Investigating the Canadian Landscape

Student Backgrounder

This backgrounder is designed to support your investigation of the physiographic landscapes of Canada. It is recommended that you take notes and observations in your own notebook based on your findings. Once you have finished your investigation using the internet and this backgrounder, you will use your findings to support the next activity.

Part A: Physiography – What on Earth?!

Physiography, according to Physiographers

Like many scientific words, 'physiography' is actually two terms smashed together. 'Physio' refers to the physical nature of an object (e.g., shape, colour and textures). 'Graphy', refers to 'graphia', which means to write.

So, what does physiography mean? According to its definition, it should mean something similar to "the writing of nature."

More specifically, **physiography** is the area of study focused on investigating and recording the **physical patterns, forms, and processes on Earth**.

Part B: Physiography in Canada

A physiographic region is defined as an area of Earth with similar land patterns, forms, and processes (aka, landscape). In Canada, there are seven different physiographic regions:

1. Arctic Lands
2. Cordillera
3. Interior Plains
4. Hudson Bay Lowlands
5. Canadian Shield Forest Lands
6. St Lawrence Lowlands
7. Appalachian Region

Image: http://www.thecanadianencyclopedia.ca/

It turns out that the Tumbler Ridge UNESCO Global Geopark actually straddles two physiographic regions: the Cordillera and Interior Plains physiographic regions.

Part C: Meet the Physiographic Seven!

In your groups, distribute the following pages amongst each group member so that each member receives one physiographic region.

1. Arctic Lands – "Land of the Midnight Sun"

Extending northwards from the treeline to the northernmost islands of Canada, the Arctic Lands is composed of the **Arctic Lowlands** and the **Innutian mountains**, also known as the High Arctic. The Arctic Lowlands is mostly composed of an archipelago consisting of islands north of mainland Nunavut (which is part of the Canadian Shield Forest Lands).

Plateaus and rolling hills are abundant in the Arctic Lowlands, but all are at relatively low elevations. The Innutian mountains are the northernmost mountain range in Canada, occupying **Ellesmere Island** and other islands in northern Nunavut and the Northwest Territories. The Innutian mountains are similar to the Appalachian mountains in height, with some peaks measuring over 2600m (the highest being **Barbeau Peak**).

The Arctic Lands, also known as the Tundra (north of the treeline), are considered a barren and sparsely populated region, primarily due to the amount of **permafrost** that keeps the ground frozen solid year round and prevents vegetation growth. However, there are significant deposits of natural resources, including ancient coal beds on Ellesmere Island.

While the sun shines 24 hours per day in the summer in the Arctic Lands (breaking up sea ice to reveal the Arctic ocean), the days remain cool and dry. Temperatures remain below 10°C in the northernmost areas, allowing the snow to remain year round in the Innutian mountains. In the winter, there is constant darkness, with temperatures plumetting towards -20°C (and down to -60°C in the furthest northern reaches).

There is little precipitation in the Arctic Lands, with only 30-180mm of precipitation per year. There are very few freshwater sources aside from the permanent snow and ice. However, several massive rivers that run though the physiographic regions to the south (Canadian Shield Forest Lands, Interior Plains, Cordillera) have their rivermouths right along the northern edge of mainland Northwest territory and Nunavut, draining into the Arctic Ocean.

2. Cordillera – "Mountains...Mountains Everywhere!"

The Cordillera region, also known as "the Western Cordillera", is located along the **western edge** of Canada, encompassing most of British Columbia, the Yukon and Northwest territories, and southwestern Alberta along the Rocky Mountain foothills.

Physically, it possesses two high-altitude, sharp-peaked mountain ranges: the **Rocky Mountains** on the eastern side, and the **Coast Mountains** on the western side. In between each range, there are many older rolling mountain ranges such as the Omineca and Selkirk mountains.

Plateaus and valleys make their way between the interior mountain ranges, carved out by glaciers and rivers such as the **Fraser River**. Many natural lakes have formed within the valleys, such as **Okanagan Lake**, and **Quensel Lake** (one of the deepest glacier-carved lakes in the world).

The annual average temperature is around 12°C, the mildest of any region in Canada. In the summer months, temperatures often reach over 30°C across the region (and sometimes over 40°C in the southern interior valleys), while arctic flows of air will take temperatures below -10°C.

The rivers and lakes of the Cordillera region continually flow with water due to the significant amount of annual precipitation (rain and snow). The **Coast Mountains** receive amongst the highest amount of annual precipitation in Canada – the northwest coast receives upwards of 3m!

