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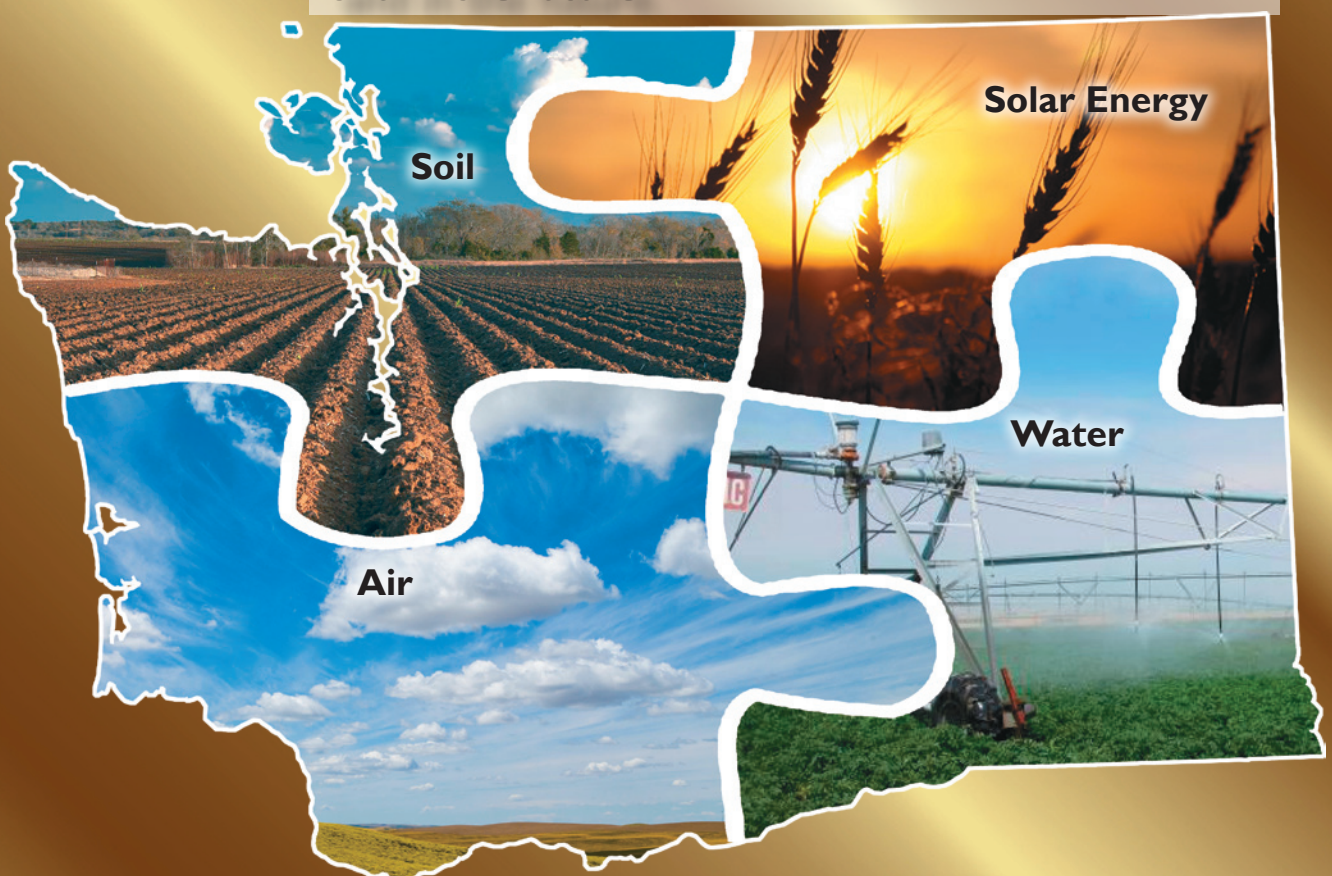
Earth Day is Every Day for Farmers!

Natural resources fit together like puzzle pieces to sustain life on earth. Caring for soil and water resources allows farmers to produce food today, and in the future.



