

BANKING ON SOIL

GET 'THE DIRT'
ON SOIL.

WORKSHEET - 4
STUDENT COPY

IT COULD BE ARGUED THAT SOIL IS THE MOST PRECIOUS RESOURCE IN ALBERTA – EVEN MORE VALUABLE THAN OUR OIL AND GAS RESERVES. WE DEPEND ON THE SOIL IN THIS PROVINCE FOR SOCIAL AND ECONOMIC BENEFITS.

In fact, Alberta has just under one third of the arable land, or soils capable of producing food, in Canada. The three Prairie Provinces (refer to map) account for 80 percent of the agricultural land in the country. And with growing interest in biofuels, the demand on agricultural land is only going to increase.

So, how do we protect our soils and ensure they remain productive? The answer is, we learn about them. For example, did you know that healthy soil is like a bank savings account?

HOW SOIL IS LIKE A BANK ACCOUNT

To think of soil as a savings account seems strange, but it's actually a good comparison. Healthy soils store water and nutrients that plants need to grow. It also protects them from the effect of pests and diseases. Nutrients come from organic material in the soil, like decaying plants and animals, or from the nutrients we add using chemical or organic fertilizers. In essence, soil becomes a bank for the plants to take what they need, when they need it. When the crop is harvested and taken to the market, it takes the consumed nutrients with it. The nutrients are then passed on to us when we eat the food produced. This is one of the reasons why fruit and vegetables are so good for us.

While soils may get some of their nutrients replenished from the plant roots and stubble left on the field after harvest, it is not as much as the hungry crop took from the soil while it was growing. So if additional nutrients are not put back

in the soil, it becomes empty and less likely to produce healthy food. This is similar to your bank account. If you had a savings account you didn't use, you might earn a little bit of money on the balance each year as interest. If you took money out of your account without putting any back, your savings would shrink and in time you would have a zero balance – meaning no money! This is like an agricultural field that produces harvests year after year. The field needs to be replenished with nutrients to continue to pay out.

KEEPING A HEALTHY BALANCE:

Farmers typically add nutrients back into the soil in the form of fertilizers or manures. They know how much to put on the field because they regularly test it. A soil test tells the farmer the amount of nutrients required, and the kinds they need to put on the soil like nitrogen, phosphorus and potassium. This is one way farmers make sure they put the right amount of nutrients on the field, at the right place, and at the right time. Often, the farmer will test their soil before he or she plants their crop in the spring, but owing to many time constraints placed on the farmer they may choose to sample in the fall before the soil is prepared for winter.

WAYS THAT NUTRIENTS GET INTO THE SOIL:

- leaving or placing organic matter on the field like crop stubble or manure composts
- leaving plants to live and die on the land naturally becoming organic matter
- adding fertilizers to the soil before or after harvest



PROTECTING HEALTHY SOIL:

In addition to feeding the soil, farmers need to protect it from being blown away by strong winds, or carried away by water that comes with melting snow or heavy rain. You may have seen trees or shrubs planted along the edge of a field. These act as barriers and reduce the speed of the wind that blows across the surface. Keeping plants rooted in the soil throughout the year is another way farmers keep the soil in place. They can cover the fields with grass, or unused parts of the crop (called crop residue). Next time you are driving past a field, look to see what's there.

THE SOILPRINT OF ALBERTA:

Now let's take a closer look at some of the soils in Alberta. You could say that soil is largely a product of its parents – that is the parent material that created it! Soil in any area is a result of the rocks around it, the hills and valleys that protect or expose it, the vegetation that grows on it, climate and age of the land. When these factors are combined, you have the fingerprint for the area, or a soilprint for the province.

So what do we know about Alberta that would give us clues about the type of soils it contains? From forests in the north, to the rugged mountains in the west, and vast prairies in the east, Alberta is a province with a lot of different landscapes.

UNDERWATER ALBERTA:

We know that between 408 - 360 million years ago, Alberta was mostly covered by water. This great sea left the province with rocks that are largely composed of limestone and shale. It also left the remains of organisms and plants that, under pressure for millions of years, produced Alberta's oil and gas reserves. Some of this pressure came from glaciers that existed over 10,000 years ago. Alberta was almost completely covered by heavy sheets of ice several kilometres in depth. The grinding action associated with their movement shaped the Prairies. They were responsible for the first erosion to occur in the province.

