

DEQ in the Classroom: Hey, We Need That!



IDAHO
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ENVIRONMENTAL
QUALITY

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Grade Level:

Kindergarten – 5

Time Required:

45 minutes (can be longer or shorter depending on discussion), plus discussion time in weeks to come as class observes plants.

Before scheduling this activity, explain to the teacher that you will be leaving plants to grow and the activity will require a small amount of follow-up time on the teacher's part (class discussion one or more times). Be sure the teacher is OK with this.

Objective:

Students learn that we need sunlight and clean air, water, and land (soil) to live. DEQ helps keep the air, land, and water clean.

Meets Idaho State Standards:

Grade K: K.S.1.6.1, K.S.3.1.1, K.S.3.2.1, K.H.1.1.11

Grade 1: 1.S.3.1.1, 1.S.3.2.1, 1.LA.6.1.1, 1.H.1.1.11

Grade 2: 2.SS.2.2.2, 2.S.1.2.1, 2.S.1.6.2, 2.S.3.2.1, 2.H.1.1.10

Grade 3: 3.S.1.2.1, 3.S.3.2.1, 3.LA.6.1.4, 3.H.1.1.10, 3.S.1.6.1, 3.S.1.6.2,

Grade 4: 4.H.1.1.10, 4.S.1.6.1, 4.S.1.6.2

Grade 5: 5.SS.2.2.1, 5.S.3.2.1, 5.H.1.1.8, 5.S.1.6.2

Meets standards in social studies, science, health, and language arts.

Focus:

Multimedia. All living things (humans, animals, plants, fish, etc.) need sunlight and clean air, water, and land (soil) to live. Students observe plants that are deprived of their vital resources. Students learn the necessity of keeping these resources clean and what they can do to help. They also learn this is part of DEQ's job.

Materials: (for a class of 25)

6 small, living, potted plants (label pots 1 – 6)

Gravel – enough to fill one of the plant pots

Watering can or water bottle

Zipper-type plastic bag, big enough to hold one plant pot with plant

Water

Distilled white vinegar (16 oz jar)

Paper towels and/or plastic bag

4 – 6 living things or photos/pictures of living things (e.g., one of the plants for this activity, a photo of your family, a child from the class, etc. There are pictures of a lizard and a tree on page 9 that can be used as well)

4 – 6 non-living things (e.g., the watering can/water bottle, plastic bag, gravel, and paper towels from above)

5 plastic plates or lids (to place under plants to contain water if it runs through)

1 black marker

Background:

For life to exist, we need sunlight, clean air, clean water, and clean land/soil. Plants need all of these things for photosynthesis: carbon dioxide (air) and water combine during photosynthesis to make food, with sunlight being the energy source to make this happen. Plants get necessary minerals and nutrients from soil to live and grow so photosynthesis can take place.

Directly or indirectly, all living things rely on plants for food. Some living things eat plants (e.g., people eat lettuce; cows eat grass); other living things eat things that eat plants (e.g., people eat meat).

In addition, people and other animals need clean air to breathe, clean water to drink (and live in, for aquatic plants/animals), and clean land/soil to live on.

Pollution of the air, water, and land can compromise the life-supporting properties of these resources. DEQ's job is to help keep Idaho's land, water, and air clean. By understanding the importance of clean air, water, and land, we can begin to learn why and how we need to keep them clean.

Students may point out that "clean dirt" is somewhat of a contradiction. Explain that the dirt/soil represents clean land. Also point out that while dirt is "dirty," by "clean" we mean not made dirty by people (not polluted). For example, "dirty" land/soil/dirt or water might have litter on/in it or something spilled on/in it (like paint or motor oil or soda).

Vocabulary:

Photosynthesis	The process in green plants (and certain other organisms) by which carbohydrates (food) are made from carbon dioxide (from the air) and water using light as an energy source.
Pollution	Something that contaminates (hurts, makes dirty) the natural environment; usually a result of human activities.
Recycle(ing)	Transforming waste materials into usable resources. For example, paper that we don't need anymore can be made into new paper.
Soil	The top layer of the earth's surface, made of rock and mineral particles mixed with organic matter. Dirt.
Waste	Any material (solid, liquid, or contained gas) that is discarded, recycled, reused, or considered inherently waste-like. Garbage.