Fill in the blanks with the correct resource:

1. The sun provides _____ which plants need to grow.
2. Healthy _____ provides nutrients and minerals that are taken up by plant roots.
3. People, crops, animals, industry, aquatic life, and recreation all must share the _____ supply.
4. Trees and crops use carbon dioxide and produce oxygen, making the _____ healthier for people.




Today's Children…Tomorrow's Leaders

Sustainable Agriculture: Using technology and resources to keep farms profitable, improve human lives, yet respect the environment.

Agriculture Feeds the World

If you ate food today, you should thank a farmer! Producing food to feed 7.8 billion people is no small task! Farmers understand that we need to use resources to produce food today without using up those resources. We will need those same resources to produce food in the future. While countries around the world will take one day, April 22, to celebrate and appreciate our environment, **everyday is Earth Day for farmers**.

This issue of Ag@School touches on two of the most important resources, soil and water. Every ecosystem on earth relies on soil. It is a complex layer teeming with life. Soil is where the atmosphere, water, sunlight, and the earth's crust mix and interact. Almost all the biological activity in the soil takes place in the top one or two inches (called the **topsoil**). Water is essential for all life. To produce food for you to eat, farmers need water, either rain or water stored for irrigation.

Farmers are able to grow more food on each acre by using science and technology. They choose improved seeds and plants and often test the soil before planting to determine the composition, pH (acidity or alkalinity), and balance of nutrients present. Results are used to determine the proper type and amount of fertilizer to apply for the specific crop they are planting. Farmers also manage pests and use better equipment and techniques to increase production.

Farmers know and appreciate their land and the advancements in science and technology which have allowed farmers to be more efficient at using critical resources.

"Treat the earth well; we do not inherit the Earth from our Ancestors, we borrow it from our Children."
- Ancient Indian Proverb

SUSTAINABLE AGRICULTURE...

American agriculture is the most earth-friendly in the world. Our farmers know they need to be friends of the land, soil and water. Why? If they treat the earth well, it will be able to keep giving back… and not just for us today, but for future generations too.

Sustainable agriculture meets the needs of today but does not use up resources for the future . It must be:

- Environmentally friendly; taking care of the soil so it will remain productive now and in the future
- Profitable enough to keep farmers in business
- Able to improve the quality of life for farmers and all of society

Both conventional agriculture and organic agriculture can be sustainable.

Organic food is produced without using fertilizers made with synthetic ingredients, genetically engineered seeds, or synthetic pesticides (but natural pesticides and mineral salts can be used).

Organic food accounts for just over 6% of total sales in Washington. Organic production certainly meets the first condition of sustainability being environmentally friendly. Organic food is usually more expensive than conventionally produced food. It needs to be, because it is often more expensive to produce organic crops because there is more labor involved. The majority of organic foods are higher cost fruits and vegetables. It is easier to farm organically on smaller farms, or with established fruit trees or vines that do not require annual planting.

Sustainability does not mean raising crops without the benefit of commercial fertilizers, pesticides or biotechnology.

Large-field crops like grains are less likely to change to organic because there is not enough profit to pay for the extra labor, while growing fewer bushels, and losing a year of production when producing green manure.
Remember to be sustainable, farmers have to make enough money to stay in business.