AN ICY RETREAT:

When the glaciers receded, the rocks and soils they left behind warmed to form vast grasslands. The increasingly dry climate and strong winds that blew across the landscape soon led to the development of prairie plants. This environment did not encourage trees or shrubs to grow, but was ideal for tall grasses, insects and animals. Over time, as these plants and creatures returned to the soil as organic matter, the overall soil fertility increased. The grasslands developed soils that were rich in plant nutrients and perfect for growing crops like wheat, barley, and canola. Their flat, open space also made them suitable for ranching.

FOREST FORMATION:

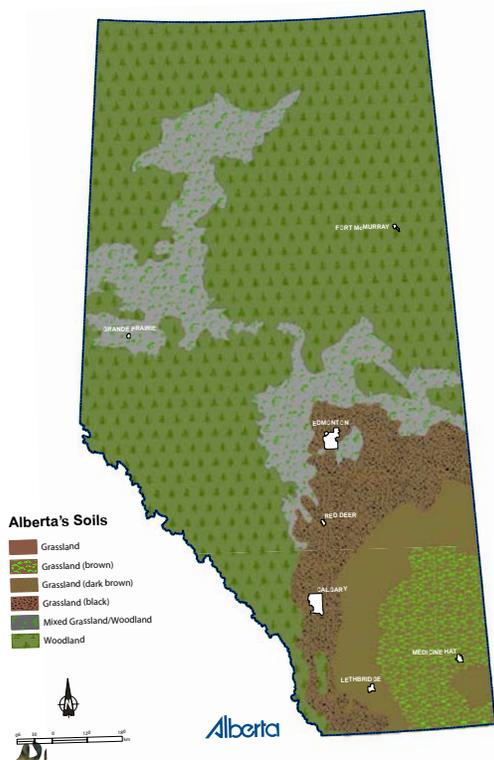
Trees tended to grow in the more northern part of the province, along hillsides, beside rivers and streams, and in valleys and mountain ranges. In these locations the trees were partially protected from the sun's heat and were able to access more water. Alberta contains majestic woodlands dominated by coniferous trees like spruce, fir and pine. The soil in these areas is typically cooler and wetter than those found in grassland soil. The soils in wooded areas need different care than those found in the grasslands.

WHO CARES? YOU SHOULD:

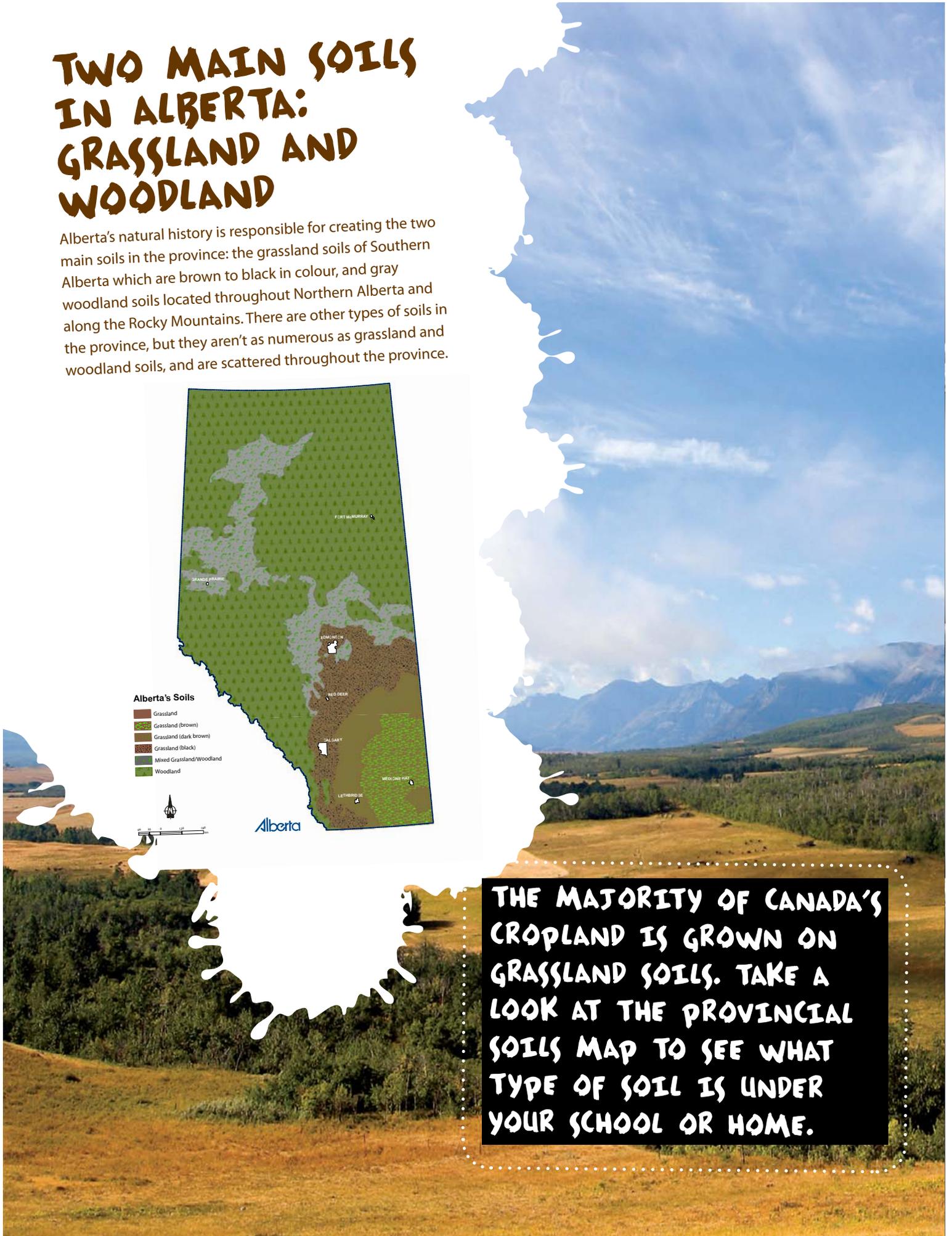
BECAUSE WE RELY SO MUCH ON OUR HEALTHY SOILS FOR FOOD, MEDICINES, CLOTHING AND MANY OTHER THINGS, WE NEED TO TREAT THEM RIGHT. IF WE DON'T PROTECT SOILS FROM THE ELEMENTS, OR REPLENISH THEM WITH ESSENTIAL NUTRIENTS LIKE FERTILIZERS OR MANURES, WE COULD EMPTY THE SOIL BANK. AS THE NEXT GENERATION OF DECISION MAKERS IN THIS PROVINCE, YOU WILL BE RESPONSIBLE FOR TAKING CARE OF ALBERTA'S MOST PRECIOUS RESOURCE – ITS SOIL.

