ISSUE FOUR

eco zine
THE GREEN ZINE

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ecozine – an alternative magazine, bucking the trends followed in mainstream media

eco – from the Greek word oikos meaning house

extreme bc – a look at how extreme our province can be – in climate, landscape, and ways of life

Cover photo: Robert Cannings
This issue of EcoZine looks at British Columbia's extremes in climate, landscape, and people. Our lead article should give you an idea of why our province is so extremely interesting.

A Day in the Life of BC
BC's extremes extend to people and their lifestyles. Meet some British Columbians and see how and where they like to live.

Extreme Beginnings
BC's extreme landscape was shaped by powerful and awesome forces. Learn about glaciers, tectonic plates, and volcanoes.

You Are Here: An interview with Barb von Sacken, Ecosystem Mapper
Barb is one of the many scientists in BC working on ecosystem mapping. She maps her own career and her thoughts on Extreme BC in this interview.

Digging up History
Paleobotany helps us uncover our climate's ancient history.

Where to Work?
Pondering your career path? Find out what jobs and career choices have to do with BC's geography and economy.

Stuff to read
If you're hungry for more info, bite into this further reading list.

ECOZINE A PRIMER ON FOREST ECOLOGY
Looking at a map of British Columbia, you don’t really see what makes it one of the most varied regions in the world. How can BC have places like Merritt, which receives an average of 310 mm of precipitation each year, and places like Tofino, which receives an average of 3,290 mm per year? More than ten times as much! Why are the differences so extreme?

This issue of EcoZine looks at how extreme our province can be—in climate, in landscape, and in ways of life. We’ll look at why there are such extreme differences, from the rain forests of the Queen Charlotte Islands to the grasslands of the Okanagan and from the boreal forests of Fort Nelson to the cedar-hemlock forests of the Selkirk Mountains.

We’ll start by comparing Merritt and Tofino and look at some differences by comparing photographs of the two places. The photo above shows us what it looks like around Tofino on the west coast of Vancouver Island. Being right on the ocean, it’s a windy and wet place—very green with dense, lush forests. The photo on page three gives you a typical view of the area around Merritt. It’s dry, dusty, range country. There’s lots of brown grass, and tree cover is sparse.

Some differences can’t be seen in photographs. The table on page three shows temperature, frost-free period (the number of consecutive days in a year without frost), and precipitation for some selected corners of BC. Tofino and Merritt show the differences between the coast and the interior, while Osoyoos and Fort Nelson show the differences between the south and the north.

From the table, you can see that Tofino receives more than ten times as much precipitation as Merritt and stays quite warm, even in its coldest month. Fort Nelson, way up north, has the coldest temperatures and the shortest frost-free period. Osoyoos, on the other hand, is warmer than Fort Nelson in both summer and winter.

Most of these differences can be explained by the climate of each of these places. BC’s climate is shaped by many forces, including the mid-latitude jet stream, high- and low-pressure systems, and the mountains. The mid-latitude jet stream is a current of very fast-moving air about 12 km above the Earth’s surface. In the winter, a low-pressure system called the Aleutian Low sits in the Gulf of Alaska. Low-pressure systems are masses of warm air which usually bring us rain and snow. As the jet stream moves from east to west, it brings winter storms from their “birthplace” in the western Pacific and from the Aleutian Low.

In the summer, the Aleutian Low moves north, and a high-pressure system called the North Pacific High moves in from the south and sits off the west coast. A high-pressure system is a mass of cold, heavy air which pushes warm air away like ice displacing water in a glass. The jet stream brings us clear weather from the North Pacific High in the summer while storms hit further north in Alaska and Yukon.

continued on page 4
The jet stream delivers weather to our doorstep on the west coast. But BC’s topography and continentality further shape the weather as it travels eastward to the interior. Topography is terrain, including mountains and river valleys. Continentality describes how far “inland” an area is. The closer to the ocean, the less continental the area. Both of these factors have strong effects on precipitation and temperature across BC.

The major topographical feature of BC’s west coast is the Coast Mountains, made up of several mountain ranges. As moist air moves east from the Pacific Ocean, it hits the Vancouver Island Ranges. The air rises, cools, and drops its moisture on the windward side of the mountains, which is where we find Tofino. The same air mass continues eastward and warms as it descends over the Thompson Plateau and into the Okanagan Valley. Having dropped most of its moisture on the Coast Mountains, the air mass drops much less precipitation on Merritt and the Okanagan Valley. Places with drier climates which lie on the leeward side of mountains are said to be in rainshadows. Victoria is a rainshadow area because Pacific air masses lose their moisture on the Olympic Peninsula before passing over Victoria.

