



Welcome to Ag@School!

Class sets of this magazine, aimed primarily at 4th grade level, are **FREE** to subscribing Washington teachers. Instructions for subscribing are on Page 6.

This is the last of three issues for 2019-2020. **Your subscription for next year will NOT be automatically renewed.** We need to hear from you that you would like to continue receiving the subscription. **PLEASE RENEW NOW** for next school year, and **NO LATER** than mid-September to insure you receive the 1st issue!. Renew at www.waic.net under subscription button!

Produced by Washington Ag in the Classroom, Ag@School is designed to help teachers meet student educational goals as well as develop agricultural literacy.

- This issue is designed to help students understand:
- farmers and ranchers are caretakers for soil and water resources, so every day is Earth Day for them, not just one day a year
 - what the term “sustainable agriculture” means
 - the importance of seeds
 - grazing animals benefit our environment

Teacher Guide

- Reproducible activities in the teacher guide expand on concepts covered in the magazine.

Why Agricultural Literacy?

Agriculture is society’s lifeline and an integral part of our heritage. Unfortunately as our country moved from agrarian to urban, people lost contact with the main industry necessary for survival—food production. America’s largest industry has dropped from public discourse except for the occasional media splash. Yet we all eat, and it is important that we have an understanding of where our food is produced and who we depend upon to deliver it to our tables.

Less than 2% of the US population is involved in agriculture production (farming) yet 24 million American jobs are dependent upon it. Agriculture is more than working the land and tending the animals. This huge industry—production, processing, transportation, and marketing—generates billions of dollars each year. Agriculture is vital to national security, a stable economy, and the US trade balance.

Why Agriculture?

Teaching about agriculture is an ideal way for students to make real-life connections to science, math, and social studies concepts. Agriculture is relevant because students encounter it daily. Who doesn’t enjoy talking about food? Nearly everything we eat, wear, use- even some fuel that powers cars and buses, comes from plants and animals grown on farms. Agriculture provides perfect real-world connections to STEM and makes learning relevant to students.

Helping students understand the farm-to-table connection is important in our consumer-driven society. Teaching students to be agriculturally literate connects their learning to everyday life.

Browse the Matrix!

Visit our website at <http://www.waic.net> and browse the National Ag in the Classroom link to the Curriculum Matrix.

The Agricultural Literacy Curriculum Matrix is an online, searchable, and standards-based curriculum map for K-12 teachers. The Matrix contextualizes national education standards in science, social studies, and nutrition education with relevant instructional resources linked to Common Core Standards.



Search our instructional, classroom ready resources now! After you find what you need, consider storing them in your personal binder — MyBinder! Create a MyBinder profile now, or login.

Vocabulary Words

Each issue will introduce several words that may be unfamiliar to students. These words will appear in **bold** type the first time they are used.

Words in the this issue include:

Natural resources, soil, solar energy, air, water, sustainable agriculture, topsoil, conventional agriculture, organic agriculture, condensation, evaporation, groundwater, percolation, precipitation, transpiration, embryo, germinate, dormancy, cotyledons, monocots, dicots, annual, perennial, biennial, winter annuals, summer annual, cereals, legumes, humus, pollen, nectar, stone fruit.

Definitions can be found scattered throughout the magazine.

Ag@School Funding

Many businesses, organizations, public agencies and individuals contribute money and time to providing you this magazine at no cost. They are listed on Pages 5 and 6 along with a suggested activity for research and writing letters of thanks. We suggest using the activity as a small group project both for internet research practice and, of course, letter writing experience.

Standards Alignment

This publication is aligned with 4th grade standards for Washington state students

Social Studies EARLS (Essential Academic Learning Requirement) –

Economics 2.2.1, 2.4.1

Geography 3.1.2

Common Core State Standards (CCSS)

Reading –

Questioning, Inference, and Interpretation - RI.4.1, Themes and Central Ideas –RI.4.2

Connections – RI.4.3, Academic vocabulary RI.4.4, Text Structures and Features – RI.4.5, Points of View/Purpose – RI.4.6,

Visual/Auditory Media and Information Sources – RI.4.7, Augment and Reasoning – RI.4.8, Fluency – RF.4.4a.

