

GRADE

6

FOREST INVENTORY



MY COMMUNITY FOREST



TEACHER'S GUIDE

KNOW BEFORE YOU GO!

TEACHER NOTES

Welcome to your very own forest field trip kit! Your kit includes the following materials, which will help you and your students complete a guided community forest inventory:

- **Student booklets** (class set)
- **Anemometer** (1)
- **Magnifying glasses** (class set)
- **1.3m length strings** (class set)
- **Guide to Common and Native Trees and Shrubs of Alberta** (1)
- **Alberta Nature Guide** (1)
- **Pocket Guide to Animal Tracks** (5)
- **Pencil crayons** (2 per student)

The community forest inventory is an online survey that we are asking all schools to complete so we can create a database of forest inventories from across the province. The student responses that you need to compile are highlighted in the booklet, and are noted in the teacher's notes at the top of each activity.

This booklet will serve as an answer key for you, help you prepare by laying out the materials you will need for each activity and also suggest discussion questions to debrief the activities with your students.

For your forest exploration, choose an area within walking distance of your school; this can be the school yard or a nearby park/natural area. Look for an area with a few different kinds of trees/shrubs where you can set safe boundaries for outdoor exploration.



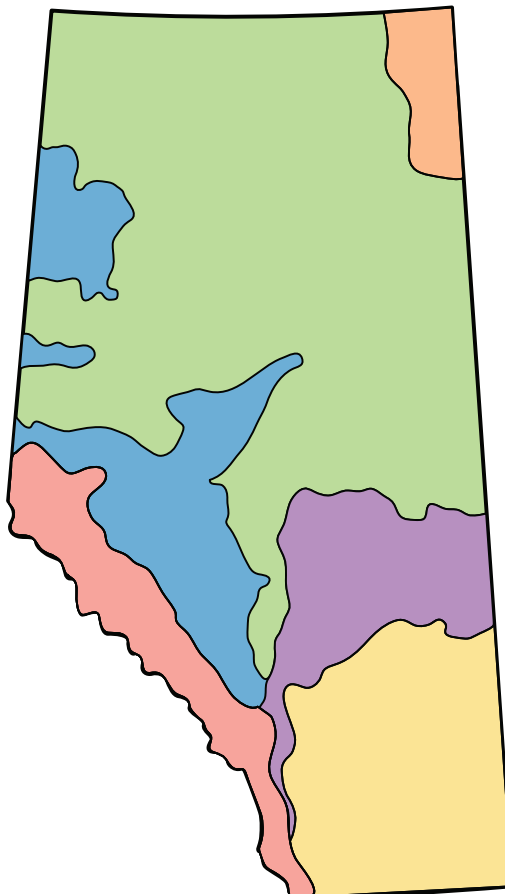
Scan the QR code to access the Community Forest Inventory survey

DISCUSSION QUESTIONS

- What are the differences between the ecoregions. Are they all forested? How do their forests differ?

Alberta has SIX different ecoregions, do you know what they are?

Label the ecoregions using the legend below.



Parkland

Canadian Shield

Boreal Forest

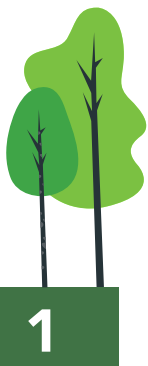
Foothills

Rocky Mountains

Grasslands

Which ecoregion are you in today?

Draw a star where you are!





GET TO KNOW YOUR COMMUNITY FOREST

Teacher Notes

This activity is done individually.

TOTAL TIME: ~10 minutes

MATERIALS FROM KIT:

- *Anemometer*

INPUT INTO THE COMMUNITY FOREST INVENTORY:

- Location
- School name
- Natural Region
- 1 photo of your site

DISCUSSION QUESTIONS

- Is your community forest more natural? Managed/Disturbed? Urban?

SITE ASSESSMENT

Knowing the weather conditions when you are about to head outside is important for safety! You need to dress appropriately and weather events like wind and heavy rain may be dangerous. **Record the outdoor weather conditions as a class using the *anemometer* in your kit.**

Weather Conditions (circle one):

Sunny / Partly Cloudy / Cloudy / Rainy / Snowy / Windy

Temperature: _____ C Wind Speed: _____ m/s

Find a space where you can sit by yourself and quietly look, listen and feel what your community forest has to offer today. Record your observations below:

What do you hear?	What do you smell?	What do you see?