Topography explains the difference in precipitation, but what about differences in temperature? These are better explained by continentality and latitude. The ocean dampens extremes in climate, so coastal places like Tofino, the Queen Charlotte Islands, and Vancouver have mild winters and warm summers. If you go further inland to a more continental climate, the ocean cannot provide warm and moist air to regulate temperatures. Places like Merritt and Osoyoos have colder winters and hotter summers. But why is Fort Nelson so much colder than Osoyoos? Fort Nelson is so far north that its climate is affected by Arctic air masses, which are bitterly cold and quite dry. Being much further south, Osoyoos is unaffected by cold Arctic air.

Climate explains a lot of the extreme differences across BC. Geology explains many others—including the shaping of BC’s topography. The article “Extreme Beginnings” describes how some of BC’s landscapes were formed by geological processes: namely, plate tectonics, volcanoes, and glaciation.

So looking at a map tells only part of the story. It’s when you consider how climate is created, how landscape is formed, and how the two interact that you start to see the whole extreme picture.  

Also see table on page 5
It’s when you consider how climate is created, how landscape is formed, and how the two interact that you start to see the whole extreme picture.

<table>
<thead>
<tr>
<th>Place</th>
<th>Average Annual Precipitation (mm)</th>
<th>Highest Temperature Recorded (°C)</th>
<th>Lowest Temperature Recorded (°C)</th>
<th>Average Temperature of the Warmest Month (°C)</th>
<th>Average Temperature of the Coldest Month (°C)</th>
<th>Average Frost-free Period (days)</th>
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<tr>
<td><strong>Coast vs. Interior</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tofino</td>
<td>3,288</td>
<td>33</td>
<td>-15</td>
<td>14</td>
<td>4</td>
<td>203</td>
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<tr>
<td>Merritt</td>
<td>308</td>
<td>39</td>
<td>-43</td>
<td>18</td>
<td>-7</td>
<td>122</td>
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<tr>
<td><strong>South vs. North</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osoyoos</td>
<td>335</td>
<td>40</td>
<td>-26</td>
<td>22</td>
<td>-3</td>
<td>180</td>
</tr>
<tr>
<td>Fort Nelson</td>
<td>452</td>
<td>37</td>
<td>-52</td>
<td>17</td>
<td>-24</td>
<td>106</td>
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</tbody>
</table>

En route -

Hunters and Gatherers

It’s hard to fathom a life that revolves around tracking down woolly mammoths, hunting whale from a wooden canoe, or even rounding up a herd of bison on foot. That is how BC’s first residents lived in a land as geologically diverse as its people. Scientists believe humans have been living in BC since the decline of the last Ice Age (about 10,000 years ago). As the glaciers retreated, they revealed the rugged mountains, gently sloping valleys, and maritime shores that would be home to BC’s First Nations.

BC’s prehistory has been pieced together by native elders, archaeologists, ecologists, and others. It tells us about how and where the first inhabitants lived. The prehistory of BC’s first peoples is divided into three main study groups based on geographic location: Coast, Plateau, and Sub-Arctic.

The Sub-Arctic region begins in the northern reaches of the province and extends into what is now the Yukon, Northwest Territories, and northern Alaska. Of the three regions, northern Alaska was by far the harshest to live in. Long cold winters, scarce food, thick stands of black spruce, and muskeg made these people’s lives more difficult than those of their southern neighbours. Their communities were small because they moved around, following the migratory animals they relied on for their food.

Another semi-nomadic culture, the people of the Plateau, occupied the large area between the Rocky and Coast Mountains. People of the Plateau lived in small bands, often far apart. The Okanagan band lived in a steppe environment alongside cactus, sagebrush, and rattlesnakes. Interior bands were strongly influenced by their coastal neighbours and adopted some of their customs and traded goods with them. The Plateau peoples exchanged dried berries, twine, and tanned skins for slaves and dug-out canoes. Northern bands lived near dense forests and high mountain peaks where they could hunt larger mammals such as moose and elk.

The Pacific Coast was one of the most densely populated areas of Canada thousands of years ago. A gentle climate combined with an abundant food supply provided a hospitable environment with time for celebrations, art, and leisure. Hand-carved boxes and totems, intricately woven dresses, and elaborate masks preserved over time exhibit a coastal life rooted deep in history and tradition. The cedar forests that surrounded maritime villages were integral to coastal people’s art and culture. Families established permanent villages strung along isolated misty shores against the backdrop of fjords and mountains, with resources close at hand. The first contact Europeans had with western Canada was with the Pacific Coast and its people.

