask students if they remember what nutrients caused the eutrophication of the pond they viewed on the video. (nitrates, phosphates, and potassium). How did these nutrients get into the pond? (Fertilizers from the nearby golf course.) Why were these nutrients used on the golf course? (To keep the grass on the course lush and green). Ask students to look at the label for the fertilizer they will be using in their tests and name the nutrients in it. (Answers should include nitrates and phosphates, possibly potassium). Nitrogen and phosphorus are the primary nutrients found in fertilizers, because they help plants grow. **Tell students that they will do an experiment to study the effects of excess nutrients on dissolved oxygen in water.**

2. Place two clear tubs of pond water in front of class. Label one tub "No fertilizer added", and the other "Fertilizer added." Add 100 ml of Root Stimulator Fertilizer to the tub labeled "Fertilizer Added."

3. Have a student take the beginning temperature of each tub of water. Have students record beginning temperature on chart. Have each group record visual observations of water clarity on chart. Place tubs in a sunny window and allow them to sit for 48 hours. (Time may need to be extended during cooler weather or cloudy conditions.)

Part II

4. After 48 hours, have each group observe the visual clarity of the water and record on their charts. Have a student in each group take the temperature of each tub of water and record on the chart. (While algae are in the growth process, there should be higher amounts of dissolved oxygen in the water. When they begin to die and decompose, the dissolved oxygen amounts should be begin to drop.)

5. Remind students to wear gloves and collect a sample of the water with no added nutrients in the test tube. Direct them to place the test tube completely below the water and cap it while it is still under. There should be no air bubbles in the tube. Carefully uncap the bottle and add two Dissolved Oxygen TesTabs. Recap the bottle and shake it 3-4 minutes until the testabs dissolve. Once dissolved, set the bottle on the desk and allow it to sit for five minutes. Use the color chart provided with the D.O. test to determine the approximate amount of dissolved oxygen in the bottle. Record on the chart.

6. Pour out the water and rinse the bottle with distilled water. Repeat step six using the water with the added fertilizer. Record results on chart. Allow water to sit for 48 more hours and repeat temperature reading and dissolved oxygen tests. (Depending on the time of year that this lesson is being done, the algae may take longer to grow in the tubs. In late spring and summer, algae growth will be faster, however, in fall, winter, and early spring, it may take a week or longer for the algae to grow enough to show death, decomposition, and lowered dissolved oxygen amounts. Adjust the time needed to accommodate the season.)

7. Discuss the results with the class. They should notice that the tub with extra nutrients has more algae growth. The dissolved oxygen readings for the fertilized water should also be lower once the algae begin to die and decompose. (Due to the type of test used, students will not be able to get an exact reading of D.O., they should however, be able to see a difference in water color in the tube, which will indicate one has less oxygen than the other.)

8. Ask students if they noticed any differences in temperatures between the tub with no fertilizer and the tub with fertilizer. If there was a noticeable difference in temperature ask if they noticed any differences in the amount of algae growth when compared to temperature? Was there any difference in the amount of algae growth when compared to fertilizer amounts? Record students' observations on wall chart. What generalizations can be made concerning nutrients and algae growth? (increased nutrients usually spur increased algae growth, less nutrients mean less algae growth) What generalizations can be made about temperature and algae growth? (the higher the temperature, the more algae growth you will see)

9. Relate what students learned in the Learning Activity to the results of the hands-on activity. Be sure to emphasize how the dissolved oxygen levels decreased after the algae started to die.

CULMINATING ACTIVITIES:

Ask students to use the information from their experiment to give advice to these students about how to clean the water in their fish tank and how to prevent future problems. Have students pretend that these students have sent an e-mail asking for advice on cleaning their fish tank. They are to respond to the e-mail with what they learned from the experiment. Provide students with the **e-mail response sheet** or have them use the class computer (with internet access) to e-mail you with their advice on it. This can be used as an evaluation of what they learned. (Response should include reducing light, partially changing the water supply, cleaning the tank to remove excess algae and nutrients, and/or reducing the amount of nutrients being put into the tank)

CROSS-CURRICULAR EXTENSIONS:

LANGUAGE ARTS/ART:

- After researching how to set up and clean an aquarium, have students put together a how-to booklet to share with others. The booklet should include drawings of each step in the process.

MATHEMATICS:

- Graph the relationship between the amount of nutrients in the water and the dissolved oxygen content. Make a generalization about how adding nutrients to a water supply affects the amount of dissolved oxygen. Graph the relationship between the temperature of the water and the amount of dissolved oxygen available.

SCIENCE:

- Have students research and draw the nitrogen cycle, labeling the important steps.Then they should explain how the nitrogen cycle is established in an aquarium and what happens if it gets out of balance.