PLANT DIVERSITY

Teacher Notes

Get students to identify different trees to get a sample of the different species at your site. They will fill out this page and compare with the facing page to find the native species most similar to what you have on site. You can use the Guide to Native Trees and Shrubs for more information and specific identification.

This activity is done individually.

DISCUSSION QUESTIONS

- Why might there be non-native tree species here?

TOTAL TIME: ~20 minutes

MATERIALS FROM KIT:

- *Guide to Native Trees and Shrubs*

MATERIALS FROM CLASSROOM:

- *Meter stick/measuring tape*
- *Marker* (1 per student)

INPUT INTO THE COMMUNITY FOREST INVENTORY:

- List of native species found on the site.

Choose a tree and draw it here


AM I A TREE AT ALL

Does your plant have these three characteristics?


- Trunk:** A large single stem
- Bark:** A hard outer layer
- Wood:** A solid inside

If yes, congratulations, it's a tree!

Coniferous OR Deciduous
(Circle ONE)



Cones
Needleleaf
Evergreen



















Loses Leaves,
Broadleaf,
Flowers, Catkins,
or Fruit

LEAF SHAPES AND PATTERNS

Different types of leaves and how they grow are often the best way to tell trees apart.

Check all of the characteristics that apply to your tree.

<input type="checkbox"/> Needleleaf 	<input type="checkbox"/> Single Needles 	<input type="checkbox"/> Clustered Needles 	<input type="checkbox"/> Needle Pairs (Sheathed) 
<input type="checkbox"/> Square Needles 	<input type="checkbox"/> Flat Needles 	<input type="checkbox"/> Broadleaf 	<input type="checkbox"/> Alternate 
<input type="checkbox"/> Opposite 	<input type="checkbox"/> Compound 	<input type="checkbox"/> Toothed Edge (coarse or fine) 	<input type="checkbox"/> Lobed 
<input type="checkbox"/> Oblong 	<input type="checkbox"/> Oval/Ovate 	<input type="checkbox"/> Triangular/Heart 	<input type="checkbox"/> Round 






































Common Alberta Tree Species

Which common Alberta species is most like yours ?

Look at the tree you chose to draw and check next to the species with the most similar characteristics. If you think it's an exact match circle your checkmark.

The majority of the plants identified found by your class were:

<input type="checkbox"/> Black Spruce or White Spruce 	 Cones	 Needleleaf	 Single Needles	 Square Needles
<input type="checkbox"/> Lodgepole Pine or Jack Pine 	 Cones	 Needleleaf	 Needle Pairs	
<input type="checkbox"/> Balsam Fir 	 Cones	 Needleleaf	 Single Needles	 Flat Needles
<input type="checkbox"/> Tamarack/ Larch 	 Cones	 Needleleaf	 Clustered Needles	
<input type="checkbox"/> Balsam Poplar 	 Broadleaf	 Alternate	 Fine Curved Teeth	 Oval Shape
<input type="checkbox"/> Aspen Poplar 	 Broadleaf	 Alternate	 Fine Curved Teeth	 Ovate Shape
<input type="checkbox"/> White Birch 	 Broadleaf	 Alternate	 Coarse Teeth	 Ovate Shape

Were the majority of the plants found by your class (circle one)

NATIVE

INTRODUCED/ORNAMENTAL

NOT SURE

TREE MEASUREMENTS

Teacher Notes

Measuring Trees is something done in forestry to estimate the volume of wood in a forest, which determines if the trees are ready for harvest and how much wood product can be made. This information can also be used to estimate the amount of carbon stored in trees.

If you are in a heavily forested area, be sure to set clear boundaries for your students for this activity. Students will be working in pairs.

DISCUSSION QUESTIONS

- Why might people want to know how large trees are?

TOTAL TIME: ~30 minutes (after the measurements are taken, the rest can be done inside)

MATERIALS FROM KIT:

- 1.3 m length of string (1 per student)

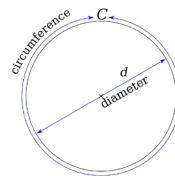
INPUT INTO THE COMMUNITY FOREST INVENTORY:

- Height & Diameter of selected tree (input the smallest and the largest from the class)
- Volume of wood of the tree (of the smallest and largest trees)

Measuring Diameter

Imagine the trunk of a tree cut horizontally through the middle as a flat circle. The diameter of a tree trunk is the distance across that circle. This is hard to measure on a living tree, so instead we can measure the circumference of the tree, and use a mathematical formula to calculate the diameter.

