



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 2016-2017. **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!. Thank you in advance for your help. The first issue next fall should arrive at schools around the end of September.

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:

- the role of agriculture in the conservation of our natural resources, and its importance to the industry
- what the term sustainable agriculture means
- that good farmland is a very limited resource
- the economic and environmental impact of various agricultural commodities to Washington
- that Earth Day for agriculture is not just once a year, it's every day

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 1% 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.

Augmented Reality

Augmented reality (AR) is a live direct or indirect view of a physical, real-world environment whose elements are augmented (or supplemented) by computer-generated sensory input such as sound, video, graphics or GPS data. (Wikipedia)

Ag@School has added this feature using the Aurasma platform. As you read you will see pictures with the Aurasma logo (A) in the corner. Scanning the picture with your phone or tablet will lead you to a short video which will enhance understanding of a concept.



You can also look online at <http://www.waic.net> under publications for the online version of this magazine. With the online version you can simply click on the picture to show the videos to the class.

We hope you enjoy this feature, it's a work in progress but we think that it will be a great way to make connections to this magazine and to agricultural information.

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 this issue include: soil, natural resources, conservation, stone fruit, pollination, stamen, pollen, pistil, stigma, ovule, self-pollination, cross pollination, nectar, humus, conservation tillage, condensation, evaporation, groundwater, aquifers, percolation, precipitation, transpiration, ruminants, and watershed.

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.

Page 2 – Farmers are Environmentalists 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?

“Fruitful State” answers

1. Apple Capital of the World
2. Eastern WA has less precipitation (and irrigation is controlled water application)
3. $9200 \times 7910 = 72,772,000 \#$ or 36,361 tons (2000 lbs in a ton)
4. Whole grapes have more fiber than juice; both juice and whole grapes are much superior nutritionally than sugar-packed jelly

Page 3 – Pollination Crossword

Across: 3- nectar 5 – pollination 7 - pollen 8 – bees

9 – ovule

Down: 1 – seed 2 – stamen 4 – stigma 6 – anther

7 – pistil

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Across: 3- nectar 5 – pollination 7 - pollen 8 – bees 9 – ovule

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Cover – Give a Cheer For Soil!

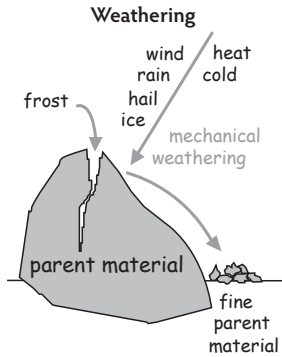
April 22 is Earth Day—a day intended to inspire awareness and appreciation for the Earth’s natural environment.

Students need to understand the critical role of soil in our environment and that farmers appreciate and care for the soil on their land. Satisfying the global demand for food (we need to double food production by 2050 to feed the expected 9 billion people) requires farmers to apply the best production practices to ensure the sustainability and health of every farmed acre.



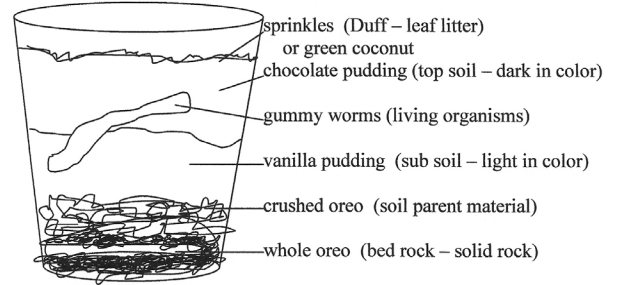
Page 4 & 5 How Soil is Made

The world has thousands of different soils (70,000 just in the US). Parent rock (like lava, limestone, granite) is broken apart into finer particles by a process called weathering. Temperature and water are critical in this process. Water dissolves minerals and is important in chemical reactions. Freezing and thawing also break down rocks. Plant roots can enter cracks in the rocks and break them apart. Roots can form acids that help break down particles. When plants and animals die, they add organic matter to the weathered parent material. Bacteria, fungi, and worms enrich the soil by breaking down organic matter to form topsoil. Soil formation is very slow, taking thousands or even millions of years.