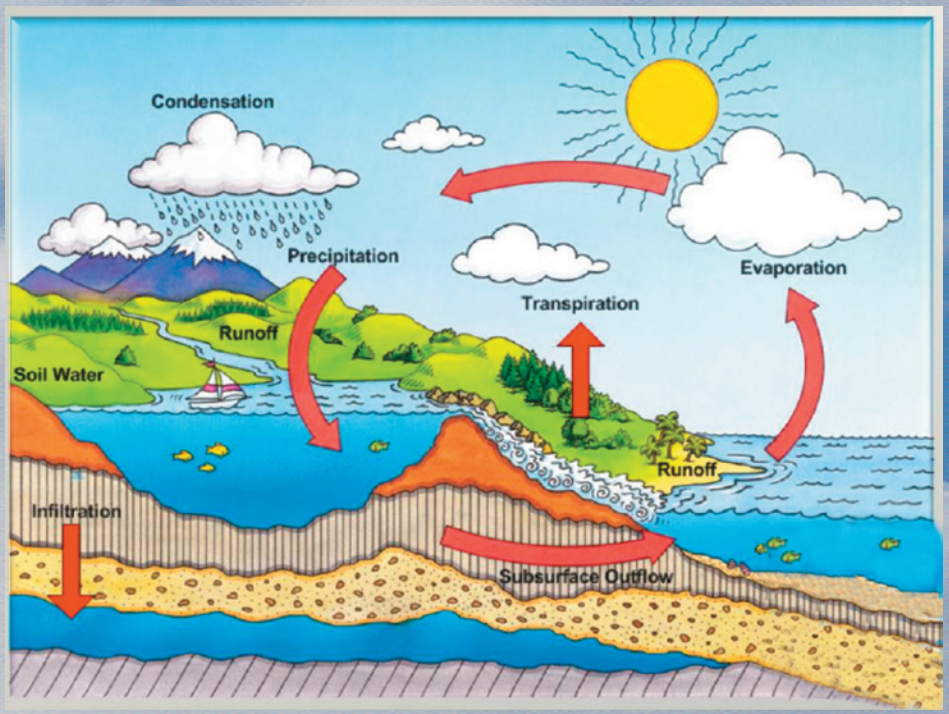
It is true that organic production does not use synthetic (man-made) fertilizers. If we went to only organic production, we would have to produce the necessary nitrogen (the main plant nutrient) by either:

- Converting 1/3 of all crop land into green manure production (where crops are plowed down into the soil). This is a great method for improving the soil and adding nitrogen, but it takes that land out of production for that growing season (and perhaps for a second year in dryland Eastern Washington in order to build up enough soil moisture for a grain crop).
- Or increasing the number of cattle to produce the manure necessary to replace synthetic fertilizer. The US currently has 97 million head of cattle; we would need to add another billion head. Can some of them stay in your backyard?

Isn't organic food better?

The answer is more about varieties and handling than production systems. Locally grown food (whether organic or conventional) may indeed taste better. Characteristics that make fruits and vegetables ship well, process easily, or extend the shelf-life may come at the expense of flavor and texture. Buying from local growers gives you the chance to try varieties of red, juicy strawberries, flavorful tomatoes, and carrots with more vitamin A.

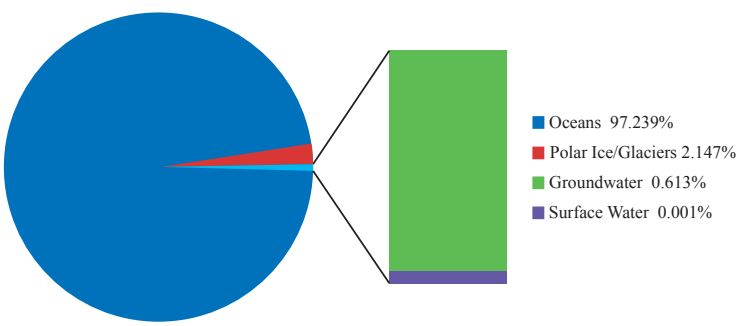
Water–The Most Common Material on Earth



http://youtu.be/vYBjPE0wekw

Total Water on Earth

Remember that about 70% of the earth is covered by oceans and those oceans hold more than 97% of all the water. Just over 2% of the water is frozen in glaciers. That means that less than 1% of the earth's water is available for drinking, and most of that is groundwater. The very thin purple line at the bottom of the bar to the right of the pie chart represents all the combined water in lakes (0.017%), the atmosphere (0.001%) and rivers (0.00001%)



How Much Water is Enough? There's An 'App' for That!

Farmers can use their smart phones or computers to operate center pivot irrigation systems. They can also use an irrigation scheduling program that will calculate how much water to use based on soil types, weather (rain, wind, heat), crop being grown, how much water has already been applied, etc. The goal is to keep crops growing at an optimum without wasting water. WSU researchers at Prosser developed the program.