The soil of the Cordillera region supports vast grasslands and forests full of cedar and fir trees in the lower elevations, while upper elevations near the Rocky Mountains support many shrubs, lichens, and herbs. With plenty of volcanic activity, this physiographic region is actually the youngest of Canada's physiographic regions, forming as the North American geological plate collides with the Pacific geological plate. This explains the high, sharp mountain ranges – there hasn't been a whole lot of erosion yet!

3. **Interior Plains – "I Can See for Miles and Miles…"**

The Interior Plains physiographic region of Canada spans across the **middle of Canada**, including most of Alberta, Saskatchewan, the southern areas of Manitoba, and some of Northwest Territory and British Columbia. It is divided into the **foothills** (western edge), **plateaus**, and **lowlands** (eastern edge).

It is most recognized by its flat geographical form with deep, rich soils for growing a wide variety of harvestable vegetation, including the vitally important grass known as **wheat**. Trees grow sporadically across the southern portion of the region, while a belt of coniferous trees grow across the northern region as part of the **Boreal Forest**.

The sedimentary bedrock is composed mostly of shale, siltstone, and sandstone left over from tens of millions of years ago when the plains were beneath a shallow sea known as the **Western Interior Seaway**. These rocks are rich with natural resources, such as metallurgical minerals, oil, gas, and coal. Several areas where rocks have been eroded significantly expose the layers of sedimentary rock, such as the **Badlands** in Alberta.

Some areas of the Interior Plains receive well over 200 days of sunshine per year. Thus, the general climate of the Interior Plains can be described as simply cold and dry in the winter, and hot and dry in the summer. Precipitation falls mostly as snow in the winter months, with an average of 300-500mm total precipitation per year. The temperatures are drastically different from winter to summer, with lows of -30°C in the winter months to highs of over 30°C in the summer months.

The Interior Plains are home to many long winding rivers that make their way either east towards the Canadian Shield region (including the **Saskatchewan River** and **Bow River**), or north towards the Arctic Ocean (such as the **Peace River**, flowing into **Great Slave Lake** and the **Mackenzie River**). Two major lakes are in the northern region of the Interior Plains, including **Great Slave Lake**, and **Great Bear Lake**.

4. **Hudson Bay Lowlands – "Wetlands and Polar Bears Galore!"**

The Hudson Bay Lowlands are Canada's largest wetland, and are amongst the largest in the world! Spanning from the eastern portion of Manitoba, where the **Churchill River** flows into Hudson Bay, to the northern expanse of Ontario (and a small slice of Quebec), the Hudson Bay Lowlands is almost entirely surrounded by the Canadian Shield physiographic region.

An abundance of wide, slow flowing rivers wind their way through the Hudson Bay Lowlands enroute to the Hudson Bay (where they mix with salt water), including the **Churchill River** and **Nelson River** in Manitoba, and **Severn River** and **Attawapiskat River** in Ontario. The elevation is relatively low, only rising a few hundred meters above sea level at its highest aspects. Along some coastal areas however, erosion since the last glaciation has revealed spectacular sedimentary layers along cliffs hanging high above the water.

There is little vegetation aside from a massive **peatland** which is often covered in **permafrost**, and a few coniferous groves located sporadically. Thus, the soil is of poor quality due to being nearly permanently frozen.

Average annual temperatures are generally colder along the coast and warmer inland. Short summers keep temperatures relatively low despite nearly 24 hours of sunshine – daily averages are 12 to 16°C in July, while long, dark, cold, and dry winters hover around a chilly -25 to -35°C. Average annual precipitation is roughly 500-700mm per year, mostly falling as rain.

5. **Canadian Shield Forest Lands – "The Reason Why Canada is Really Big!"**

Covering nearly half of Canada's landmass, the Canadian Shield is the largest and oldest of Canada's seven physiographic regions – it is over **3.96 billion years old**! The eroded, rolling hills of the Canadian shield, once as high and sharp as the Rocky mountains, consist of some of the oldest metamorphic and igneous rocks on Earth.

The U-shaped Canadian Shield Forest Lands extend from the southern region of Nunavut to the northwest, southwards to cover northern Manitoba and most of Ontario, and northward and eastward through Quebec towards Labrador and Baffin Island.

The lowlands have poor soil (too dense and coarse) and little vegetation aside from mosses. Plateaus with many deciduous and coniferous trees are found in the higher areas, including part of Canada's boreal forest. Most of the Canadian Shield Forest Lands exist at a relatively low elevation (300m to 600m above sea level). There are a few small mountain ranges, such as the **Laurentian Mountains** in southern Quebec and **Torngat Mountains** on the Labrador peninsula in Newfoundland.