Foresters use a tool called a diameter tape that eliminates the need to do this math in the field because the calculations are built in!



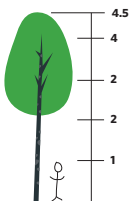
$$C = \pi d$$

$$d = \frac{C}{\pi}$$

- Wrap the **string** all the way around the tree at 1.3m above the ground. Mark where the string meets itself.
- Measure the marked length using a metre stick or measuring tape. This is your **circumference**.
- Follow the formula to calculate **diameter**.
- Record your answers in the table below.

Measuring Height

Measuring the height of a tree is no easy task. Unless you have a special tool, it is easier to estimate the height of a tree using your partner as a reference.



- Find a partner and measure their height in meters.
- Have your partner stand next to the tree, and move back far enough so you can see the top and bottom of your tree easily.
- Estimate how many times your partner could fit into the height of the tree.
- Complete the calculation and record the estimate the height of your tree.
- Record your answers in the table below.

Diameter calculation	
Circumference	_____ cm
Diameter = circumference / π	_____ cm / π
	= _____ cm

Height Calculation	
Height of my partner	_____ m
Number of times my partner fits into the height of the tree	_____
Tree height = Height of partner x Number of times they fit into tree	_____ m x _____
	= _____ m

VOLUME OF WOOD

Using the height and diameter we calculated, we can now estimate the volume of a tree. Foresters use species specific *Tree Volume Tables* to figure out tree volumes. To simplify, we have provided you with only Deciduous and Coniferous tables.

To estimate the volume of your tree, select the appropriate table (*Deciduous or Coniferous*). Find your **Tree Height row and **Diameter** column and see where they meet up. This is your volume.**

Volume of wood: _____m³



Deciduous
Individual Tree Volume in m³

		Diameter (cm)							
		1.1 - 11.0	11.1 - 21.0	21.1 - 31.0	31.1 - 41.0	41.1 - 51.0	51.1 - 61.0	61.1 - 71.0	71.1 - 81.0
Total Tree Height (m)	3.1 - 5.0	0.0047	0.0315	0.0785	0.1435	0.2254	0.3247	0.4422	0.5794
	5.1 - 7.0	0.0071	0.0491	0.1230	0.2240	0.3490	0.496	0.6639	0.8525
	7.1 - 9.0	0.0096	0.0667	0.1679	0.3060	0.4755	0.6723	0.8935	0.1368
	9.1 - 11.0	0.0121	0.0844	0.2131	0.3889	0.6042	0.8527	1.1297	1.4312
	11.1 - 13.0	0.0146	0.1021	0.2584	0.4724	0.7342	1.0358	1.3704	1.7326
	13.1 - 15.0	0.0171	0.1198	0.3039	0.5563	0.8652	1.2206	1.6142	2.0389
	15.1 - 17.0	0.0196	0.1375	0.3495	0.6405	0.9968	1.4068	1.8603	2.3487
	17.1 - 19.0	0.0221	0.1553	0.3952	0.7249	1.1290	1.5938	2.108	2.6612
	19.1 - 21.0	0.0246	0.1730	0.4408	0.8094	1.2615	1.7818	2.3570	2.9756
	21.1 - 23.0	0.0270	0.1908	0.4866	0.8940	1.3942	1.9702	2.6069	3.2915
	23.1 - 25.0	0.0295	0.2085	0.5323	0.9788	1.5272	2.1590	2.8576	3.6087
	25.1 - 27.0	0.0320	0.2263	0.5781	1.0636	1.6604	2.3482	3.1090	3.9269
	27.1 - 29.0	0.0345	0.2441	0.6239	1.1485	1.7937	2.5377	3.3608	4.2459
	29.1 - 31.0	0.0370	0.2619	0.6697	1.2334	1.9272	2.7274	3.6131	4.5656
	31.1 - 33.0	0.0395	0.2796	0.7156	1.3184	2.0607	2.9173	3.8657	4.8858
	33.1 - 35.0	0.0420	0.2974	0.7614	1.4034	2.1944	3.1074	4.1187	5.2066
	35.1 - 37.0	0.0445	0.3152	0.8073	1.4885	2.3281	3.2977	4.3718	5.5277
37.1 - 39.0	0.0470	0.3330	0.8531	1.5736	2.4619	3.4881	4.6253	5.8492	