Procedure:

Step 1. Place several items (living and non-living) in the center of a table at the front of the class. Place the "Living" sign (page 7) at one end of the table and the "Not Living" sign (Page 8) at the other end. Have student volunteers come to front one at a time to sort the items (one item each) into "living" and "not living" categories and move them to the side of the table with the appropriate sign. When everything is sorted, briefly discuss what is in each pile. If anything is in the wrong pile, or feasibly could have been put in the wrong pile (e.g., a synthetic plant), discuss it with the class. Tell students you will be discussing what we need for living things to live. (*Suggestions of living items: a plant, a class pet, an earthworm, photos of living items [pets, people, trees, etc.]. Suggestions of non-living items: a rock, soil, something plastic or metal, a synthetic plant, etc.*)

Step 2. Ask students to brainstorm what things are necessary for life. Record the answers on the board.
The four answers you are looking for are air, water, soil/land, and sunlight. You may have to help them with the soil/land and sunlight answers.

From here on, discussion questions alternate with procedure. Follow the order of questions/procedure as given.

Questions for Discussion 1 - 7:

Tailor your level of discussion and use of terminology to the age of your audience. When discussing things such as pollution and recycling, ask if they know what these are and be prepared to explain and provide examples, if necessary.

1. Direct students' attention to the living things on the table. **Ask how the living things need/use clean air, water, land (soil), and sunlight. Discuss how/why each of these things is needed. See "Background" on page 2.** *For example, plants need all four to grow and to make food (photosynthesis). Mammals needs clean air to breathe, clean water to drink, clean soil/dirt/land to live and play on, and sunlight to keep warm and for light. Mammals also needs all of these because they rely on plants (directly and indirectly) for food. (Fifth graders begin to learn about photosynthesis [using the term]; younger than that, explain basic needs [plants need these things to make food; all living things use this food] without going into terminology.)*
2. **Ask a few students what they ate for breakfast that day.** *Show the connection to plants for all food.*
3. **Are air, water, soil, and sunlight living things or non-living things?** *Non-living.*
4. **What do you think would happen if we didn't have sunlight?**
Steer answers toward: plants couldn't grow (would die), plants couldn't "do" photosynthesis, plants couldn't supply food for us or other animals. Other appropriate answers: cold, dark, etc.
5. **What do you think would happen if we didn't have clean air?**
Steer answers toward: plants couldn't make food (photosynthesis), so they wouldn't be able to supply food for us or other animals. Other appropriate answers: it would be hard for people and animals to breathe, it could make us sick, it blocks out views, it stinks, etc.
6. **What do you think would happen if we didn't have clean water?**
Steer answers toward: plants couldn't grow (they would die) or make food (photosynthesis), then they wouldn't be here to supply food for us or other animals. Other appropriate answers: drinking dirty water makes us sick, dirty water stinks and looks bad, dirty water kills fish and other things that live in it, dirty water is no fun for swimming/wading/fishing/boating.
7. **What do you think would happen if we didn't have clean land (soil/dirt)?**
Steer answers toward: plants couldn't grow (would die), because they couldn't get nutrients and minerals from the soil. Plants also need the soil to hold the water that they need so that their roots can access it. If plants die, they wouldn't be here to supply food for us or other animals. Other appropriate answers: dirty land/soil/dirt looks bad, dirty land can make water dirty.

Procedure, Cont.

Step 3. Tell students they are going to use some plants to observe what happens to them without clean air, water, soil, and sunlight. Get out the six plants. Invite one volunteer to the front to help with each plant (six volunteers total, one at a time).

Step 4. Explain what they will do with the plants. Have your volunteers do each of these things. Using a marker, have students label each of the pots with its pot number. (Leave these instructions with the teacher/group leader so that she/he can reference the numbers on the pots with the instructions below.)

Pot 1: Will be well taken care of – appropriate sunlight, water, air, soil, etc. *Water plant, place in window (or wherever).*

Pot 2: Will be placed in a dark place with no sunlight, but will be watered, will get air, and has good soil. *Water plant, place in a dark place (e.g., a closet or cabinet).*

Pot 3: Will get sunlight, water, etc., but we're going to take away its soil. *Using paper towels and/or the plastic garbage bag, carefully remove the plant from the pot, dump the soil out, and remove the soil from the plant roots. Fill the pot ½ full of gravel and plant the plant; add remaining gravel. Water and place in window (or wherever).*

Pot 4: Will get sunlight and was planted in good soil and will be watered, but will be sealed in plastic bag so it doesn't get any air. *Water and seal in bag (expel all air first); place in window (or wherever).*

Pot 5: Will get sunlight, etc. and has good soil, but won't get any water. *Place in window (or wherever).*

Pot 6: Wait to discuss until after Question 8.

As you do this, ask students what they think will happen to each and why.