A vast number of winding rivers and lakes across the Canadian Shield suggests that they are relatively young compared to the rocks beneath them. **La Grande Riviere**, the **Nelson River** and **Churchill River** flow through to Hudson Bay, while the **Ottawa River** flows into the St. Lawrence seaway. The Canadian Shield also borders the northern shores of **Lake Superior** and **Lake Huron** of the **Great Lakes** system.

With such a large geographic range, the climate varies widely. In the northern regions, such as Nunavut and Northern Quebec, the winters are long, dark, and remain close to -30°C on average. The summers are short and dry with nearly 15 hours of sunlight per day, resulting in less than 300mm of annual precipitation. Winters in the southern regions remain cold (~ -8°C) with precipitation often in the form of snow while the summers are often quite warm and humid (~ 22°C).

6. St. Lawrence Lowlands – "Where Canada, as a Nation, was Born"

Nestled in between the Canadian Shield Forest Lands to the Northwest and the Appalachian Region to the East, the St. Lawrence Lowlands is broken into three major areas: the **West St. Lawrence Lowland**, the **Central St. Lawrence Lowland**, and the **East St. Lawrence Lowland**. Previous glaciation of the entire region carved it into a bowl-shape, but a deep fault line beneath the water allows the famous **St. Lawrence River** to flow towards the ocean as it drains the **Great Lakes** basin.

The altitudes in the region range from 15m above sea level along the St. Lawrence River to over 150m along the boundaries of the **Laurentian Mountains** near Quebec City. Prominences over 1000m high are closeby, but considered to be part of the Appalachian region. Nonetheless, most of the St. Lawrence Lowlands consists of gently sloping plateaus and hills with deep river beds. The glacial erosion of the region has left the soil deep and immensely fertile (the most fertile top soil in Canada), resulting in a thriving agricultural industry, growing corn, wheat, and other grains.

Water is in abundance in the region, as the river and lake valleys are deep and long. The **Great Lakes** basin draws water from higher elevations in the Canadian Shield as well as the physiographic regions of the American Midwest. The region borders three of the five **Great Lakes: Lake Huron, Lake Erie** and **Lake Ontario**. The Great Lakes basin, which is entirely drained by the **St. Lawrence River**, has an area of over 1.3 million square kilometers and releases an average of 16,800 cubic meters per second (measured from below the **Saguenay River**) back to the Atlantic ocean.

The St. Lawrence Lowlands receives a moderate amount of annual precipitation (about 800mm annually) yet remains humid due to the **Great Lakes** providing a source of atmospheric moisture. Thus, the St. Lawrence Lowlands has a significant range in temperatures throughout the year, with hot summers often reaching about 30°C and cold winters reaching -30°C. As a result, over 100cm of snow will accumulate over the winters, often through several major storms.

7. Appalachian Region – "Beautiful Bays, Inlets, and Highlands"

As Canada's easternmost physiographic region, the Appalachian Region is nestled between the St. Lawrence Lowlands to the West and the **Atlantic Continental Shelf** to the East. It was born from the collision of the North American geological plate with modern day Europe and Africa nearly 300-450 million years ago.

Once standing as high and mighty as the Rocky Mountains, erosion has taken its toll on the mountains, rounding them into the rolling hills that characterize the region's geography. Dramatic cliffs and mountains stand tall along many of the coastlines, such as the **Cape Breton Highlands** and **Long Range Mountains**. **The Appalachian Mountains** stretch from Newfoundland all the way south to Georgia in the United States.

The soil in the Appalachian region supports its massive **deciduous broadleaf forests**, for which the region has become well known, as well as white pines and other smaller conifers. However, in higher inland regions, such as the higher plateaus of Newfoundland, the soil is sandy and fairly infertile – most notably in **Gros Morne National Park** where the Earth's mantle peaks through the crust to reveal a magensium and iron-rich reddish hue. In fact, much of the soil in the Appalachian Region is red in colour, due to the amount of iron in its composition.

Receiving weather systems from the waters near Greenland and the Arctic Ocean, the climate of the Appalachian Region is characterized by short, cool summers and long, mild winters. The average temperatures hover around 14°C in the summer and -5°C in the winter. Inland, nearly 900mm of precipitation falls annually, while the coastal regions receive nearly 1500mm annually, making the Appalachian Region one of Canada's wettest and stormiest physiographical regions.

The Appalachian region is home to few freshwater rivers and lakes due to the small landmass and geographical location. However, several of the larger lakes, such as **Bras d'Or Lake** in Cape Breton, Nova Scotia, are brackish – a mixture of salt and fresh water.