Writing –

Argumentative- W.4.1b, Informative/Explanatory – W.4.2, Narrative – W.4.3, Task, Purpose and Audience –W.4.4 , Technology –W.4.6, Research – W.4.7, Access and Organize Information – W.4.8.

Speaking and Listening –

Collaborative discussions – SL.4.1, Evaluate Presented Information – SL.4.2, SL.4.3

Language –

Language conventions – L.4.3

Reference materials – L.4.5c

Math –

Multiplication and Division - 4.NBT.B.5, Measurement – 4.MD.A.2

Science (Next Generation Science Standards -NGSS):

Energy 4-ESS3-1, Structure, Function and Information Processing – 4-LS1-1, Earth and Human Activity 4-ESS3, Engineering Design 3-5-ETS1-1.

Cover – Every Day is Earth Day

April 22 is Earth Day—a day intended to inspire awareness and appreciation for the earth’s natural environment.

Farmers understand that the bounty of crops they are able to produce is dependent upon the sun’s energy, adequate water, and a healthy soil ecosystem. Sustainable agriculture must be environmentally friendly by taking care of the soil and using water efficiently, but it must also be profitable enough to keep farmers in business, and able to improve the quality of life for the farmer, farm workers, and all of society.

Cover – answers: 1. solar energy 2. soil 3. water 4. air

Page 2 – Agriculture Feeds the World Think and Discuss

Discussion starters:

1. *Why are farmers important environmentalists?* It is the right thing to do and they know that they need to care for the land and livestock in order for it to be productive and prosperous in the future. Farmers are “caretakers” of the land. Their livelihood depends on keeping the soil, water, and air clean and healthy.
2. *Talk about the true definition of sustainable agriculture.* What would happen if people could not make a living? If all US farmers went out of business what would replace agriculture on the land? Where would people get their food? How secure would our food supply be if we had to rely on other countries to grow it for us?
3. *What are Washington’s natural resources?* Brainstorm a list of all the wonderful things that occupy our land, air and water. Don’t forget people! Why is it necessary to protect these treasures?
4. *How are farmers able to grow more food per acre?* By using science and technology farmers are able to grow more with less. Please visit Vol 19 issue 2 (Technology issue) to re-visit the many ways farmers use and apply science and technology to farming practices.
5. Discuss the importance of proper care of air, water, and soil and how urban and rural residents might have differing views on the best use of these resources (water for example, farming use vs recreational use).

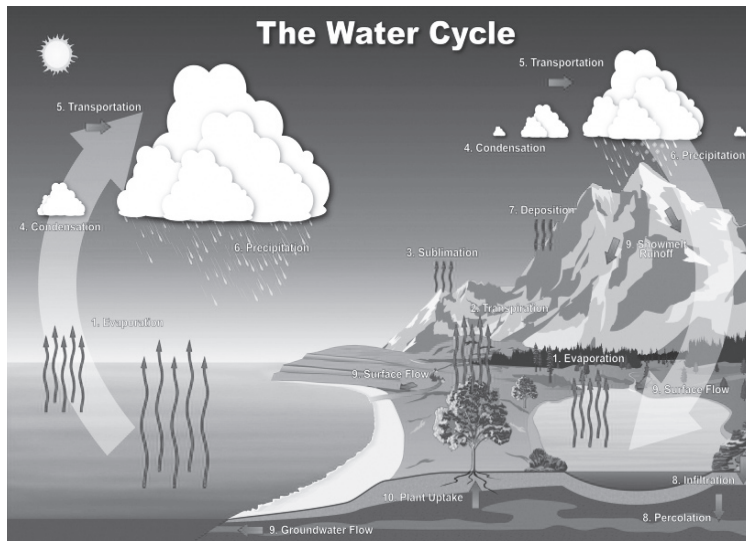
Page 2 – Sustainable Agriculture

Discussion starters:

- **Why are farmers our most important environmentalists?** (Because they manage such a large amount of land—over 46% nationally and they know that caring for the land means having the resource in the future.)
- **Why must farmers make a profit?** (Farmers are self-employed, so when they sell their crops and animals, that money is used for paying their expenses, investing in their business, and is also their paycheck to pay for their own personal expenses like food, clothing, shelter—as well as benefits like vacation time and health insurance. Farmers must earn a profit in order to stay in business.)