The water cycle is the circulation of the earth's water in a never-ending process. The heat from the sun causes (1) water from the ocean, streams, lakes, and even plants to evaporate. As the water vapor rises, it is cooled by the upper air. Cold air cannot hold as much water vapor as warm air so (2) water vapor condenses into water droplets and creates clouds. The wind carries clouds over the land and (3) water falls back to earth as precipitation.

Water is Life!

All living things (plants, animals, humans) must have water to survive. **The amount of water on earth stays the same. It is never 'used up', but continues to move through the water cycle**. However, the water in a specific location can change in amount or form, sometimes we have a drought and sometimes we have extra snow or rain. A growing human population puts pressure on available water.

Condensation: The process of water vapor in the air turning into liquid. As water vapor rises it cools and becomes liquid again. These droplets form around dust particles in the air and become clouds.

Evaporation: Changing from a liquid or solid state to a vapor or gas. Only pure water evaporates. Substances like salt and minerals are left behind when water evaporates.

Groundwater: Water which has seeped below the earth's surface and is held there in the underlying sand and gravel. Water bearing layers are called **aquifers**. In Washington, 2/3 of the people get their drinking water from aquifers.

Percolation: The movement of water into soil through pores, holes and cracks.

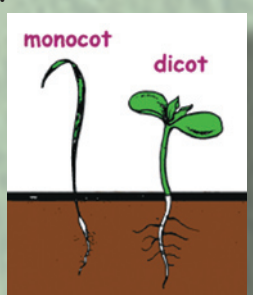
Precipitation: Rain, snow, hail, sleet, dew, and frost.

Transpiration: Water that is absorbed by plants, usually through the roots, is evaporated into the atmosphere from the plant surface through leaf pores.

Seeds - Mira

Thanks to seeds, all human, plant and animal life on earth survives. Without seeds, we would die. The life cycle of most plants begins with seeds. Seeds vary in size from nearly microscopic orchid seed to the gigantic seed of the coco de mer which could weigh over 38 pounds. A seed coat layer protects the tiny baby plant (**embryo**) inside. Most seeds also contain a supply of stored food (starch, oil, protein) to start the embryo on its way.

Seeds sprout, or **germinate**, when there is a certain amount of warmth and moisture. Most seeds need a period of rest or **dormancy** before they start to grow. When germination occurs, the seed coat splits, a rootlet starts downward, and a sprout bearing seed leaves called **cotyledons**, makes its way to the soil surface.



Grasses (including corn, wheat, and other grains) have only one cotyledon and are called "**monocots**". Other plants including many vegetables have two cotyledons and are called "**dicots**".

As living things, seeds are perishable, particularly if not kept cool and dry. The ability to germinate varies between plants from a year to the extreme example of wheat seed found in Egyptian tombs that still sprouted after thousands of years.

Plants are also classified by the length of their life cycle. **Annual** plants complete their life cycle within a year, while **perennial** plants live for over two years. A third classification, **biennial** plants, refers to plants with a two-year life cycle. Carrots are biennials. We can choose to harvest carrots as a root vegetable in the first year. Carrots for seed are not harvested for their roots. Harvest occurs after the leafy carrot top sets seed in the second year, completing the life cycle.

1st year carrots

Annuals are planted and harvested in less than a year, so new seeds must be planted every year to produce a crop. **Winter annuals** have seeds that germinate in autumn or winter. The small plants live through the winter, establishing a good root system, then bloom in winter or spring and set seed before fall. Important crops in Washington would be winter wheat and winter canola.

Winter annuals develop root systems that hold the soil and prevent erosion during winter and early spring and they usually yield better than spring varieties.

carrots for seed

dcles of Life

Summer annuals are planted in the spring, sprout, flower, and produce seed in the summer.

Development of cultures traced to seeds

Early people were hunter/ gatherers. They moved from place to place gathering seeds to eat. When groups of people wanted to stay in the same place, they planted seeds to produce crops that they could harvest.

Native Americans gathered corn, squash, pumpkin, and sunflower seeds and safely stored some to eat, and some to save for planting the next year. Settlers coming to the United States brought seeds with them. They guarded and protected the seeds on ocean journeys, wagon trains and travel on foot. Their seeds were treasures that could make the difference between life or starvation in the new land.