Coniferous
Individual Tree Volume in m³

		Diameter (cm)							
		1.1 - 11.0	11.1 - 21.0	21.1 - 31.0	31.1 - 41.0	41.1 - 51.0	51.1 - 61.0	61.1 - 71.0	71.1 - 81.0
Total Tree Height (m)	3.1 - 5.0	0.0048	0.0306	0.0772	0.1470	0.2453	0.3799	0.5609	0.8009
	5.1 - 7.0	0.0074	0.0479	0.1193	0.2212	0.3563	0.5295	0.7476	1.0189
	7.1 - 9.0	0.1000	0.0654	0.1625	0.2982	0.4725	0.6879	0.9482	1.2588
	9.1 - 11.0	0.0126	0.0831	0.2066	0.3774	0.5935	0.8548	1.1631	1.5214
	11.1 - 13.0	0.0152	0.1009	0.2512	0.4583	0.7178	1.0279	1.3883	1.8000
	13.1 - 15.0	0.0178	0.1188	0.2962	0.5402	0.8446	1.2055	1.6209	2.0902
	15.1 - 17.0	0.0205	0.1368	0.3415	0.623	0.9731	1.3863	1.8589	2.3887
	17.1 - 19.0	0.0231	0.1548	0.3870	0.7063	1.1030	1.5696	2.1011	2.6937
	19.1 - 21.0	0.0257	0.1728	0.4326	0.7901	1.2338	1.7549	2.3465	3.0037
	21.1 - 23.0	0.0284	0.1908	0.4784	0.8743	1.3655	1.9416	2.5944	3.3177
	23.1 - 25.0	0.0310	0.2089	0.5243	0.9588	1.4978	2.1296	2.8445	3.6348
	25.1 - 27.0	0.0337	0.2270	0.5702	1.0435	1.6307	2.3186	3.0962	3.9547
	27.1 - 29.0	0.0363	0.2451	0.6163	1.1284	1.7640	2.5084	3.3494	4.2768
	29.1 - 31.0	0.0389	0.2633	0.6624	1.2135	1.8977	2.6990	3.6038	4.6007
	31.1 - 33.0	0.0416	0.2814	0.7086	1.2988	2.0318	2.8901	3.8592	4.9263
	33.1 - 35.0	0.0442	0.2996	0.7548	1.3842	2.1661	3.0818	4.1155	5.2532
	35.1 - 37.0	0.0469	0.3178	0.8010	1.4697	2.3007	3.2740	4.3726	5.5814
37.1 - 39.0	0.0495	0.3359	0.8473	1.5553	2.4355	3.4666	4.6303	5.9107	





WHAT WOOD I MAKE ?

Different tree species make different types of products. The Alberta forest industry produces 4 main types of products, and Table 1 shows the tree species used to produce each forest product.

Using Table 1, determine what type of forest product can be made with the tree you measured. Choose one and write it here

Type of forest product I can make with my tree _____

Using Table 2, calculate the amount of that product you can make.

Number of items I can make _____

Hint: Number of items = Volume of tree ÷ Amount of wood per item

Table 1. Forest products produced from various tree species

		Forest Products			
		Lumber	OSB	Plywood	Pulp
Native Boreal Forest Trees	White Spruce	×		×	×
	Black Spruce	×			×
	Jack Pine	×			×
	Lodgepole Pine	×			×
	Balsam Fir	×			
	Tamarack				×
	Aspen Poplar		×		×
	Balsam Poplar		×		
	White Birch	×		×	×

Table 2. Examples of items made from different forest products

Forest Product	What can I make?	Amount of wood per item
Lumber	Picnic Table	0.51m ³
OSB	Dog House	0.12 m ³
Plywood	Dresser	0.25 m ³
Pulp	One roll of Toilet Paper	0.0007 m ³



FOREST HEALTH

Teacher Notes

Tree diseases range from relatively harmless to destructive. Many diseases affect the merchantability of the wood inside of trees. Other diseases can cause whole areas of forest to die out, causing an increased risk for fire, flood, and erosion. In urban settings diseased trees are removed for safety reasons.

This activity is done individually.

DISCUSSION QUESTIONS

- Are tree diseases ever useful to the forest? How are humans impacted by tree disease?

TOTAL TIME: ~20 minutes

MATERIALS FROM KIT:

- *Magnifying glass* (1 per student)

INPUT INTO THE COMMUNITY FOREST INVENTORY:

- photos of affected trees
- list of types of evidence found
- percent cover of leaf litter (*class average/consensus*)

Trees, just like people, can also get sick.

Fungus, insects, bacteria, viruses, and even other plants all affect trees.

Match the descriptions below to the images on the right.