Questions for Discussion, Cont.:

8. Ask students if they know what pollution is. Discuss/explain, if necessary. **Do we want our air, water, and soil/land to be polluted? NO! How do air, water, and soil get polluted?**

Potential Answers: littering; car exhaust; factories; pouring things (chemicals) into the water, on the ground, or down storm drains; not picking up after pets; throwing things away instead of recycling or reusing, etc. Be sure items related to water pollution – especially pouring things (e.g., soda, motor oil, etc.) on the ground/into water/down storm drains – gets discussed.

Procedure, Cont.

Step 5. Pot 6. Will get sunlight, air, soil, and liquid to drink, but instead of clean, clear water, we are going to “water” this plant with vinegar. It looks just like clean, clear water, but it's definitely not! **Do people drink or eat vinegar?** While we use some types of vinegar in small quantities for cooking or on salads or French fries (balsamic vinegar), we usually don't drink or eat distilled white vinegar directly.

Also point out that the vinegar can represent many types of pollutants in water in the environment.

Should plants drink vinegar? What will happen to this plant? Why? Is polluted water (or air or soil) better than no water/air/soil at all? How could water in “real life” get polluted? *Water the plant with vinegar and place in window (or wherever).*

Step 6. For DEQ Employees Explain that there are laws and rules that people and businesses must follow to help keep the air, land, and water clean. Explain who DEQ is and that this is what DEQ does. Explain your particular role. Point out there are also easy things we can all do to help (more detail on this in Discussion Question 9). Keep all of this simple/brief.

Questions for Discussion, Cont.:

9. What can you (a kid) do to help make sure we have clean air? Clean water? Clean land/dirt/soil?

Potential Answers:

Air: Don't ask mom or dad to drive you in the car; walk, ride your bike, take the bus, or ride with a friend (carpool). Ask mom and dad to turn off the car engine when waiting to pick you up. Plant a tree. Remind mom and dad to do all their errands in one trip. Remind mom and dad to not burn garbage.

Water: Don't put/pour litter or liquids (like soda or motor oil) on the ground, in streams, lakes, etc. or down storm drains. Be nice to plants growing near streams (don't pull up, run over, etc.) to prevent erosion. Plant trees or other plants near streams. Remind mom and dad to not use more lawn chemicals than they need. Pick up after my dog. Pick up my litter and other people's.

Land: Pick up my litter and other people's. Recycle (cans, paper, plastic, bottles, etc.). Reuse items (e.g., use the back of old paper for drawing). Use both sides of paper. Ask mom and dad to buy recycled things. Give away old toys, etc. (to charity, friends, siblings) instead of throwing them away. Use things that can be used again (e.g., use a lunch box instead of a new lunch sack each day).

Procedure, Cont.

Step 7. Teachers – in the days/weeks to come. Have students compare the plants as the days go by and focus again on needs. **What is living? Living, but looking sick? Dying?** If things do not grow as they should (that is, the pampered plant dies and/or another plant thrives), use that to segue into “why?”: needing things in the correct quantities and conditions (that is, it got sunlight, water, etc., but maybe too much or not enough of something), adapt to changing environments, etc. *Don't forget to water the plants (except Pot 5) as necessary. When watering Pot 4 (no air), unseal bag and quickly water, then expel air from bag and quickly re-seal. Remember to water Pot 6 with vinegar. Use the pampered plant as a guide of when to water the other plants/gauge their light needs, etc. (for example, if the pampered plant appears to be getting too much light, move it and move the other plants too [except Pot 2] to keep the other plants from dying from causes other than the intended ones.*

Remember to leave these instructions with the teacher so that he/she can reference the pot numbers to the pot treatment.

Assessment/Follow-Up:

After the Activity:

- Quiz students on the four essential things needed for life.
- Have students create collages from pictures cut from magazines. Collages could be of living things, non-living things, or the four things essential for life (air, water, soil/dirt, sunlight).
- Have students individually observe the plants on a regular schedule and record their observations, then report on what happened and why. (This is different than Step 7, which is a more informal class discussion.)
- Complete “DEQ Kids: Who is Protecting Idaho’s Clean Air, Land, and Water?” Available for download at http://www.deq.idaho.gov/air/educ_tools.cfm, Student Resources or from your DEQ regional office. (DEQ regional office employees – get from your office’s publications coordinator; state office employees, get from Leslie Nelson, x0383.)

Additional Resources:

Air Quality in Idaho (links to air information on DEQ's Web site) <http://www.deq.idaho.gov/air/index.cfm>

DEQ Educational Tools: http://www.deq.idaho.gov/multimedia_assistance/educators_students.cfm

DEQ Kids Activity Booklet Series

Do You Care About Air? http://www.deq.idaho.gov/air/educ_tools.cfm, Student Resources

Let's Talk Trash... http://www.deq.idaho.gov/waste/educ_tools.cfm, Student Resources

Water Does a Lot For Us...http://www.deq.idaho.gov/water/educ_tools.cfm, Student Resources

Who is Protecting Idaho's Clean Air, Land, and Water...? http://www.deq.idaho.gov/air/educ_tools.cfm,
Student Resources

Sun, Soil, Water, and Air. Songs for Teaching by the Banana Slug String Band.