Today, most of the world's food supply depends on seeds that farmers plant, especially **cereals**, **legumes** (peas and beans), and nuts.

One grain of wheat can produce a plant that will produce 100-200 more seeds.

Seeds are also used to feed livestock. Some seeds are used to make most cooking oils as well as spices that flavor our foods.

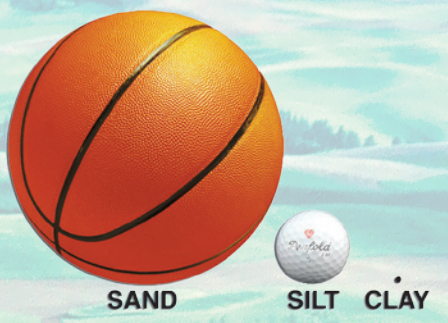
How many seeds can you find in your kitchen? How about at the store? Make a list to see how many you can identify.

Banking on Seeds

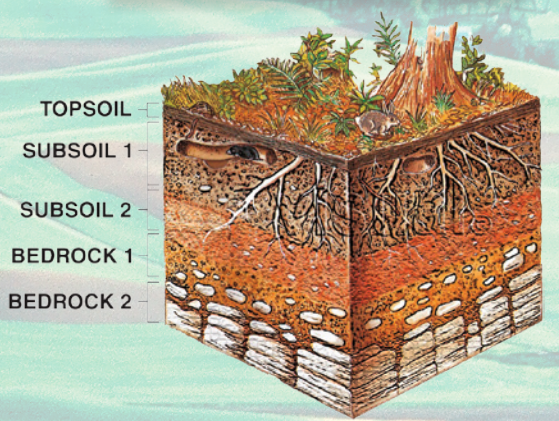
People put money in a bank for safekeeping. Did you know the US government does the same thing with seeds? The National Laboratory for Genetic Resource Preservation in Fort Collins, CO holds more than 470,000 samples of seeds from around the world. Right here in our state in Pullman, seeds are also stored, grown out and distributed for 18 genebanks spread across the US! If natural disasters or plant diseases destroy large numbers of our seeds, we could turn to the seed bank for replacements.

National Laboratory for Genetic Resource Preservation

CAN YOU DIG IT?



Soils are made of three basic particles called sand, silt, and clay. The difference in size between the three would be like comparing a basketball (sand), a golf ball (silt), and the tip of a ballpoint pen (clay). Soils from different locations vary in their amounts of each of the three particles. The amount of each type of particle is important because that determines the capacity of the soil to hold water and air. In the Columbia Basin, soil can be very sandy. Whereas near Mica, WA the soil is nearly all clay. In fact, there is a business in Mica that uses the soil to make bricks.



Ideally soil is:

- 45% particles (sand, silt, and clay)
- 5% organic matter (dead plants and animals)
- 50% empty space (pores) half filled with air, and half filled with water

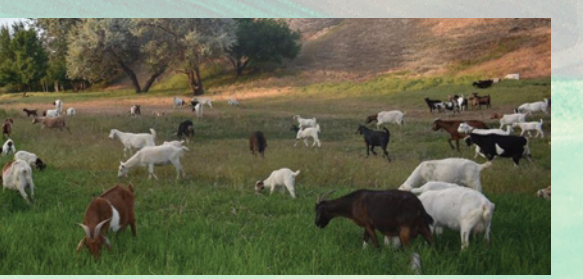
Without decayed organic matter, **humus**, the soil loses its capacity to retain the water and air that soil organisms need.

Grazing Benefits Animals and Soil Alike

Beef is one commodity that is produced in all 39 of the counties in Washington State. Cattle and other **ruminants** (animals with a four-compartment stomach) such as sheep and goats are able to utilize land that is not useful for growing crops. This land may be too steep, too rocky, or even too wet to grow other crops. Grazers and browsers convert solar energy (in the form of grass and other plants) into nutritious high-protein foods for the human diet.

Some of the many environmental benefits of well-managed grazing land are: plant growth is promoted, soil erosion is reduced, brush is controlled, and at the same time the ground is fertilized with manure. Grazers can clear excess vegetation from forest undergrowth which reduces the fuel load for wildfires.