<p>Dutch elm disease A fungal infection spread by beetles that burrow in the bark of elm trees turning the leaves turn yellow and brown.</p>
<p>Forest tent caterpillar This hairy moth larvae is blue with white spots. It eats the leaves of deciduous trees making them unable to grow.</p>
<p>Mountain pine beetle This beetle burrows into the bark of pine trees like lodgepole pine. They lay their eggs inside, and the larvae consume the phloem. They also carry a fungus, called blue stain fungus, which clogs up the tree's xylem.</p>
<p>Dwarf mistletoe Dwarf mistletoe is a parasitic plant. It steals water and food from coniferous trees by growing under the tree's bark. Sometimes the plant itself is visible but the most obvious sign is a clump of dense twigs and branches called a witches broom.</p>
<p>Conk fungi Conks are the fruiting bodies of fungus that grow within dead and dying trees. They are a sign of decay. Conks come in many colours including white, brown, grey and even green or yellow.</p>
<p>Burl Burls are large growths on the trunk of a tree. They can be caused by bacteria, viruses, or even insects. Generally they do not cause much damage, but can impact forestry operations.</p>



SECTION 4 FOREST HEALTH

Now that you know a little more about common diseases and pests in Alberta's forests, get out your magnifying glasses and see if you can find any evidence in your community forest.

Use this checklist to keep track of what you see.

Type of Evidence	Check if present	Draw the most interesting thing you've found!
Larvae on the undersides of leaves or stems	<input type="checkbox"/>	
Damaged buds	<input type="checkbox"/>	
Discolored leaves/needles	<input type="checkbox"/>	
Discolored Stems	<input type="checkbox"/>	
Drooping/wilting	<input type="checkbox"/>	
Holes in leaves	<input type="checkbox"/>	
Cavities in stems/trunk	<input type="checkbox"/>	
Tunnels chewed into wood/bark	<input type="checkbox"/>	
Dead leaves/branches	<input type="checkbox"/>	
Globs of pitch on the outer bark of trees (<i>pitch is similar to sap, but much thicker</i>)	<input type="checkbox"/>	
Deformed Growth	<input type="checkbox"/>	
Visible Fungus (<i>Conk or other</i>)	<input type="checkbox"/>	

Is there evidence of forest pests/diseases in your community forest?

Yes / No (Circle one)





Not all insects, bacteria and fungi are harmful to the forest! Sometimes these organisms help turn dead material back into nutrients through decomposition.

Decomposers (and other helpful insects!) live in leaf litter on the forest floor - take a look at your forest floor and choose the image below that best matches the ground in your community forest.

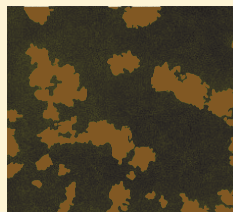
Bare Soil



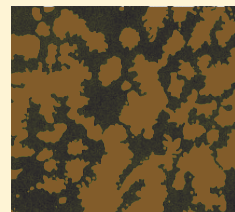
Plants but no leaf litter



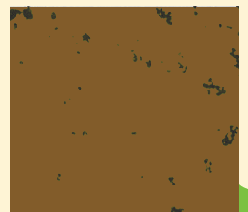
25% leaf litter



50% leaf litter



100% leaf litter



EVIDENCE OF ANIMALS

Teacher Notes

Detecting animals in a forest does not usually involve actually seeing them. Sounds, nests and the tracks left behind are the most effective way to identify the wildlife living in your forest.

This activity is done in groups.

DISCUSSION QUESTIONS

- Can wildlife live in human-used forests? What makes for good wildlife habitat?

TOTAL TIME: ~20 minutes

MATERIALS FROM KIT:

- **Magnifying glass** (1 per student)
- **Pocket Guide to Animal Tracks** (1 per group)
- **Alberta Nature Guide** (for teacher to help students identify species)

INPUT INTO THE COMMUNITY FOREST INVENTORY:

- Species names of animals you have found evidence of.
- 1 photo of a bird.

ANIMAL EVIDENCE SCAVENGER HUNT

Alberta's forests are full of all kinds of different animals and each one plays their own unique role.

Look for evidence of animals that share your community forest. Check off the different types of evidence you find. Use the **Pocket Guide to Animal Tracks** to guess which animal left that evidence.