Also see chart on page 6
**LOCATION AND LIFESTYLES OF ABORIGINALS IN BC – PREHISTORY**

**LOCATION**

- **Sub-arctic**
- **Plateau**
- **Pacific Coast**

**Food**

- Sub-arctic: mainly carnivorous diet: moose, woodland caribou, thinhorn sheep, woodland bison, fish, and berries; used hot stone method for cooking; made containers and vessels from birch bark; carved utensils from horns.
- Plateau: omnivorous diet: salmon in spring and fall, lake fish, deer, moose, elk, caribou, bighorn sheep, ground-squirrels, marmots; dried fish and berries for winter use; berry-picking expeditions brought women together in autumn months.
- Pacific Coast: mainly marine diet: seals, sea lions, sea otters, mussels, clams, scallops, sea cucumbers, seaweed, and salmon; also hunted black-tailed deer, elk, mountain goat, and waterfowl; berries, bark, and root crops supplemented diet; dried and stored much of the catch for winter.

**Shelter**

- Nomadic lifestyle led to simple home designs; some bands lived in pit homes: semi-permanent, dome-shaped structures dug into ground and covered with spruce boughs and moss.
- Constructed pit homes along river banks in the autumn and lived in them throughout the winter; in summer they constructed teepees; further north, they lived in A-frame style homes built from cedar slabs.
- Different winter and summer locations; giant cedar timbers provided the framework for longhouses; mats hung along the inside frame provided privacy for multiple family units; nearly all homes were built in a row facing the water.

**Transportation**

- Made snowshoes from birch and spruce boughs; canoes carried people and their belongings from one area to the next during summer; depending on the terrain and the materials available, canoe design and construction would vary from one band to another.
- Water transport was minimal; rivers raged with rapids that made travel almost impossible in many areas; canoes were still used in almost every region of the Plateau—probably for travelling in calm waters; in winter months, hunters and trappers used snowshoes, and dogs pulled toboggans; horses were introduced in the early 1700s.
- Canoes were the main mode of transportation; canoes varied in size and design depending on the intended use; small hunting canoes carried one or two persons, and larger ones transported goods and people; some people ventured over the mountains to hunt; others travelled inland on foot to trade with Plateau neighbours.
The only thing more diverse than British Columbia’s landscape is its people. With almost four million people living in all corners of the province, we’re bound to have an interesting mix of lifestyles. A Vancouver bicycle courier lives a very different life from a Williams Lake rancher. And a Prince George mill-worker’s environment is very different from a geoduck diver’s life in Tofino.

Just as BC’s geography supports extremely different ecosystems, it also supports a wide variety of lifestyles. We asked some BC residents about their place in Extreme BC and how it affects their quality of life.

**Holly Jackson** grew up near Kamloops where her parents operate a cattle ranch. Her early years in range country gave her a passion for horseback riding and hiking. She’s currently doing her Master’s degree at the University of Victoria. She likes Victoria because it “promotes outdoor activities and is a very dog-friendly place.” Jessie, her dog, would agree.

Holly would like to move back to Kamloops if she can find work there. She misses the hot summers and snowy winters—something she doesn’t get on the coast. This aspect of the Kamloops climate allows her to enjoy winter skiing and summer swimming. “Kamloops provides pretty much everything for outdoor recreation. I even love the dry, dusty sagebrush country.” If she had to, she thinks she could move anywhere in BC. Having grown up in Kamloops and developed so many interests in the outdoors, Holly is pretty much immune to boredom.

**Deepa Tolia** left Toronto’s chaotic suburbs for Mackenzie when she landed a job with the BC Forest Service. It was a shock at first, but Deepa has no regrets. She says the mountains have become a “very valuable element” in her environment. “Mackenzie is nestled near the centre of the Rocky Mountain Trench.” She hikes in the Rocky and Omineca Mountains and says just being able to see them every day is a source of motivation. A lake with walking trails is only five minutes from her door—a luxury she didn’t have in Toronto.

*continued on page 8*
A D A Y  I N  T H E  L I F E  O F  B C

continued from page 7

Mackenzie is a forestry-based community of about 7,500 people. As a forester, Deepa says living in a forestry community helps her understand what the forest means to people whose lives are so closely tied to it. She also likes Mackenzie’s relaxed pace of life: “No traffic jams, no fighting for parking spots, and everything is five minutes away.” The only harsh words she has are for Mackenzie’s winters, which are very cold and have fewer daylight hours than down south. Asked where she would move in BC if she had to, Deepa answered Kamloops—mainly because it has longer summers and is closer to larger cities like Vancouver and Calgary.

The Toews family lives on Kootenay Lake, about 20 minutes from Nelson. Their house is on a quarter hectare lot right on the lake—which made moving from the city a lot easier. Dave, a hydrologist, spends time in the office and in the field looking at how forestry and other activities affect the movement of water in the ecosystem. Judy is a nutritionist and a writer, with the freedom to work at home a few days a week. Their eldest daughter, Sarah, is at UBC, where she is studying commerce. And Erica is in high school keeping busy with soccer, cross-country running, and the piano.