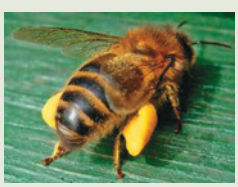
Grazing along streams removes excess plant matter that would otherwise decompose into the water (think about how water in a vase of flowers looks and smells after a few days). Grazing animals are also used in cities to control overgrowth. Well-managed grazing utilizes land which is not good for growing crops and it can also improve the water quality and habitat for fish and wildlife.



Honey Bees

Honey bees are very important insect pollinators. For honey bees to produce honey, they consume pollen and nectar from a variety of flowers. **Pollen** is one of the purest and richest natural foods, containing all of the nutritional requirements of a honey bee: sugar, carbohydrates, protein, enzymes, vitamins and minerals. **Nectar** is a sweet fluid found in flowers.

When a honey bee is collecting pollen from the anthers of a flower, it puts the pollen in a special pollen basket on its hind legs.



All that pollen will be taken back to the hive.

BUSY AS A BEE

- Honeybees will usually travel approximately 3 miles from their hive.
- Each bee will visit 50-100 flowers on a single trip out of the hive.
- Honey bees fly at 15 miles per hour.
- Honey bees' wings stroke 11,400 times per minute, thus making their distinctive buzz.
- Bees communicate with each other by dancing and by using pheromones (scents).
- Honeybees are the only insect that produce food for humans.
- Honeybees never sleep!

A Very "Fruitful" State

Washington is a top producer of apples, pears, sweet cherries, red raspberries and concord grapes.

Tree Fruit

Washington produces 65% of all US apples, but accounts for 90% of all apples exported to other nations. Our slogan "The Best Apples on Earth" certainly describes Washington apples that are shipped to over 60 countries around the world. Washington produces nearly 49% of the pears grown in the US. Thanks to advancements in Controlled Atmosphere (CA) storage technology, fresh apples and pears are available to consumers nearly year-round. The three main tree fruit regions are the Wenatchee Valley, Columbia Basin and Yakima Valley. These areas are ideal because of the mild climate, dry growing season, good soils, and plentiful irrigation water from nearby rivers.

1. *Because we produce over half of the U.S. crop of this fruit and ship them world wide, Washington is know as the _____ Capital of the World.*

A Berry Nice Place

Berries are grown in many areas of our state but the major production area is the Puget Sound lowlands. The soil and climate there are great for blueberries, strawberries, raspberries and blackberries. Most cranberries are grown in the Willapa Hills region. Over 34% of America's red raspberries are grown in Washington, most of those in Whatcom County

3. *If WA harvests 9,600 acres of red raspberries and the yield is 8,070 pounds per acre, the total harvest will be _____ pounds.*

How many tons? _____

Stone Fruit

No, they don't grow out of rocks! **Stone fruits** have a large, hard seed called a pit. Cherries, apricots, peaches, nectarines, plums and prunes are all stone fruits produced in our state. Weather is very important to a stone fruit grower. Rain and hail can damage the tender fruit and destroy an entire crop in the blink of an eye.

Even gentle rain on cherries is bad. A water drop collects in the dimple where the stem is attached and causes the cherry's skin to split open. This ruins the fruit. If it rains a grower might pay a helicopter to hover over his trees to blow the water off and dry the fruit quickly.

2. *Comparing weather across the state, why would most stone fruit be grown in Eastern Washington? _____*

_____

_____

Grapes

The grape industry has grown to become Washington's 9th most valuable crop. We lead the nation in production of Concord grapes (used for juices and jams) at 42%. We also produce 25% of the nation's Niagra grapes and are second nationally in the production of wine grapes.

Washington's wine industry contributes more than $7 billion to the state's economy. Wine tourism attracts nearly two million visitors annually. Nearly all our grapes are raised east of the Cascades.

4. *Which is your favorite – grape juice, grape jelly, or table grapes? _____*

Which one is better nutritionally?

_____

Earth Day is Every Day for Farmers & Ranchers!