Type of Evidence	Animal
<input type="checkbox"/> Footprints or Tracks	
<input type="checkbox"/> Scat (poop)	
<input type="checkbox"/> A nest	
<input type="checkbox"/> A lodge or dam	
<input type="checkbox"/> Holes dug in the ground	
<input type="checkbox"/> Holes in a tree	
<input type="checkbox"/> Scratched or stripped bark	
<input type="checkbox"/> Chewed Plants	
<input type="checkbox"/> Hair or Feathers	
<input type="checkbox"/> Bones	
<input type="checkbox"/> Hidden stash of cones or seeds	
<input type="checkbox"/> Bird calls	
<input type="checkbox"/> Insect sounds	
<input type="checkbox"/> Frog calls	
<input type="checkbox"/> Other	



Use the **Alberta Nature Guide** to select an animal.

In the area below draw a forest scene with evidence that your animal was there.

If you need inspiration look at the **Animal Tracks** Guide.

Think about the following things:

- How does your animal move?
- Where does your animal hide?
- What does your animal eat?
- What clues does it leave behind?

Show your forest scene to your friends.

Are they able to correctly guess which animal you have selected?



HUMAN USE OF THE LAND

Teacher Notes

If possible sit away from the area you did most of the activities and look at the entire space from a distance to complete this activity.

This activity is done individually.

DISCUSSION QUESTIONS

- Can humans and forests exist in the same place together? Is human activity in a forest good/bad/neither?

TOTAL TIME: ~20 minutes

MATERIALS FROM KIT:

- **Pencil crayons** (2 colours per student)

INPUT INTO THE COMMUNITY FOREST INVENTORY:

- Average % of natural forest in your study area
- List 3 ways your class is going to care for the community forest

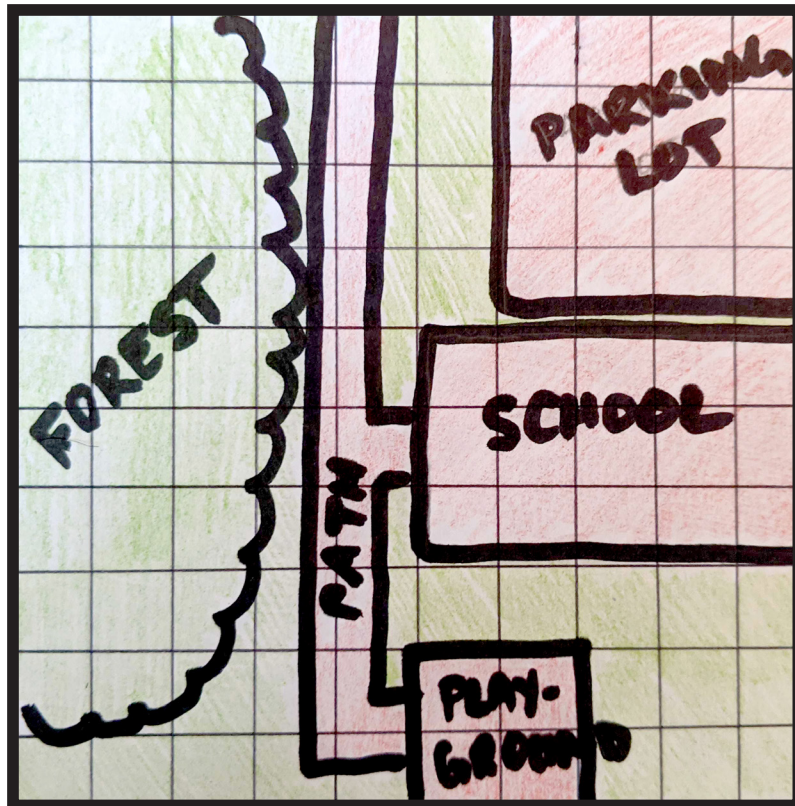
Think about your community forest as a whole and all the different ways that plants, animals and people are interacting with each other.

STEP 1

Draw a sketch of your community forest

STEP 2

Using 2 different coloured pencils to create an image of your forest that represents all of its parts.



Colour 1 = the areas that are influenced by humans (eg. path, playgrounds, picnic area, soccer fields, buildings)

Colour 2 = the natural areas (eg. grasses, trees, shrubs, water)

Count the number of squares of each colour

Colour 1 = 55

human influenced

Colour 2 = 45

natural forest

Why would it be important to limit the amount of space influenced by humans in your community forest?

STEWARDSHIP REFLECTION

Why are forests important to you?

Think about the relationship between humans and the forest.

List 5 ways that humans rely on the forest:

What can you do to care for your community forest?





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SPRING 2021

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