Page 3 – Water

The most common material on earth



Discussion starters:

- How is water cleaned through the water cycle (evaporation—also large particle contaminants like silt are trapped in percolation process)
- What impurities might be left behind when water evaporates?
- What can people do to prevent impurities from getting into the water in the first place?

Reinforce that salt water cannot be used for drinking water or to water plants and animals. The amount of water in the world is constant although it changes location and physical form.

Total Water on Earth – Check the Math

Explain to students that the chart on page 3 is a combination of a pie chart and a bar graph. The bar graph is expanding the very thin slices of the pie chart that represent groundwater and surface water. (In fact, for visual reasons, the surface water portion of the graph is out of scale so that it can even be seen). Students should be impressed by how much of the water is contained in the oceans, and how little of the total is surface water (lakes, rivers, and the atmosphere).

Water in the atmosphere is mostly in the form of water vapor. If it all fell as precipitation at once, the Earth would be covered with only about 1 inch of water. Students should recognize that each zero to the right of a decimal point is also a factor of 10. For instance, if told that all plants and animals contain 0.0001% of the total water, they should reason that the atmosphere contains 10 times as much (0.001%). They should also be able to recognize that 0.001% is the same as 1/1000 of 1%.

Water Cycle Song

(to the tune of “She’ll Be Coming ‘Round the Mountain)

Water travels in a cycle yes it does,

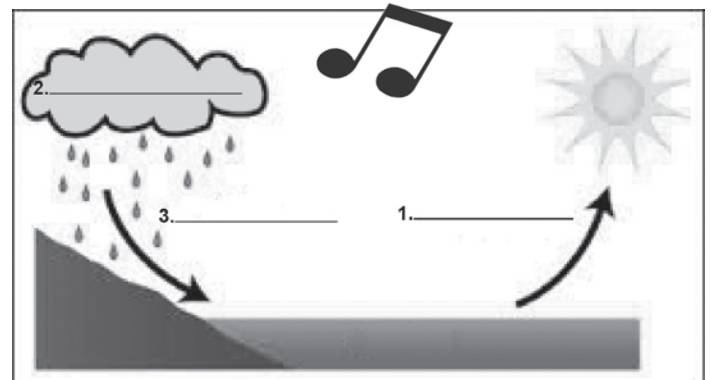
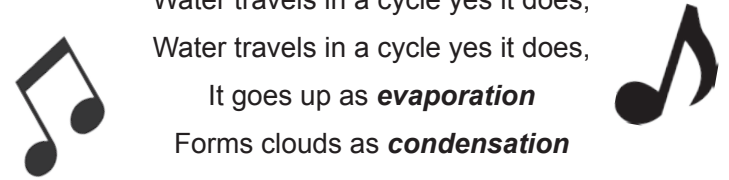
Water travels in a cycle yes it does,

It goes up as **evaporation**

Forms clouds as **condensation**

And comes down as **precipitation**

Yes it does!



Page 4/5 – Seeds – Miracles of life

Choose a variety of vegetable seeds. Let students examine them with magnifying glasses before planting. Use clear plastic cups with some potting soil. Plant seeds against the side of the cup so students will have a window to view the germination. Plant some seeds upside down or sideways to see what happens. Be sure to keep the potting soil moist, but do not overwater—remember that soil should be 50% empty space. If you fill the empty space with water, you will drown the plant.



As plants emerge, note the roots and the sprout. How many leaves does each seed produce? Is it a monocot or a dicot? How long does each seed take to germinate? Have students record the results.