Earth Day was first celebrated on April 22, 1970, and has been celebrated on the 22nd of April each year since. Farmers and ranchers celebrate the earth every day by protecting and conserving the Earth's resources all year round. Farmers and ranchers know that without plants - all humans, animals, and agriculture could not exist. Caring for the environment allows the needed renewable resources to continue to be produced now and into the future.

More than 90% of US farms are operated by individuals or families. Maintaining and improving the environment is necessary to keep the family business going. Today's farmers are restoring wetlands, reducing soil erosion, protecting wildlife, and generating far less waste than ever before. Every day is Earth Day for agriculture!

What would you do without agriculture?

If you eat, you can thank a farmer, or rancher, or fisherman. If you use a pencil or write on paper, you can thank a forester. Do you like sushi or tuna fish? If so, you can thank a fisherman!

More than 330,000 people in Washington State grow our food, protect our forests, fish our waters and process their harvests so that we can live well. Sales of agricultural products add almost $68 billion to our state's economy. (For $68 billion, you could buy 40 new space shuttles!)

To help farmers, ranchers, fishermen and foresters run and grow their businesses, Northwest Farm Credit Services supports them with reliable, consistent credit and financial services. Northwest FCS is part of the Farm Credit System, which was created to serve farmers and ranchers by the U.S. Congress more than 100 years ago. And because it's a cooperative, farmers, ranchers, fishermen and foresters are customers AND members of Farm Credit.

Have you ever been on a farm or in the forest, or fished from a boat?

Northwest® FARM CREDIT SERVICES

Industry Analyst

Hi! My name is Jon, and I'm an industry analyst at Northwest Farm Credit Services. In my job, I learn about how farmers, foresters and fishermen (and other people who work in agriculture) make connections with people so they can buy things for their businesses and sell what they produce, and then I get to tell their stories.

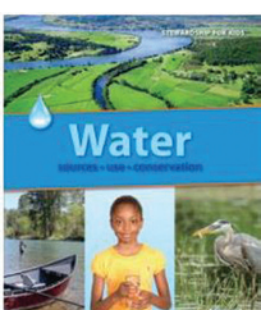
I learn by reading reports, industry and business magazines and newspapers, and talking to people with a lot of experience in ag and business. I also learn by studying numbers like prices and yields, profits and loss because numbers reveal important information that helps people make decisions.

To find out what the numbers are telling me, I study them. (This is also called analysis. That's why my job is called Analyst.) The numbers help me understand the relationships between buyers and sellers and the marketplace. Then I write and tell the stories to help farmers make good business decisions about what they grow, and when they should buy supplies and sell their crops.

For farmers, foresters and fishermen in Washington, I tell cool stories about apples, cows, wheat, hay, potatoes and other crops grown in the state. I talk and write about yield per acre and cost per hundredweight, and about trade that farmers have with other countries like Japan and Mexico, and laws that affect what farmers do.

I also tell these stories in person to many groups of people each year. People who work in agriculture are always interested in information that will impact their business, so I travel to their meetings and they listen to what I say and they read what I write. They also ask questions. I am always happy to help them with what I've learned.

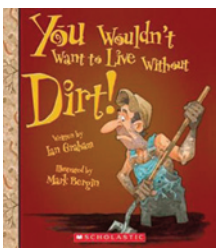
LIBRARY CORNER



Water: Sources, Use, Conservation

This 32-page book is perfect for any lesson on water. It contains informative text, pictures, and facts. Learn about the importance of water as well as the states, supply, and availability of it. Learn about the water cycle, rain, water tables, irrigation, and how water is used in agriculture. The book also includes numerous activities, websites, and other resources for teachers. Written by Nancy Carlson.

You Wouldn't Want to Live Without Dirt!



Without dirt, or soil, life would have developed differently and we humans probably wouldn't be here at all. Soil supplies a surprising variety of raw materials for making things and provides the foundation for growing the plants that feed us. This book is full of information about the ways soil has been used by humans over the centuries. Each spread highlights a different topic, including types of soil, life in the soil, growing plants, soil erosion, and protecting soil resources for the future. Many sections also include suggestions for activities that can be used to further explore soil in the classroom.