SCIENCE/RESEARCH SKILLS:

- Have students set up their own freshwater aquarium after researching the necessary steps to follow. They may access the following sites for instructions or do their own Web search:
  http://dmoz.org/Recreation/Pets/Fish_and_Aquaria/Freshwater/
  http://www.honors.montana.edu/~weif/firsttank/setup.phtml
  http://www.aquariumtropicana.co.uk/set%20up.htm
  http://theaquarians.net/ArticlesandWallpapers/article_algae.htm

COMMUNITY CONNECTIONS:

- Visit a pet store that specializes in setting up aquariums. Have the pet store owner/manager show students how to set up an aquarium and keep it from getting cloudy or full of algae.
- Visit a mini-wastewater treatment facility on a golf course to learn how the fertilized water is disposed of effectively. Ask what type of fertilizer is used to maintain the lush appearance of the course and the nutrients that are in it. Research the proximity of any waterbodies to the golf course and if there is any direct access to the waterbody by water that runs off the golf course. Take nutrient readings and dissolved oxygen readings at this waterbody if there is one. Alert the golf course management of any potential problems that their lawn (course) care might be creating.
- Visit a local body of water to determine the dissolved oxygen levels and nutrient levels. Observe how water enters this waterbody and what nutrients might be entering it.

STUDENT MATERIALS:

- Picture of Cloudy and Clear Aquarium
- Chart for Data Collection (Optional hands-on activity)
- ***Learning about Algae*** Web site Worksheet/Answer key
- ***Algae as Water Pollution*** Web site Worksheet/Answer key
- E-mail activity sheet
- Generic Root Stimulator and Plant Starter Solution Ingredient List (Optional hands-on activity)

CLOUDY WATER IN AQUARIUM

CLEAR WATER IN AQUARIUM

Group Members:______________________________

NUTRIENT ENRICHMENT DATA

		TEMPERATURE	D.O. AMOUNT	APPEARANCE OF ALGAE
NO FERTILIZER	DAY 1			
	DAY 2			
	DAY 3			
FERTILIZER ADDED	DAY 1			
	DAY 2			
	DAY 3			

LEARNING ABOUT ALGAE

(Controlling Algae in Fishtanks)

Use the following Web site to learn about algae:

http://www.thesquarians.net/ArticlesandWallpapers/article_algae.htm

1. What is algae?

2. What three things does algae need to thrive (grow) and reproduce?

Read the section called "Lighting Issues" to answer these questions:

3.How much light should you give your aquarium each day?

4. Why shouldn't an aquarium be placed near a window?

Read the section called "Nutrient Issues" to answer these questions:

5. How does changing the water in an aquarium help control algae growth?

6. What are three ways to control algae growth in an aquarium?

Read the section "Advanced Algae Solutions" to answer this question:

7. How else might excess nutrients get into a fish tank?

8. What are the two main reasons for algae growth in fish tanks?

9.What do you think are the main reasons for algae growth in larger bodies of water such as ponds, lakes, rivers, and oceans?

LEARNING ABOUT ALGAE
(Controlling Algae in Fishtanks)
ANSWER KEY

Use the following Web site to learn about algae:
http://www.thesquarians.net/ArticlesandWallpapers/article_algae.htm

1. What is algae? ***(a microscopic plant that grows in water)***

2. What three things does algae need to thrive (grow) and reproduce? ***(Algae needs light, micro- and macro- nutrients, and a supply of dissolve gas)***

Read the section called "Lighting Issues" to answer these questions:

3.How much light should you give your aquarium each day? ***(10-12 hours a day)***

4. Why shouldn't an aquarium be placed near a window? ***(You can't control the amount of sunlight coming into the aquarium.)***

Read the section called "Nutrient Issues" to answer these questions:

5. How does changing the water in an aquarium help control algae growth? ***(It gets rid of wastes and nutrients that algae need to grow.)***

6. What are three ways to control algae growth in an aquarium? ***(Partially change the water at least once a week. Vacuum the gravel to remove decaying food and fish wast. Reduce the volume and frequency of feeding the fish.)***

Read the section "Advanced Algae Solutions" to answer this question:

7. How else might excess nutrients get into a fish tank? ***(from the water source being used to fill the tank)***

8. What are the two main reasons for algae growth in fish tanks?***(nutrients and lighting)***

9.What do you think are the main reasons for algae growth in larger bodies of water such as ponds, lakes, rivers, and oceans? ***(excess nutrients and sunlight)***

Algae as Water Pollution

Use the following Web site to learn how algae can create problems for aquatic organisms: http://edugreen.teri.res.in/explore/water/pollu.htm

Directions: Read the entire article on water pollution to gain an understanding about how water becomes polluted.