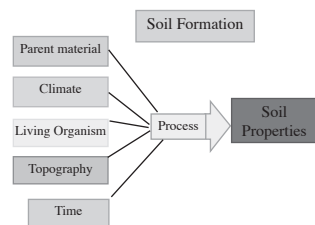
Kitchen Seed Search

Students may discover quite a few seeds in their kitchens or on grocery shelves including: anise, caraway, celery, coriander, cumin, dill, dry beans, fennel, flax, lentils, mustard, pepper, poppy, sesame, and sunflower.

Page 6 - Soils

How Is Soil Made: 5 soil forming factors

1. **Parent Material:** Chemical and physical weathering break down rocks over time. The parent material dictates what texture the soil has, whether it is sand, silt, or clay (or a combination). Texture affects the soil's ability to store water and nutrients, and therefore affects plant growth.
2. **Climate:** The higher the precipitation and temperature, the greater the weathering.
3. **Living organisms:** the number of organisms in the soil depends upon the climate. Soils in warmer, moister climates have more microbes. The organisms breaks down the humus in the soil and turn it into usable nutrients for more plant production. More plant production adds more humus. This increases the soil's nutrient content and water holding capacity.
4. **Topography:** Soil formation on steep slopes will not be as great because the water will run off and not percolate through the soils and may also cause loss of soil through erosion.
5. **Time:** the more time that passes, the more intense the soil forming processes are, which usually means the soil is deeper.



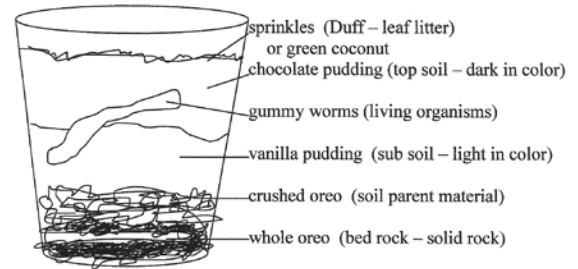
The Soil is Alive

The soil is home to an incredible number of organisms, most of them so tiny we cannot see them without a microscope. They decompose organic matter, take nitrogen from the air and make it

available to plants, improve soil structure, and control crop pests. There are all manner of creepy-crawlies---algae, bacteria, rotifers, fungi, protozoa, nematodes, arthropods, earthworms---all part of the soil food web. The human food system would collapse without the complicated food web that exists in the soil. We are totally dependent upon the soil web to provide and maintain the growing environment for larger plants that feed us and the animals we use for food. Farmers understand this delicate balance. They know if they treat the soil well, it will be able to keep giving back...not just for us today, but for future generations too. If microscopes are available for your use, it is well worth the effort to examine soil samples under magnification. Observing this fascinating world may be just the impetus

students need to encourage further scientific investigation. There are also short You-tube videos of soil microbes and pond water organisms.

SOIL PROFILE - SERVE EDIBLE DIRT: Explain the significance of each layer.....



Page 8 - Every day is Earth Day!

Discussion starter:

Discuss why every day is Earth Day to a farmer. Why must he take care of natural resources?

Writing prompts for this issue:

- How would you describe the role of agriculture in managing or taking care of natural resources?
- Persuade the reader that the goal of agriculture should be to grow more food on less land. Give reasons to back up your argument.
- Explain the importance and the process of the water cycle in detail.
- Describe the importance and process of pollination for food production.

Visit www.waic.net

FOR LINKS TO:

- Lessons
- Activities
- Information
- Student Websites
- and more!

Washington Ag in the Classroom
is your launch pad for information and activities about all fields of agriculture!

Publication and Credits

Ag@School is a publication of Washington Agriculture in the Classroom, a non-profit entity created in 1981 to encourage and help teachers increase agricultural literacy in their students. Both public and private groups including the WA Dept. of Agriculture, WSU, commodity commissions, farm organizations, agri-businesses and individuals, support this mission. Teachers may reproduce any pages for use.

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