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.

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

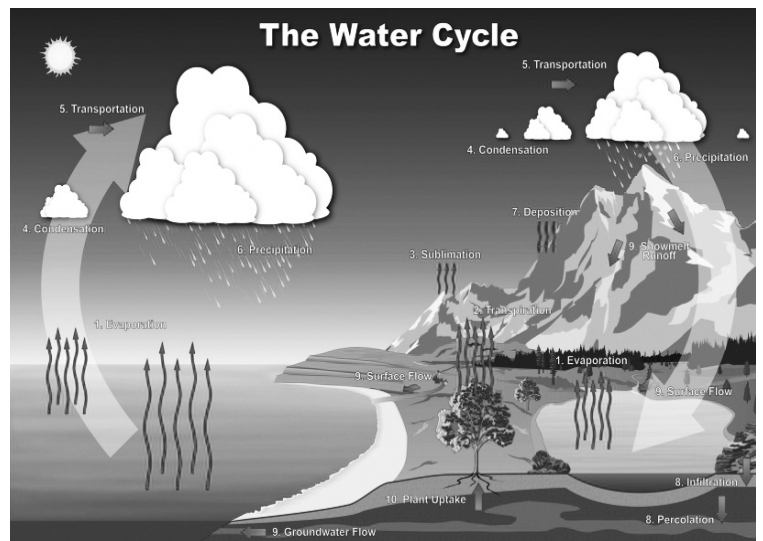


If microscopes are available for your use, it is well worth the effort to examine soil samples under magnification. Observing this fascinating world may be just the impetus students need to encourage further scientific investigation. There are also short You-tube videos of soil microbes and pond water organisms.

Natural Resource puzzle answers

1. solar energy 2. soil 3. water 4. Air

Water Cycle

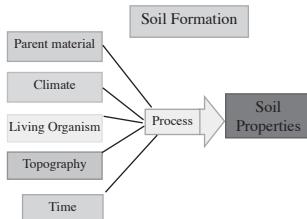


Discussion starters:

- 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.

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 abil-

ity 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

Total Water on Earth – Check the Math

Explain to students that the chart on page 7 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%.



Page 6 - Forestry



To learn more about the authors of the article, please visit their website at www.wafriends.com. They have a teacher section as well.

Clams in Agriculture? to learn more about the authors of the article, please visit their website at www.skookumshellfish.com.

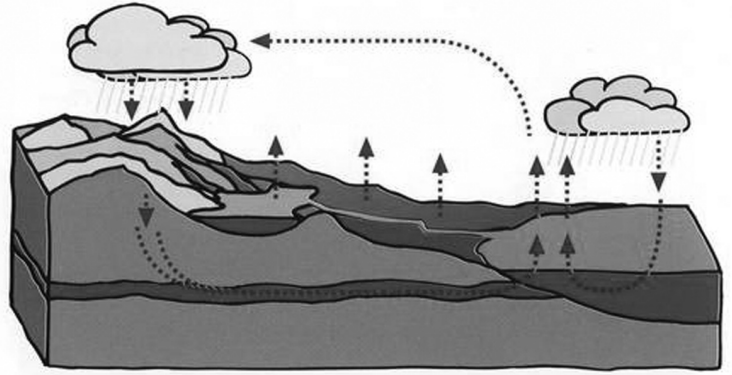
Page 8 – Every day is Earth Day!

Discussion starter:

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

Make a quick watershed model by crumpling newspaper

and draping a piece of plastic over the ‘hills’. Spray on water and have students trace the movement downhill. Discuss what watershed you live in and where your runoff eventually ends up.



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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- School's mailing address (for postal delivery)
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