1. Name 3 sources of water pollution.

2. What is **domestic sewage?**

3. What are the main organic materials found in domestic sewage?

4. What type of pollutants are found in **agricultural runoff?**

Read the section labeled "Eutrophication" to answer these questions.

5. What is eutrophication?

6. Where do excess nutrients entering a body of water come from?

7. What do these excess nutrients cause?

8. What happens when the algae die?

9. How does this make algae a "water pollutant"?

Algae as Water Pollution
ANSWER KEY

Use the following Web site to learn how algae can create problems for aquatic organisms: http://edugreen.teri.res.in/explore/water/pollu.htm

Directions: Read the entire article on water pollution to gain an understanding about how water becomes polluted.

1. Name 3 sources of water pollution. ***(city sewage, industrial waste, agricultural runoff)***

2. What is **domestic sewage?** ***(wastewater discarded from households)***

3. What are the main organic materials found in domestic sewage? ***(food and vegetable waste)***

4. What type of pollutants are found in **agricultural runoff?** ***(chemicals from fertilizers and pesticides)***

Read the section labeled "Eutrophication" to answer these questions.

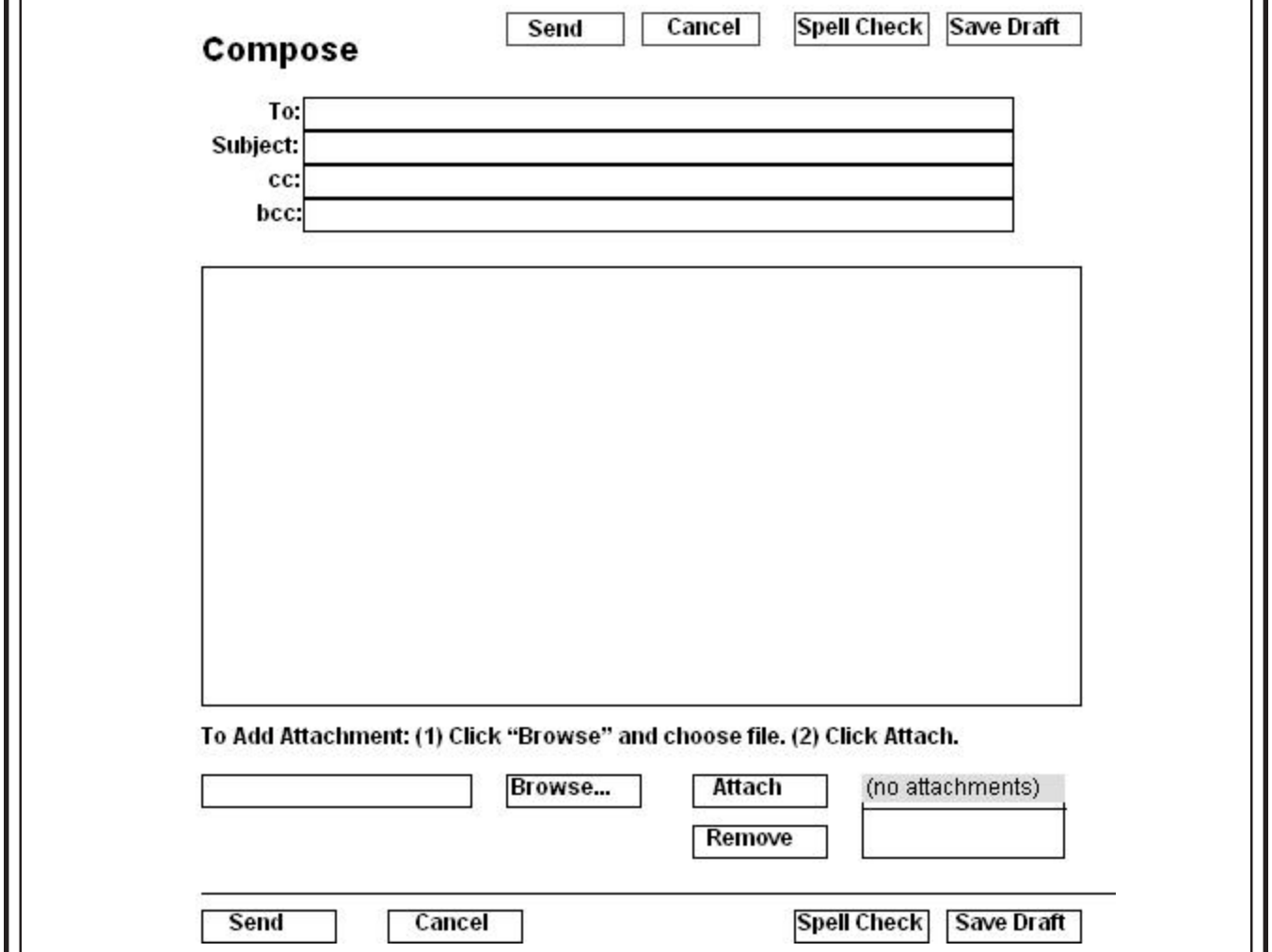
5. What is eutrophication? ***(When fresh water is artificially supplemented with nutrients and it results in an increase in the growth of water plants such as algae.)***