TWO MAIN SOILS IN ALBERTA: GRASSLAND AND WOODLAND

Alberta's natural history is responsible for creating the two main soils in the province: the grassland soils of Southern Alberta which are brown to black in colour, and gray woodland soils located throughout Northern Alberta and along the Rocky Mountains. There are other types of soils in the province, but they aren't as numerous as grassland and woodland soils, and are scattered throughout the province.



THE MAJORITY OF CANADA'S CROPLAND IS GROWN ON GRASSLAND SOILS. TAKE A LOOK AT THE PROVINCIAL SOILS MAP TO SEE WHAT TYPE OF SOIL IS UNDER YOUR SCHOOL OR HOME.



SOIL EXERCISE 1

HOW WOULD YOU PROTECT TOPSOIL IN THE FOLLOWING SITUATIONS? EXPLAIN AND DRAW YOUR ANSWER.

1. THE DOWNSPOUT OF AN EAVES TROUGH IS CREATING A GULLY AS WATER DRAINS TO THE STREET.

DRAW

EXPLAIN

2. YOU WANT GRASS TO GROW ON A STEEP, SOUTH-FACING HILL IN YOUR YARD. THE SLOPE IS DRY FROM THE SUN'S HEAT BUT IF YOU WATER IT, THE SEEDS WILL BE WASHED AWAY.

