United Nations Educational, Scientific and Cultural Organization

Stonehammer UNESCO Global Geopark

DRIFTINGAPART

Northern Periphery and Arctic Programme 2014–2020

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STONE HAMMER

GRADE 4 SUPPLEMENT TO DRIFTING APART TEACHER RESOURCE: **BRUNDAGE POINT**

WEATHERING AND EROSION AT BRUNDAGE POINT

The rolling hills we can see throughout our landscape were once comparable to the Rocky Mountains. The low, round shape of today is the result of hundreds of millions of years of erosion. Teachers could show students pictures of the Rockies and the Himalayas to compare. Studies of erosion are brought to life by seeing the gentle, rolling hills that look so different from the tall crags of igneous rock that would have been here before the action of water, wind, and ice.

Water is also a significant player in the story of erosion, and we can watch the river flowing out to the sea here as erosion continues to happen today. Students can take a closer look at the riverbanks and look at how engineers deal with erosion in building the structures and the landscaping at this site.

THE EFFECTS OF ICE ON THE LANDSCAPE AT BRUNDAGE POINT

The main resource discusses the glacier story at Brundage Point. Soil in the general area is "ablation till" deposited from the glacier. This geosite does not have much bedrock visible, so discussing how soil is formed from rocks is a good activity here, along with how glaciers moved across the landscape. Students will enjoy modelling a glacier with cornstarch, a student activity described in the Drifting Apart Resource for use at the Reversing Falls Rapids site.

NATURAL PHENOMENA THAT SHAPED THE LANDSCAPE AT BRUNDAGE POINT

The hills of the Kingston Peninsula were shaped many millions of years ago by violent volcanic eruptions. The land that lies in between the fault lines of the Saint John and Kennebecasis Rivers is one formation of igneous rock cooled from lava.

GRADE 4 CURRICULUM LINKS

300-5 compare different rocks and minerals from the local area with those from other places

300-6 describe rocks and minerals according to physical properties such as colour, texture, lustre, hardness, and crystal shape (minerals)

300-7 Identify and describe rocks that contain records of the Earth's history

301-4 describe ways in which soil is formed from rocks

301-5 describe the effects of wind, water, and ice on the landscape

301-7 describe natural phenomena that cause rapid and significant changes to the landscape

301-6 demonstrate a variety of methods of weathering and erosion

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GRADE 4 SUPPLEMENT TO DRIFTING APART TEACHER RESOURCE: ROCKWOOD PARK

COMPARING ROCK FROM DIFFERENT PLACES AT ROCKWOOD PARK

In the year 2000, Visit Canada Visitez developed a trail to commemorate Canadian Confederation. Each Province and Territory sent a two tonne rock to be used as a monument. Each stone monument was cut, polished and decorated with the provincial or territory crest, the year of entry into confederation, and an image to represent the region. A piece of each rock was also used to create a 'maple leaf' monument.

Take a walk along the Confederation Trail. Compare how different minerals and colouring give the granites from different places a very different look. Note that PEI is the only province that sent a sedimentary rock due to their unique geology, the island being made up entirely of sandstone.

VIEWING EXAMPLES OF EROSION AT ROCKWOOD PARK

Students can do the vinegar-chalk weathering experiment in the main resource. Various examples of erosion in the park allow the students to compare chemical weathering (the caves, porous formations and disappearing streams of the marble Karst landscape especially visible on the Clean Air Trail) and physical weathering (students can notice how the relative hardness of the igneous rock of the rock climbing cliff opposite the duck pond has resulted in greater erosion of the softer rocks around it. The harder igneous rock has undergone less erosion and stands higher today.)

EXAMINING THE PHYSICAL PROPERTIES OF ROCKS AT ROCKWOOD PARK

Grade 4 rock hounds can see more minerals and properties of igneous rocks in the polished granites of the monuments at Rockwood Park than in the weathered surfaces of the natural rocky outcroppings. When looking at natural outcroppings, look for the freshest edges of the rock. Students can look at sedimentary clast sizes in conglomerate rock found around the Lily Lake trail, compare the size of the mineral grains in the tiny-grained (almost invisible) dacite of the rock climbing wall (nearly lava when cooled into rock form) and the large-crystal-sized granodiorite of the outcroppings along the path of the Confederation Trail (warm magma settled slowly into rock with time for minerals to organize).