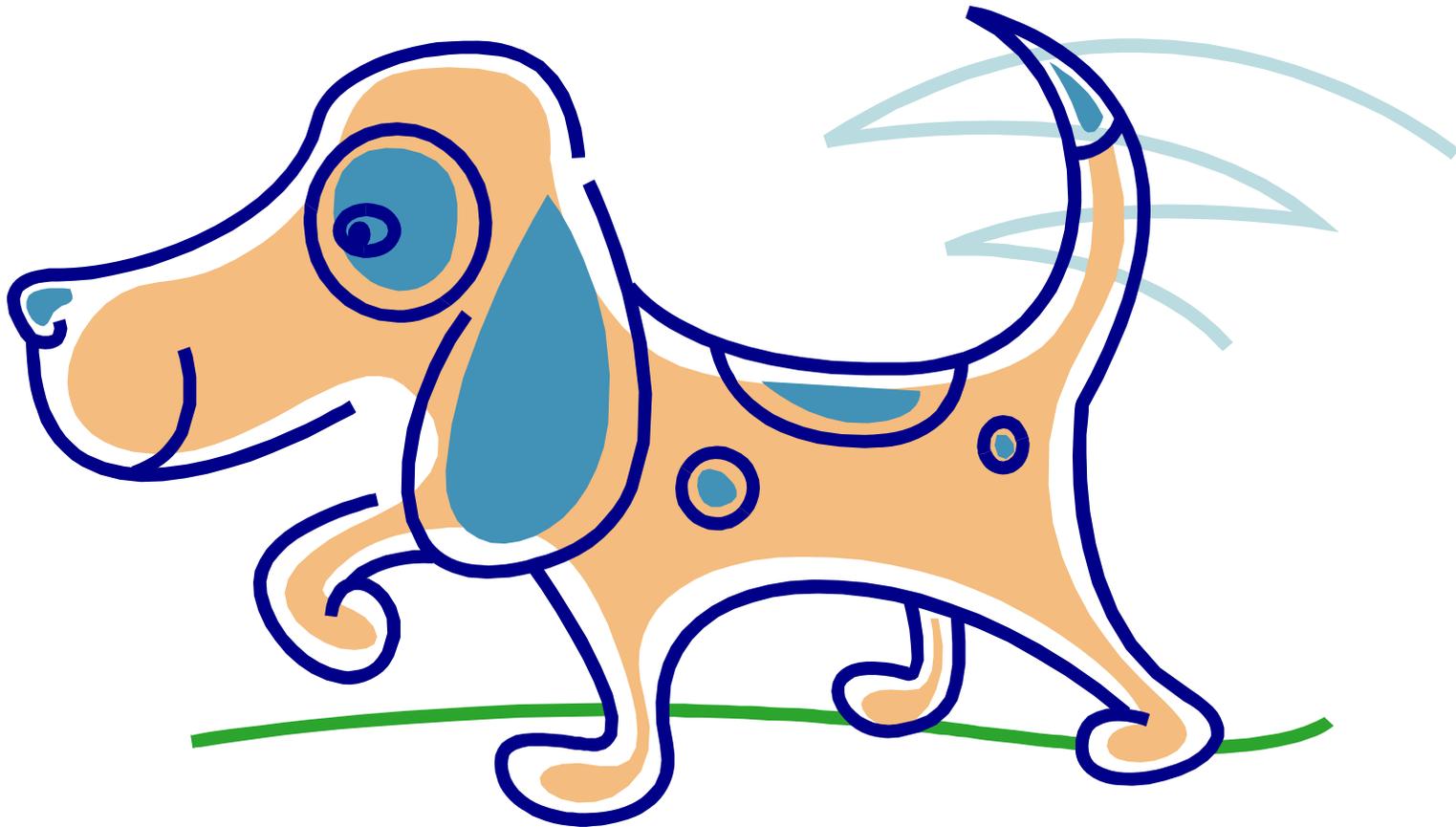
<http://www.songsforteaching.com/bananaslugstringband/sunsoilwaterair.htm>

Waste (links to waste/land information on DEQ's Web site) <http://www.deq.idaho.gov/waste/index.cfm>

Water (links to water information on DEQ's Web site) <http://www.deq.idaho.gov/water/index.cfm>

What Does DEQ Do? http://www.deq.idaho.gov/about/deq_purpose.cfm

Living



Not Living