The Toews (pronounced taves) are pretty happy in their corner of BC. Dave and Judy describe their community as “friendly and safe.” But they also realize what they gave up by not living in a bigger city. “A lot of our relatives are in Vancouver, including Sarah of course.” But things like “precious hours wasted in traffic” remind them why they left in the first place. For now, they’re making the most of their natural environment. The whole family hikes, boats, and skis together. Dave especially likes the mountains and makes a point of visiting them regularly.

Deepa, Holly, and the Toews have different lifestyles, but they also have things in common. Like many British Columbians, they appreciate the natural beauty of their surroundings and consider themselves lucky for being able to enjoy it.

But these are just a few examples. Consider the people you know. Do they prefer big cities or small towns? Do they like outdoor or indoor activities? Is their job tied to where they live? Of course, there isn’t one answer for everyone. Most people like a mix of activities and environments. And Extreme BC likely offers the right mix.

AM|EZ

Table and Lingo from Extreme Beginnings on page 9

LANDFORM LINGO

cirque - steep-sided, semi-circular basins or bowls carved out of a mountain-side close to its peak.
eratic - very large piece of rock transported over long distances by a glacier.
fjord - partially submerged, steep valley with almost parallel walls dug out by glaciers as they plowed into the sea. A large mound (sill) of rock and soil forms at the farthest extent of the glacier, like a snow bank created by a plow.
geyser - hot spring which periodically ejects water and steam. Hot volcanic rock causes groundwater to vaporize. Pressure builds, and an eruption follows.
mantle - layer of the Earth, 2,900 km thick, between the liquid core and the crust. The crust, which is only 8 to 40 km thick, floats on the mantle.
mud pot - a pocket of mineral mud that churns and bubbles as vapours escape from below.
volcanic vent - the opening through which magma comes out in a volcanic eruption. The main vent of a volcano creates a crater at its top.

It is hard to imagine the time it took to shape this planet. If we could condense the major eras of geological history into one day, we would see that most of that day occurred over 500 million years ago. In this day-long life of our planet, Homo sapiens didn’t appear until two seconds before midnight (about 100,000 years ago).

<table>
<thead>
<tr>
<th>Era</th>
<th>Time Period</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precambrian Era</td>
<td>570 – 220 million yrs ago</td>
<td>Earth’s permanent crust formed, including the Canadian Shield and the Great Plains of northeastern BC; first life forms are blue-green algae. Life diversifies; Burgess Shale marine fauna live near present-day Field, BC; European and North American continents collide; marine life flourishes in first 325 million years of era, then undergoes mass extinction at its close. “Supercontinent” Pangaea begins to break up; North America and Africa separate, opening the Atlantic Ocean; Rockies begin to build as two plates collide; western Cascades and southern Coast Mountains merge; climate warmer than present; dinosaurs climax and then become extinct at end of era. Rocky Mountains completed; Okanagan Valley opened; volcanic activity along Coquihalla River; Coast Mountains begin rising as the crust beneath them heats and expands; modern plants and animals appear; ice ages; rise of Homo sapiens.</td>
</tr>
<tr>
<td>Paleozoic Era</td>
<td>220 – 570 million yrs ago</td>
<td>3,800 – 570 million yrs ago 12:00am – 8:24pm</td>
</tr>
<tr>
<td>Mesozoic Era</td>
<td>570 – 220 million yrs ago</td>
<td>8:24pm – 10:37pm</td>
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<tr>
<td>Cenozoic Era</td>
<td>75 million yrs ago</td>
<td>10:37pm – 11:32pm</td>
</tr>
<tr>
<td>Present</td>
<td>75 million yrs ago</td>
<td>11:32pm – 12:00am</td>
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</table>
From mountain peaks to the ocean floor, volcanoes, tectonic plates, and glaciers have shaped BC into a spectacular array of landscapes.

Planet Earth is about 4.5 billion years old and has always been changing. Landscapes and landforms are present-day reminders of our ever-changing planet. Alterations to the landscape can happen in minutes, as with an earthquake or volcano, or they can take millions of years, as with glaciation. From ancient times to the present day, humans have been intrigued by the Earth's history and the geological forces that shape it. The ancient Greeks and Romans believed that mythological figures had a hand in shaping the landscape.

Present-day geology is the study of the Earth's origin, structure, and composition. Geologists examine rocks and landforms to date events in the Earth's history. On a geological timeline, our 4.5 billion year history is broken down into many time periods. The major changes in minerals and landforms, as well as changes in the kind of life that the Earth supported, characterize and define the different epochs and ages of Earth's past.

From mountain peaks to the ocean floor, volcanoes, tectonic plates, and glaciers have shaped BC into a spectacular array of landscapes.

Seismology is the study of the Earth below its surface. Recent studies reveal that the continents and oceans ride on a series of plates that float on the Earth's mantle like a giant jigsaw puzzle. This theory, known as plate tectonics, examines the plates, the continents, and their movement in relation to one another. The movement of tectonic plates is also known as continental drift.