6. Where do excess nutrients entering a body of water come from? ***(Waste discharged from industries, agriculture, and uban communities, chemical runoff from fields)***

7. What do these excess nutrients cause? ***(algae blooms)***

8. What happens when the algae die? ***(become part of the organic waste in the water, water becomes depleted of oxygen, all forms of organisms die)***

9. How does this make algae a "water pollutant"? ***(foul smells result, water is unsightly, organisms that live in the water have to leave or die)***


Send
Cancel
Spell Check
Save Draft
Compose
To:
Subject:
cc:
bcc:
To Add Attachment: (1) Click "Browse" and choose file. (2) Click Attach.
Browse...
Attach
Remove
(no attachments)
Send
Cancel
Spell Check
Save Draft

Send | Cancel | Spell Check | Save Draft

Compose

To:
Subject: Help for my aquarium
cc:
bcc:

Dear ,

I have been having a lot of trouble with my new aquarium. I set it up a few months ago and have been having lots of algae and cloudy water. I was wondering if you could tell me what was causing it and how I can clear it up. The fish in the tank appear to be having difficulty breathing. It is set up in my bedroom in front of my bedroom window. Do you think I should move it?
I would appreciate any help you could give me.

Sincerely,
Janna Guppy

To Add Attachment: (1) Click "Browse" and choose file. (2) Click Attach.

Browse... | Attach | Remove | (no attachments)

Send | Cancel | Spell Check | Save Draft

GENERIC ROOT STIMULATOR & PLANT STARTER SOLUTION

- Also Contains Hormone Type Root Stimulator and Fertilizer That Aids Development of Fast - Strong Root Structure and Vigorous Plants
- For Newly Planted Flowers, Shrubs, Trees and House Plants
- 3 ½ Tablespoons per Gallon of Water

ACTIVE INGREDIENTS:
Indole-3-butyric Acid..........0.0004%
INERT INGREDIENTS:........99.9996%
TOTAL..............................100.0000%
Surfactant-Soil Penetrant 1.00%

Keep out of reach of children
CAUTION
See side panel for additional cautions

NET CONTENTS
32 FL. OZS. (2 LB. 3 OZS.)

CAUTION: Keep out of reach of children. This product is not for human consumption. Avoid getting in eyes.

Do not contaminate water by cleaning of equipment or disposal of wastes.

Kitchen utensils such as tablespoons and measuring cups should not be used for food purposes after use with pesticides.

STORAGE AND DISPOSAL

STORAGE: Store in original container and place in a locked storage area.

DISPOSAL: Do not reuse container. Rinse thoroughly and securely wrap in several layers of newspaper and discard in trash.

GENERIC ROOT STIMULATOR & PLANT STARTER SOLUTION
4-10-3
(GUARANTEE ANALYSIS)

Total Nitrogen (N)..4%
4.00% Ammoniacal Nitrogen
Available Phosphate (P_2O_5)..10%
Soluble Potash (K_2O)..3%
Derived From: Diammonium Phosphate and Muriate of Potash.

1. What is this package for? F-370
Generic Root Stimulator & Plant Starter Solution stimulates early root formation, stronger root development, reduces transplant shock and promotes greener, more vigorous plants.

2. How do you use it?
(Shake will before use or sampling): This product is concentrated and must be diluted with water according to the following table before use:
3 ½ Tablespoons per gallon of water
1 Pint in 9 ½ gallons of water
1 Quart in 19 gallons of water
1 Gallon in 76 gallons of water

FLOWERS, SHRUBS, TREES:
Use from 1-8 pints of diluted Generic Root Stimulator & Plant Starter Solution per plant depending on size. For example, 1 pint of the mixture on Mums, Geraniums and other annual flowers. For Rose bushes and Camellias, use 3 pints per plant. For larger than 4 foot plants (trees and large shrubs), use 1 gallon of the mixture per plant. Pour diluted solution over the soil as the roots are being covered, making sure that the roots are wet with the solution. Wet soil around plants with water after planting.
HOUSE PLANTS:
Use ½ cup diluted solution per quart of soil (a 6 in. pot holds approximately 1 quart).
NOTE: Solution is a root stimulator and should not be applied to plant's foliage as fertilizer of plant food.

3. Here are the results you may expect:
This product helps plants become established quickly and helps insure vigorous growth.