They can also look for the telltale swirly bands of metamorphic rock in the marble of the Karst landscape (Clean Air Trail, look for more newly broken rocks to see the swirls of mineral banding across the rock's surface). Students can discover the 5 rock types by visiting the Rockwood Park Arboretum where they will find examples of them with interpretive signage including Stonehammer identifiers, located across from the Interpretation Centre.

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GRADE 4 SUPPLEMENT TO DRIFTING APART TEACHER RESOURCE: REVERSING FALLS RAPIDS

COMPARE WITH ROCKS FROM OTHER PLACES AT REVERSING FALLS RAPIDS

The story of how the continents collided along the Caledonia Fault Line, visible at Reversing Falls Rapids and other places throughout the length of Stonehammer UNESCO Global Geopark, was uncovered in part by geologists noticing how different these two rock formations were and comparing them to matching formations in Africa and South America.

EROSION AT REVERSING FALLS RAPIDS

Students can visualize the powerful effects of water on the landscape by understanding the phenomenon of the river current meeting the Bay of Fundy tide here and experiencing the world-renowned effects of this natural phenomena. Outlook points above Reversing Falls Rapids are some of the windiest spots in the City. As well as looking at rocks here, teachers can point out the effects of wind on the landscape by comparing the vegetation there to what grows in more sheltered spots. The effect of glaciers on our landscape covered in the main resource is relevant for Grade 4.

ROCKS THAT CONTAIN RECORDS OF THE EARTH'S HISTORY AT REVERSING FALLS RAPIDS

Part of the significance of Stonehammer UNESCO Global Geopark is that geologists have been studying this landscape for 175+ years -- almost since the beginning of the discipline of Geology. The stories of Earth's history that are told here are well described in the scientific record. At Reversing Falls Rapids the rock contact at the Caledonia Fault line tells of the birth of an ancient mountain range, and the crazy angles we can notice in the layers of sedimentary rock tell the story of its erosion. As well, the rocks here contain records of the shift of the river course, which is described more in the main resource, and students can compare this geological story with the oral history of Koluskap and the Giant Beaver.

CHANGES TO THE LANDSCAPE AT REVERSING FALLS RAPIDS

Students can join in the debate that Saint John has continued for decades on what to call this site. We use both names here, but it is sometimes called just "Reversing Rapids" or just "Reversing Falls". Sea level rise drowned the waterfall which still exists below the surface of today's river.

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GRADE 4 SUPPLEMENT TO DRIFTING APART TEACHER RESOURCE: FUNDY TRAIL PARKWAY

ROCK RECORDS OF THE EARTH'S HISTORY AND ROCKS FROM OTHER PLACES AT THE FUNDY TRAIL PARKWAY

Stonehammer UNESCO Global Geopark tells the story of the birth of the Atlantic Ocean at the Fundy Trail Parkway. Students will enjoy the stunning cliff shoreline views and will be able to visualize the original ripping apart of the supercontinent Pangea as the Atlantic Ocean opened. Still drifting apart today as the ocean bed continues to grow with new rock created in the midatlantic fault, some shorelines on the other side of the Atlantic Ocean share the same kind of cliffs. The main resource goes into greater detail.

DESCRIBING DIFFERENT ROCKS AT THE FUNDY TRAIL PARKWAY

Student rock hounds will be kept very busy with the variety of pebbles after a lively hike to Melvin's beach or, for easier accessibility, at Long Beach. See item 4 on the teacher's sheet for more information.

ROCKS CONTAINING RECORDS OF THE EARTH'S HISTORY

Of the three rock types, it can be easiest for students to visualize the stories told by rocks in examining sedimentary rocks. Fundy Trail Parkway Triassic-aged red sedimentary formations have fascinating layers with different-sized clast. Students can look for mudstone and conglomerate layers and discuss how these tell the ancient landscape's story, both in what the climate and water flow may have been like as they were turning into rock (larger pieces mean stronger current), and in looking at what happened to the layers in later ages as they were thrust off their original horizontal bed.

EROSION AT THE FUNDY TRAIL PARKWAY

The flowerpot rock at the very beginning of the Trail is a fantastic visualization of the forces of erosion for the students to explore as it marks where the whole coastline once stood.

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