The tectonic plates underlying BC have been colliding and grinding against one another for hundreds of millions of years. BC rides on the North American plate, which borders the Pacific plate—mostly covered by the Pacific Ocean. In some places, the Pacific plate moves in a northwest direction against the North American plate, which is moving southeast. In other places, the Pacific plate is pushed down into the Earth's mantle and melted—a process known as subduction.

The Juan de Fuca plate lies off the west coast of Vancouver Island and is sliding beneath the North American plate. Colliding plates are responsible for building the Coast Mountains and the Rocky Mountains. When the Pacific and North American plates collided million of years ago, the top layers of the Pacific plate were scraped.
and crumpled into the peaks and folds of the Coast Mountains. Earthquakes and volcanic eruptions are common along the edges of plates. In BC, we are reminded of the moving plates when we experience small tremors and earthquakes.

Volcanoes occur both on land and in the ocean. The most recent volcanic eruption in BC took place just over 200 years ago in the Stikine Belt, northeast of Vancouver. Other volcanic formations in BC include the Anahim Volcanic Belt on the Fraser Plateau and the Garibaldi Volcanic Belt that stretches north from Garibaldi Park, about 150 kilometres north of Vancouver. Volcanoes occur over volcanic vents, along fissures in tectonic plates, over weak spots in the mantle also known as “hot spots,” and over major subduction zones, where one plate pushes another below it (e.g., Mount Garibaldi). Under extreme heat and pressure, magma can blast through a vent in a volcanic eruption. When the magma cools, it forms a cone around the vent, creating new land. Today, geological features like geysers, mud pots, and craters can be found near dormant or extinct volcanoes.

Five successive periods of continental glaciation, each followed by a warm period, have occurred in British Columbia over the past two million years. In peak periods of glaciation, ice covered most of BC. Where Vancouver stands today, the ice was two kilometers thick. The last major glaciation in this province ended 10,000 years ago, although the lowland coast was ice free 13,500 years ago and the southern lowlands were ice free 12,000 years ago. Scientists are still debating the causes of the ice ages. Hypotheses include increased volcanic dust in the atmosphere, reduced solar radiation, and shifts in the planet’s axis of rotation. Moving ice continues to create its own landscapes over time, waxing and waning across the land. Evidence of glaciers past and present are visible throughout BC such as fjords along the Pacific Coast, cirques in the alpine and erratics hurled across the plains. KC|EZ
For most of us, living in British Columbia usually means living with snow for a third of the year. So it’s no wonder that skiing is one of the favourite pastimes in British Columbia. From Dawson Creek to Duncan and all points in between, British Columbians enjoy living in a landscape that boasts some of the best skiing in the world. If you are planning that ultimate ski vacation or looking for a ski hill off the beaten path, you might want to pick up Heather Doughty’s *Ski British Columbia*.

Heather worked hard putting this book together and had a good time doing it. Although the book focuses on downhill skiing, it includes information and destinations for Nordic, back-country, and heli-skiing. There is no mention of snowboarding, but the information is helpful to snowboarders looking for new terrain.

*Ski British Columbia* gives the reader descriptions of 33 ski resorts in BC. The resorts are arranged into nine geographic locations: Vancouver Island, Lower Mainland, Whistler, Okanagan, Kootenays, Rockies, Cariboo, North Country, and High Country. There are details of the geography and climate of each area as well as useful notes on where to stay, where to eat, how to get there, and how much it will cost you. Also listed are annual events and festivals like the Great Bathtub Race at Murray Ridge, Winterfest in Kimberley, and Spring Carnival at Grouse Mountain.

The author has included most things you need to know to decide on your next ski destination. Filled with ski facts, personal anecdotes, and historical notes, *Ski British Columbia* is worth its weight in snow. KC EZ
Road maps help us find our way from one place to another. Ecosystem maps help us find the best way to manage the land. By knowing the type of ecosystem you’re dealing with, you can tell a lot about how it will respond to logging and other uses. You can also assess how unique it is and where it would fit into a conservation strategy.

Barb von Sacken is an ecosystem specialist with the BC Ministry of Environment, Lands and Parks in Victoria. Her job is to set the standards for mapping BC’s ecosystems. I visited Barb to talk about how she got started, what she does now, and how much of BC she’s seen.

Barb got her Bachelor’s degree in geography from the University of Victoria in 1990. She’s still keen on geography because it has a bit of everything—science, sociology, and economics, to name a few. Growing up on a farm in the north Okanagan, Barb always had a connection to the outdoors. She remembers her high school class taking a field trip in and around the valleys she grew up in. “The teacher pointed out landforms, and I started to see the whole valley explained in geological terms.”

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University courses in geographic information systems and resource management helped her get a job with the BC Forest Service. She worked on the province’s ecosystem classification, which is the basis for a lot of the forestry and other land management that goes on in BC. Barb moved into her current job in 1991 when the province started developing guidelines or “standards” for the inventory and mapping of ecosystems. Standards are important because they ensure that field crews and mappers capture the best possible level of detail, and do so consistently across the province. The first draft of the standards was released in 1995 and had guidelines on everything from how to classify a slope to what thickness of pen to use when drawing map lines.

Maps are important tools that allow foresters, ecologists, and others to get a bird’s eye view of BC’s varied landscape. Barb explains, “Ecosystem mapping gives you a ‘picture’ of the diversity of the landscape. You can use that map for so many different interpretive purposes—like wildlife management, recreation, and forestry. With so many resource issues out there, you really need to have a good understanding of the area to manage it well.”

The standards and maps Barb has worked on are always evolving. Strewn across her desk during our interview were the guts of the latest standards manual marked with red ink. “Our ecosystems are so complex that there will always be something new that is worth studying.”

But Barb doesn’t just sit in her office wielding a red pen. Because of her knowledge of plant identification and how to recognize ecosystems, Barb has been on many expeditions to the far reaches of BC. She’s ridden horseback in the Tuchodi River Valley surveying songbirds. She’s flown by helicopter into subalpine ecosystems searching for the endangered Vancouver Island marmot. And most recently, Barb had what she described as the “field trip of a lifetime” on the Taku River in northwestern BC. Along with several ecologists and researchers, Barb paddled down the river, sampling the ecosystems they encountered along the way. They also used a helicopter to go further off the river to survey more remote areas.

Even with her experience, Barb is the first to admit there’s a lot more to BC than she has seen. “BC’s got more variation than most of the other provinces put together. It’s incredible that you can go from grassland in the southern interior to a huge coastal forest with trees that you can’t even see around.” Barb knows she’s lucky to have seen so much of the province through her work. “That’s what’s so great about my job. I get to see stuff that most of us living in cities don’t ever see. We can only imagine what the rest of the province is like, but it’s so incredible and so varied. With this job you get to see a lot of that—it’s wild.”

I asked Barb, “When you look down from a helicopter, do you think about what forces shaped that landscape? Glaciers or plate tectonics, for example?”

“More and more, even when I fly to Vancouver and see the Coast Mountains, I picture the plates being crushed together. When I’m flying over the mountains, I can see how glaciers have carved out the valleys.”

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“How about the interior?” I asked. “What do you notice there?”

“In the Cariboo and a lot of the interior plateau, you can see evidence of so much glacial activity—for example, the kettle and kame landscape, which consists of hundreds of little lakes (kettles) and the mounds (kames) that surround them. You can imagine the weight of the glaciers pressuring down on the whole interior plateau.”

With such wide-ranging experience in BC, I was curious to find out what Barb’s favourite spot was. This turned out to be one of the toughest questions because she had plenty of favourites. “Up in the Tuchodi, fires create thousands of hectares of green, green grass with white aspen trees. And on the Taku, we saw amazing cottonwood stands on really wide flood plains. The geological features are just as fascinating.” She finally admitted that the Cariboo was her favourite part of BC. “There’s something spiritual about big open grasslands and rolling hills,” she laughs, and adds, “Maybe I should have been a cowboy.”

EcoZine has no doubt that Barb has chosen the right profession, and we’re glad that she is doing what she is doing. With her training in geography, her experience with BC’s ecosystems, and her enthusiasm to learn more, Barb von Sacken is helping all of us understand what makes BC such a special place. AM EZ

Jökulhlaup

One of the most spectacular things Barb saw on her Taku trip was a Jökulhlaup (pronounced yo-kull-haup). Also known as a glacial outburst flood, a Jökulhlaup is the sudden release of water from a glacier-dammed lake. Every now and then, Barb explains, “the dam melts or cracks, and you get this huge burst of water and debris into the river.” Spectacular though it was, Barb and her colleagues had to get out of there because the rushing floodwaters were heading for their airstrip. “We had to evacuate. The river was wild with all kinds of debris floating in it. As we got to the airstrip, you could actually see the water level rising. We got out just in time. By the end of the day, they wouldn’t have been able to land there.”
Peel back a few metres of preserved organic matter anywhere in BC and you might uncover ancient history. By looking at peat samples or other types of sample cores, paleobotanists can guess what an area was like thousands of years ago. They can piece together the probable history of an area based on pollen, the remains of trees, and other plant material—all buried deep under the surface of bogs and lake bottoms. In anaerobic environments like these, decomposition is very slow. Digging deep into them is like travelling back in time. At one metre, you might find the leaves of a tree that died 500 years ago. Five or six metres down, you might find some moss that was buried and preserved 6,000 years ago. Vegetative remains like these can help determine what the climate was like in the past and give us a better idea of what trends have taken place over time.

This kind of research can help us better understand important issues like global warming. We know there has been a warming trend over the last 150 years, but recorded climate data doesn’t go back more than 200 to 300 years. Has the Earth been warming for 150 years—or 1,500 years? Paleobotany has helped find the answers.

Forests, grasslands, meadows, and wetlands have been evolving in BC since the most recent Ice Age ended about 10,000 years ago. That’s 10,000 years of history encoded into the growing surface of bogs and other landforms. AM EZ

Also see table and photos on page 16
Here’s a summary of what paleobotany tells us about our climate since the end of the last Ice Age (adapted from Cannings and Cannings, 1996).

<table>
<thead>
<tr>
<th>YEARS AGO</th>
<th>EVENTS</th>
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<tbody>
<tr>
<td>10,000</td>
<td>Last Ice Age ends; glaciers have disappeared from all but the highest mountains.</td>
</tr>
<tr>
<td>10,000 – 9,000</td>
<td>Climate becomes rapidly warmer; summer solar radiation is 8% greater than today; Douglas-fir forests dominate the coast.</td>
</tr>
<tr>
<td>8,000</td>
<td>Warmest period since end of Ice Age; interior summers hotter and drier than today; grasslands more extensive; forests reach higher elevations than today.</td>
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<tr>
<td>7,000 – 4,000</td>
<td>Climate becomes moister and cooler; western hemlock and redcedar forests take over from Douglas-fir.</td>
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<tr>
<td>6,800</td>
<td>Mt. Mazama erupts, covering southern BC in volcanic ash.</td>
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<tr>
<td>4,500 – 3,000</td>
<td>Interior grasslands reach minimum extent due to cooling; modern conditions prevail there.</td>
</tr>
<tr>
<td>500 – 150</td>
<td>Little Ice Age — mountain glaciers expand.</td>
</tr>
<tr>
<td>150</td>
<td>Present warming trend begins.</td>
</tr>
</tbody>
</table>

The white strip is ash from the eruption of Mt. Mazama (Oregon) almost seven thousand years ago.

Ginko leaf fossil from the cretaceous period (140–165 million years ago).
Where to work?

So where are all the jobs? If you’re looking for work or planning a career in British Columbia, you might want to try a demographic approach. Employment opportunities often depend on geographic location, the resources available, and the size and age of the population.

For thousands of years BC’s economy has been resource-based. It began with BC’s first people exchanging goods between the various regions and bands. A few hundred years ago, European and Spanish explorers discovered the abundance of natural resources, and it wasn’t long before a new way of doing commerce was introduced. A new economy began with the fur trade—goods in exchange for cash or other commodities. After the fur trade, logging, mining, and fishing soon became the mainstay of BC’s resource-based economy. Rural towns were quickly established, and cities continued to grow, creating employment opportunities and bringing more people to British Columbia.

Today we are living and working in a global economy where the world is your customer and your competitor. The days of working in one occupation in one place for the duration of one’s working life are over. People in the work force today can expect to face many career changes in their lifetime. The diversity in BC’s population and natural resources enables people to pursue careers in a wide variety of occupations in various locations throughout the province.

Geographic location often dictates employment opportunities: big cities can provide big salaries and increased opportunity. Working and living in a city is often combined with higher costs of living and urban stress, whereas small towns and villages may boast low housing prices and a slower-paced lifestyle. However, in some small towns where the mainstay of the economy is resource-based (for example, fishing and logging), employees now find themselves looking in new directions for employment. Recent trends show a resource-based economy shifting to service industries (such as tourism and telecommunications) and home-based businesses.

City or country, it all depends on where you want to work, or where you can find work. Historically, most of the jobs have been in metropolitan areas. However, the location of jobs and workers is slowly changing in BC and across Canada. A growing number of people now live and work in suburban and rural areas rather than in the central core of cities. This trend is partly due to a growing number of people who work from home. Areas of the province where working from home is common are the central coast and the Okanagan-Similkameen—areas that have been historically dependent on resource economies. Recent studies show one in every twelve persons is working from home in BC. In regions such as northern Vancouver Island and Kitimat, where primary industries are major employers, working from home is less common.

Wherever you live or whatever job you decide to do, the challenge is finding out what works for you. Knowing what you like and dislike can help you decide on a location and a profession that complements your interests and lifestyle. The choice is yours.

Where We Live

Where We Live

Ideas for businesses today and beyond

- Health and home care for an aging population
- Computer software programming and technical support
- Personal and home security systems
- Foreign language training
- Home office products and services
- Environmental products and services
- Travel/recreation activities
- Specialty foods

Occupations that are growing fast and offer many openings in British Columbia

- Management, finance, telecommunication, business services
- Restaurant managers, food services
- Legal secretaries, medical office assistants
- Computer programmers, systems analysts
- Electronic service technicians
- Health care providers
- Graphic designers, illustrators
- Technical sales specialists, wholesale trade
- Security guards

More information regarding demographics, labour trends, and occupations is available in the following publications:
- Statistics Canada publications available at your local library
- Work Futures: Human Resources Canada, with BC Ministry of Education.
Employment opportunities often depend on geographic location, the resources available, and the size and age of the population.
anaerobic - lacking oxygen. Anaerobic environments preserve organic matter because there is no oxygen for decomposition.

bog - ecosystem on deep deposits of wet, spongy peat; acidic and low in nutrients. Decomposition is characteristically slow in bogs.

cclimate - the long-term prevailing weather of an area.

continentiality - a measure of how inland or unaffected by the ocean an area is.

demographics - statistics about people, usually related to their age, gender, occupation, and living conditions.

decosystem map - a map showing the distribution of ecosystems on a landscape. The scale is usually 1:50,000 or 1:20,000.

glacier - very large sheet of ice, up to two kilometers thick, advancing or retreating depending on climate.

Ice Age - period of Earth's history (Pleistocene Epoch) from about two million years ago until 10,000 years ago when temperate regions were periodically covered by glaciers.

jet stream - a high-altitude, high-speed wind current, usually flowing from west to east at speeds up to 400 km/h and at altitudes up to 25 km above sea level.

leeward - the side of a mountain opposite to the windward side.

longhouse - a communal dwelling commonly built by North America's indigenous people; usually rectangular in shape and made of a wood frame.

magma - molten rock material under the Earth's crust. Igneous or volcanic rock is formed when magma cools.

muskox - see borg.

omnivorous - a diet which includes all edible foods, including meat, vegetation, fruit, insects, etc.

paleobotany - the study of fossilized plant material, usually to investigate climates and ecosystems that existed thousands of years ago.

peat - partially decomposed organic matter underlying bogs; usually composed of sphagnum mosses.

Pleistocene Epoch - see Ice Age.

prehistory - the period before recorded history.

rainshadow - the leeward side of a mountain range, which receives very little precipitation because air masses have lost their moisture on the windward side.

sample core - a long, continuous cylinder-shaped sample, usually of peat, soil, or ice, which contains pollen and/or vegetative remains deposited at various depths over time.

seismology - the study of earthquakes and the mechanical properties of the Earth.

steppe - ecosystem with cool, continental climate that is too dry for trees to grow in abundance; usually dominated by grasses and other drought-tolerant plants.

topography - the expression of mountains and other relief on the landscape.

windward - the side of a mountain which faces prevailing winds.

COWS QUAKE ON QCI

Hundreds of earthquakes occur in BC every year, but very few are actually felt. The strongest earthquake in Canadian history occurred off the west coast of the Queen Charlotte Islands on August 22, 1949. The epicentre was on the Queen Charlotte fault where the Pacific and North American plates meet. Its magnitude was 8.1—enough to knock cows off their hooves, collapse oil tanks, and make buildings sway in the town of Prince Rupert.


Number of lakes in BC with an area greater than 20 square miles (51.8 km²): 43
Number of millions of litres of water passing through “Hell’s Gate” on the Fraser River per minute: 908
Length in kilometres of the largest fjord on BC’s coast (Otter Passage/Gardner Canal): 193
Length in kilometres of BC’s coastline: 27,000
Number of millimeters of rain on the wettest day on Vancouver Island (Ucluelet, October 6, 1967): 489
Highest temperature in Celsius ever recorded in BC (Lillooet/Lytton, July 1941): 44.4
Temperature in Celsius of Liard Hot Springs “Alpha pool”: 49
Number of known hot springs in BC: 95
Percentage of British Columbians employed in the “Provision of Services Sector”: 74
Percentage of British Columbians employed in the “Goods Producing Sector”: 26
Year the first coal mine opened in BC (Fort Rupert): 1835
Year the first sawmill was established in BC (Millstream): 1848
Year the first shopping mall was established in western Canada (West Vancouver): 1950
Number of mountain passes on BC roads: 14
Length in metres of the longest tunnel along the Trans Canada Highway (Fraser Canyon): 650
Year of the first gold rush in BC (Queen Charlotte Islands): 1851
Number of children lost and reunited with parents at EXPO 86: 4,000
Number of disoriented adults checking into the lost and found at EXPO 86: 86,000
Number of coastal islands in BC: 6,500
Height in metres of the highest mountain in BC (Mt. Waddington, coast range): 4,016

What did you think of EcoZine? Was there too much stuff? Too little? What was your favourite part? What didn’t you like? Do you have any story ideas for EcoZine? If you know the answers to these questions, share your wisdom! Send your comments to EcoZine...

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