DRAW

EXPLAIN

3. WIND IS BLOWING SOIL FROM BARE FIELDS IN THE WINTER AS SHOWN BY BLACK SNOWDRIFTS ALONG THE ROADSIDE.

DRAW

EXPLAIN

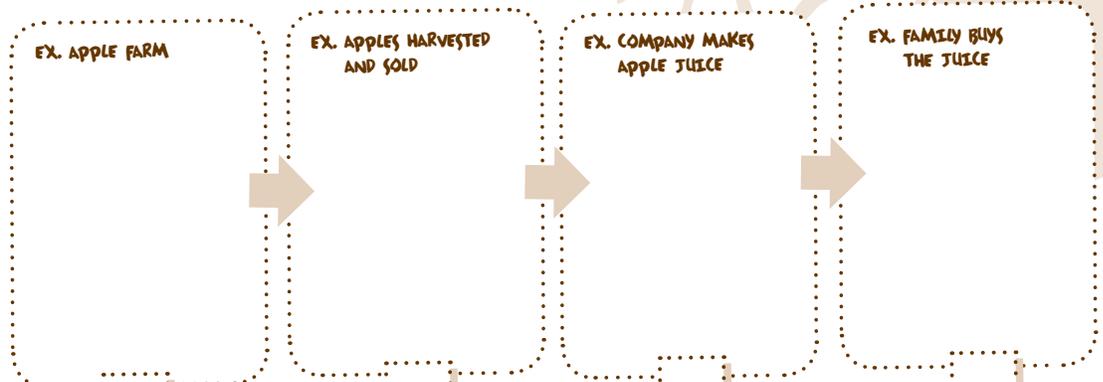
SOIL EXERCISE 2

TAKE A FEW MINUTES TO THINK OF ALL THE PEOPLE THAT ARE AFFECTED BY THE FOOD THAT IS GROWN HERE. IF YOU SAID 'JUST FARMERS', THINK AGAIN. WRITE OUT THE STAGES OF THE FOOD CHAIN FOR A CROP FROM THE TIME THAT IT WAS GROWN, THROUGH MANUFACTURING AND RETAIL, TO ITS FINAL USE. WHO, OR WHAT, BENEFITS AT EACH STAGE OF THE CYCLE? CAN IT BE COMPOSTED OR RECYCLED?

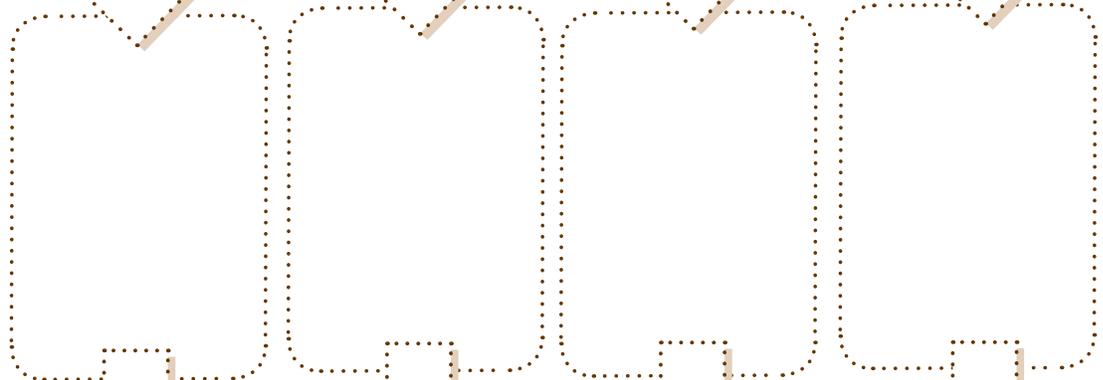
PICK A CROP TO WORK WITH - WHEAT, APPLES, COTTON, CORN OR CHOOSE YOUR OWN.

CROP STAGE OF PRODUCTION (I.E. HARVEST, FOOD ON THE TABLE...)

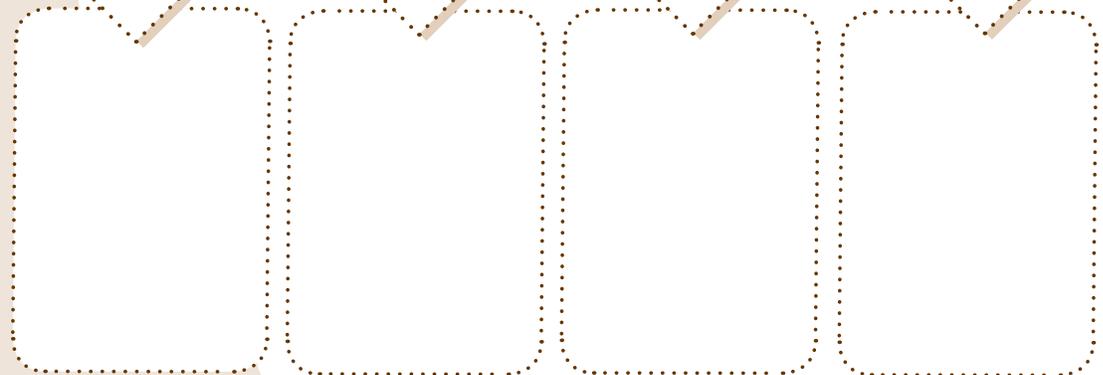
FINISH TOP LINE FIRST



WHO BENEFITS? (LIST AS MANY THAT APPLY)



HOW DO THEY BENEFIT?



MANY THANKS TO OUR SPONSORS:

