

Exploring Geography

BIG QUESTION

How can geographic inquiry and geotechnologies help us ask and answer important questions about the world around us?



▲ Geographic issues can range from large academic and public-policy issues to everyday issues. These issues can prompt a wide variety of geographic questions. This photograph shows scientists from the University of Northern British Columbia installing a GPS device designed to measure changes in thickness in the Castle Creek Glacier. What questions do you think this type of study is meant to answer?

LET'S GO!

- What does geography have to do with your life?
- What are key geographic concepts that can help you think like a geographer?
- How can you use critical thinking and geographic inquiry to answer questions?
- How can geotechnologies help you solve problems?

KEY CONCEPTS

- interrelationships
- spatial significance
- patterns
- trends
- geographic perspective
- geographic inquiry
- geotechnology

What Does Geography Have to Do with Your Life?

If someone told you that “everything has to do with geography,” would this seem like an exaggeration? Geography is all around us, and geographic issues directly affect almost every part of our lives. Successful geographers are always curious about the world around them. They want to know more about the things they see, read, or hear about. But curiosity is just the start. Once an important question has been asked, a geographer needs to know how to find the best answer.

Seeing What There Is to See

Each photo in Figure A-1 has a question. These are not the only questions that could be asked about the photos. They may not even be the most important questions. But questions such as these will help you make the kinds of connections that are key to thinking like a geographer.

▼ **Figure A-1** What questions would you ask about the geographic issues in these images? How might they relate to your life?

Geography Q & A

Why do some Canadians see these signs in their neighbourhoods?

How could this little insect cost Canada's economy billions of dollars?

How is Canada's economy changing?

Why are Canada's large cities increasingly growing upward?

Does this image show a challenge or an opportunity for the future?

What does this oil rig tell us about Canada's poorest province?

Developing a Sense of Place: Three Key Questions

Imagine a particular place that holds some meaning for you. What was it about the landscape, buildings, history, or people that created a sense of place for you?

A “sense of place” is what makes a place special or unique. It involves not only our knowledge of the place, but our understanding of how humans interact with that place. Geographers develop a sense of place by asking three key geographic questions. Let’s see how this works using the example of the mountain pine beetle.

absolute location where something is located in terms of latitude and longitude

relative location where something is located in relation to other geographic features

ecosystem a community of living things and the physical environment in which they live

WHAT IS WHERE?

Geography is all about location. You need to know the location of something before you can move on to more complex questions. There are two types of location in geography: **absolute location** and **relative location**.

Answers

- *What?* This is a mountain pine beetle. It lives most of its life inside the bark of pine trees. If enough beetles infest a tree, they will kill the tree.
- *Where?* The mountain pine beetle is native to western North America, from northern Mexico to central British Columbia. In the last 20 years, its range has expanded into parts of northern British Columbia and Alberta.

WHY THERE?

There are both simple and complex reasons why things are located where they are. In some cases, the natural environment, such as landforms or climate patterns, provide an explanation. In other cases, human actions affect the natural environment.

Answer

Mountain pine beetles have been around for thousands of years without causing too much damage. Why has this changed? Scientists have linked their increase in numbers and range to warmer weather caused by global climate change. In the past, cold winter temperatures limited the number and spread of the beetles. Recent winters have been warmer, so more beetles are surviving. The spread of the mountain pine beetle can therefore show links between human actions and the natural environment.

WHY CARE?

The importance of this question becomes clearer if we expand it a bit and say, “*Why should we care?*”

Answer

There are two reasons why we should care about the mountain pine beetle. The first is economic. Forestry is a key source of wealth and employment. Mountain pine beetles are spreading eastward, threatening the forest industry across Canada. The second reason is environmental. The beetles are disrupting an important **ecosystem**. It may be many years before we know their full impact. The final task is to decide what can and should be done about this problem.

Four Important Geographic Concepts

When geographers ask questions about a particular topic or issue, they must keep in mind four important geographic concepts, or ways of thinking. You will apply these concepts throughout this course (Figure A–2).

interrelationship a relationship that exists between different patterns and trends

spatial significance the importance of a particular location in geography

pattern the arrangement of objects on Earth’s surface in relationship to each other

trend a noticeable change in a pattern over time

GEOGRAPHIC THINKING

■ Interrelationships

■ Spatial Significance

■ Patterns and Trends

■ Geographic Perspective

▲ **Figure A–2** These concepts will appear with questions and activities throughout this book. They will help you keep in mind which geographic concepts are being explored.

geographic perspective a way of looking at the world that includes environmental, political, and social implications

INTERRELATIONSHIPS

Geographers try to identify the relationships that exist within and between natural and human environments. If you can identify **interrelationships**, it is easier to see how things affect each other, and to answer the question “Why care?”

SPATIAL SIGNIFICANCE

Spatial significance is directly related to the key questions “What is where?” and “Why there?” The location of something can be important (or unimportant) for many reasons. The significance of a place can also be different for people, animals, and plants. This way of thinking can help you explore connections between natural and human environments.

PATTERNS AND TRENDS

Geographers are always on the lookout for **patterns** and **trends**. Being able to identify patterns and trends can help you understand why something is where it is, and why this matters.

GEOGRAPHIC PERSPECTIVE

A perspective is a way of looking at the world. Geography is a unique subject that has connections with many other fields, such as economics, geophysics, urban planning, and history. This allows geographers to consider multiple perspectives while studying an issue in geography. Developing the skill to understand a variety of perspectives can help you solve problems and make judgements. Looking at things from a **geographic perspective** is central to all geographic analysis.

APPLY IT!

1. How can a sense of place help you identify an issue and understand why it is important?
2. Describe at least one geographic pattern and one geographic trend that you have noticed where you live.
3. Choose one of the photographs in Figure A–1 (other than the mountain pine beetle). Suggest, with specific examples, how the three key questions and four ways of thinking could be used to answer the question posed with the photograph.

Aboriginal Peoples and Geographic Thinking

Aboriginal peoples—First Nations, Métis, and Inuit—have a special connection to the geography of Canada. They and their ancestors have lived here for thousands of years. Over hundreds of generations, they learned how to survive in this challenging land: where and how to catch fish and hunt animals, where to search for plants and animals in each season, how to prepare food and clothing to survive the winters, and how to travel across land and water (Figure A-3). They learned about the ecology and natural rhythms of the areas in which they lived. They saw the interrelationships between all living things.

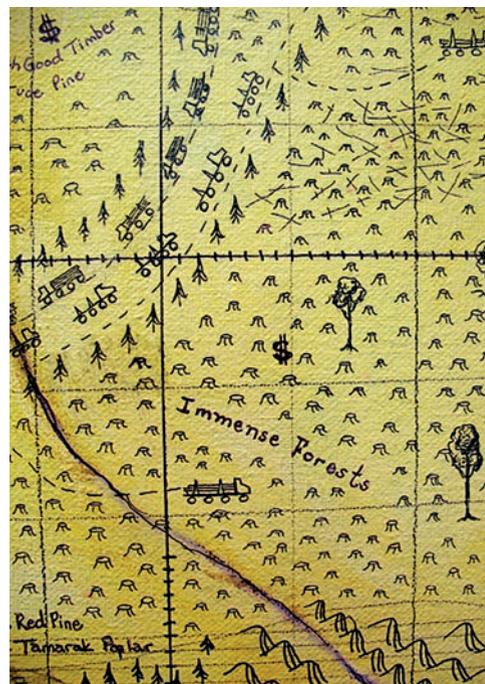
What Aboriginal peoples learned, they passed from one generation to another. Over time, their lifestyles and cultures became intimately connected with the specific places in Canada where they lived (Figure A-4). They named the places in their territories and told stories about them. These cultures endure, even though many Aboriginal people now live in towns and cities.

In this book, you will discover many ways in which First Nations, Métis, and Inuit peoples still maintain a deep knowledge of and respect for the land. You will also discover how they react to resource development, climate change, population trends, and the need to find a job—challenges faced by all Canadians.

WHAT QUESTIONS MIGHT GEOGRAPHERS ASK ABOUT ABORIGINAL PEOPLES AND THEIR RELATIONSHIPS TO THE LAND?

You have seen how the geographic thinking concepts help shape our understanding of the world around us. Let's consider how geographers might think about Aboriginal peoples' relationship to the land. They might ask the following questions:

- How did access to natural resources, such as plants and animals, affect the lifestyles of Aboriginal peoples? (Interrelationships)
- Why did Aboriginal peoples choose to live where they did? (Spatial Significance)
- Do Aboriginal peoples still live as their ancestors did? (Patterns and Trends)
- In light of their traditional connection to the land, why might Aboriginal peoples view resource development differently from other Canadians? (Geographic Perspective)



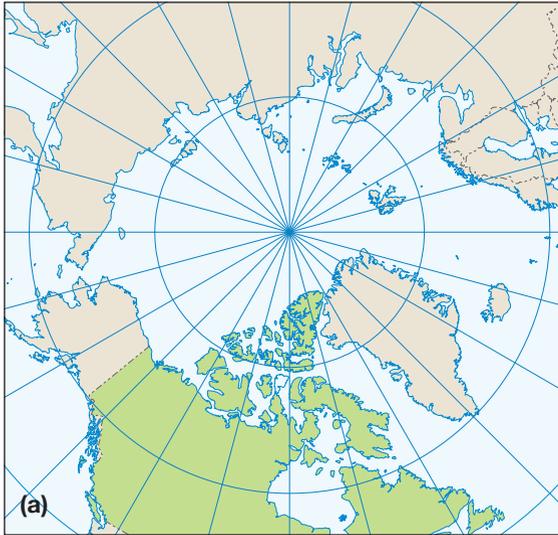
▲ **Figure A-3** A detail from Métis artist Christi Belcourt's *Good Land*. Many Aboriginal peoples are working to reclaim the original, Aboriginal names for places in Canada. How can a map or a name change our perspective of a place?



▲ **Figure A-4** Mary Simon is an Inuk from the northern part of Québec. She has spent much of her life fostering links between Canada's Arctic residents and the residents of other polar regions, including Alaska, Greenland, and Russia.

APPLY IT!

1. Use the images in Figure A-5 to create questions that reflect the four concepts of geographic thinking.
2. What sources would you consider to be the best places to find perspectives on life in Northern Canada? Explain.



▲ **Figure A-5** (a) Inuit live in the northern areas of Canada, near other polar regions in Alaska, Greenland, and Russia. (b) Traditional knowledge about the land helped Inuit survive in a challenging environment. This knowledge is shared with geographers and scientists today. (c) Many Inuit communities, such as Mittimatalik (Pond Inlet), are isolated. However, populations are steadily growing.

Critical Thinking in Geography

To a greater or lesser extent, you have been doing critical thinking for years. *Critical thinking* means thinking seriously about an issue and making sound judgements based on reliable sources of information. It is important to remember that the word *critical* has several different meanings (Figure A–6). Make sure that you have the correct meaning in mind as we proceed.

crit-i-cal *adjective*

1. inclined to criticize severely and unfavourably
2. being in or approaching a state of crisis
3. using or involving careful judgement
4. being or relating to an illness or condition involving danger of death

This is the one!

◀ **Figure A–6** Remember to use definition number 3 when you think about critical thinking!

Critical thinking is a vital part of **geographic inquiry**, which is really what thinking like a geographer is all about. Geographers gather data and information when they study an issue, but they also consider perspectives, study patterns and trends, make connections, and make judgements.

geographic inquiry an active, questioning approach to learning about the world from a geographic perspective

Geographic Inquiry

You will use geographic inquiry throughout this course to investigate issues and events in Canadian geography. In order to do good inquiry, you need to develop the following skills.

Keep in mind that inquiry is not a linear process. The following steps are meant to be a guide to good inquiry, but you should use them in the order that is most appropriate for you and the task at hand.

FORMULATE QUESTIONS

Focus your research and analysis on one important question—something we will call the “big question” in this textbook. You might do this by writing a number of questions about the issue, then narrowing it down to one clearly stated and important big question. Good questions raise more questions and start debate. There can be several, or even many, big questions for most topics (Figure A–7).

Formulating questions can help you identify the focus of your inquiry. You can also review the four concepts of geographic thinking (page 4) to determine which one is relevant to your inquiry. This can help you develop the criteria you will use when you start to gather and analyze data and evidence.



▲ **Figure A–7** Most documentary films start with big questions created by filmmakers. The documentary film *Maidentrip* tells the story of a Dutch teenager who sailed around the world by herself (see page 13). What geographic inquiry questions could you pose about this story?

Table A-1 Some sources of information

field studies	studies in local neighbourhoods, school grounds, and various sites
primary sources	census data, letters, photographs, speeches, and works of art
secondary sources	documentaries and other films, news articles, reference books, and most websites
visuals	satellite images, maps, globes, models, graphs, and diagrams
community resources	local conservation areas, resources from community groups and associations, government resources, and local plans

▲ Primary sources are sources of information that were created during an investigation or event. Secondary sources are ones created later. Both categories can include visuals and community resources. Field studies can be used to create primary sources of information.

GATHER AND ORGANIZE INFORMATION

There are many sources of information available to you (Table A-1). Part of the inquiry process is determining not only what information you need to answer your question, but whether or not the information is reliable. When you consider a source, keep these questions in mind.

- Does the source focus on fact or on opinion?
- Is the source accurate and reliable?
- Is the source biased?
- Is the information up to date?

It is helpful to organize your search from the beginning. Keep a record of where you have searched, and flag sources of information you might want to revisit later. For example, you might bookmark websites you have found. This will also help you keep a record of your sources. You might also keep a record by using an organizer to detail the source, the author, and key points of information.

You will need to decide when you have enough data. It takes experience to know when enough is enough, or when you need to do additional research. You may even have more questions.

INTERPRET AND ANALYZE THE INFORMATION

Determine if you have the right data as you read articles or decipher data and maps. Remember that the importance of any piece of information is directly related to the inquiry question. Identify the key points and ideas. Look again to identify any bias and to determine if you have included all points of view. You might also consider how the information affects different groups.

EVALUATE AND DRAW CONCLUSIONS

Once you are happy with and understand your data, it is time to work toward a conclusion—the answer to your big question. Look at the information you have gathered and organized. What does it tell you about your question? What conclusions can you make based on your data, evidence, and information?

COMMUNICATE YOUR CONCLUSION TO OTHERS

There are many ways in which a conclusion can be presented. It is important to communicate your findings in a way that suits your purpose and your audience. Your ideas can be communicated in many different ways, such as essays, blog posts, posters, or videos. These presentations can be supported by maps, photos, graphs, and charts.

Remember to use appropriate geographic terminology during your presentation, and clearly cite your sources.

An Inquiry Project: The Geography of Your Lunch

Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it.

—Samuel Johnson, 1775

You might wonder what a lunch has to do with geography. In fact, there is a whole world of geography in any lunch. To learn more about the lunch shown on the next two pages, we can use the geographic inquiry process.

The following pages will take you through a geographic inquiry exercise. Our big question will be, How does this lunch demonstrate the geographic connections that are part of our lives?

To save time in this exercise, we will provide some data for you on the following pages. By the end of this course, you should be very skilled at finding your own data. The data here came from a variety of sources—company websites, environmental groups, and even package labels. Finding data is generally not very hard. The challenge is to determine which data are relevant and which can be safely ignored. Table A–2 will give you some useful ideas on how to do this.

Steps for Inquiry

- Formulate your big question.
- Gather and organize information.
- Interpret and analyze the information.
- Evaluate and draw conclusions.
- Communicate your conclusion to others.

Table A–2 Analyzing information

	Interesting	Not Interesting
Important	Material that is <i>important</i> and <i>interesting</i> is not a problem, since you will be drawn to it by its high interest factor.	Material that is <i>important</i> but <i>not interesting</i> is a problem, since it is easy to miss. It takes practice to be able to recognize this type of information.
Not Important	Material that is <i>not important</i> but <i>interesting</i> is a problem. You will be attracted to it, but you have to be careful not to be distracted by it.	Material that is <i>not important</i> and <i>not interesting</i> is not a problem, since you will probably not even notice it.

▲ Information can be important or not important. It can also be interesting or not interesting. When you combine these two ideas, you get four possible kinds of information.

TUNA

- Several species of tuna are caught commercially (Figure A–8). Some species are threatened by overfishing.
- A DNA analysis of “tuna” being served in sushi restaurants in New York City found that none of the fish was actually tuna. A similar analysis of canned tuna indicated that almost all of it was tuna.



▲ **Figure A–8** Fishing boats, like this one, are used to catch tuna in the Pacific and Indian Oceans using a technique called long lining. How could you determine if the tuna you eat is caught in an environmentally sensitive way?

BREAD

- The bread you eat is made from hard spring wheat that was almost certainly grown in the Prairie provinces, most likely Saskatchewan.
- Winter wheat is grown in Southern Ontario. It is planted in the fall and grows a few centimetres tall before lying dormant for the winter. This soft wheat is best used to make pasta and pastries.
- Bakeries are typically built near stores where the bread is sold to ensure freshness.



LETTUCE

- During the summer, lettuce may come from local farms.
- Year round, it may come from greenhouses in Southern Ontario. The lettuce is grown hydroponically, in what is called a *soiless mixture*. Nutrients are provided in the water.
- Depending on the season, lettuce may be imported from warmer areas, such as Mexico, California, or Florida.



APPLE

- The apple could come from many countries, depending on the type of apple and the time of year. The sticker on the apple will show its origin (Figure A–9).



◀ **Figure A–9**

DRINK

- Pepsi is produced by an American-based multinational corporation called PepsiCo.
- Although it is the world's number two beverage company, 52 percent of PepsiCo's revenue comes from food products and the rest from beverages.
- Many years ago, Pepsi was much cheaper (5¢ vs. 10¢) than Coca-Cola, and it was more popular in poorer regions, including parts of Québec. English Canadians sometimes insultingly called French Canadians “Pepsis” as a result.



SNACK BAR

- Snack bars were invented by cereal companies so they could sell their products (grains, nuts, and sugar) to people who were not having a sit-down breakfast.
- Quaker is a PepsiCo brand and part of the company's business that is not beverages.



CONTAINERS

- A student may start the year with a new lunch bag and a couple of different plastic boxes. Assuming that they are not lost, they may be used for the entire school year.
- These bags and boxes are manufactured in many countries around the world.



CHIPS

- Frito-Lay is another PepsiCo product. If you had Aunt Jemima pancakes, Quaker cereals, or Tropicana orange juice for breakfast, your family was contributing to PepsiCo's annual sales of US\$66 billion in 2013.



APPLY IT!

1. How does the lunch in this inquiry project demonstrate the geographic connections that are part of our lives? Consider the four ways of thinking like a geographer (page 4) when formulating your answer.
2. What questions came to mind as you analyzed the information provided about the sample lunch?
3. Of the information provided, what was most important? What information was not useful to support your conclusion? Using Table A-2 on page 9 as a model, organize the information in a table to show what was interesting, important, not interesting, and not important.
4. Analyze the lunch you had (or will have) today.
 - a) Write a number of questions you have about the lunch. Narrow your questions down to one clearly stated big question.
 - b) What areas would you have to research to answer your big question? Suggest three or four resources. Where might you find various viewpoints?
 - c) Use your notes to take a position and suggest a conclusion.
 - d) List four different ways you could communicate your conclusion.

The Role of Geotechnologies in Geographic Thinking

You have seen that geographers develop a sense of place by asking questions such as “What is where?” “Why there?” “Why care?” How can technology help answer these questions?

Consider Figure A–10 below. This device allows drivers to see the state of traffic on their route as they are driving. This is a simple yet powerful example of **geotechnology** in action.

This information exists because of a unique combination of technologies and geographic thinking skills. Only 25 years ago, the technologies used here did not yet exist. We can only guess at how we might be using geotechnologies in another 25 years, as our needs change and new technologies develop.

geotechnology the use of advanced technology in the study of geography and in everyday use



▲ **Figure A–10** What other information can be derived from geotechnologies?

Before and After the Geotechnology Revolution

Geographers have used technology for as long as there have been geographers. The Greek scholar Eratosthenes (276 BCE–195 BCE), perhaps the first geographer, made the first near-accurate estimate of Earth’s size in an attempt to make greater sense of the world he lived in. He did this using the geotechnology tools that existed 2200 years ago.

Over time, geographers have continued to seek answers to their questions about the world. The only thing that has changed is the quality of the tools they have to work with. Advances in electronic and satellite technologies have meant that geographers like you have a much more powerful toolbox to use than your parents did at your age.

Kinds of Geotechnologies

There are several kinds of geotechnologies. These have become very familiar parts of modern life and have many different applications. Sometimes only one of these technologies is used. More often, more than one is combined in the devices we rely on.

GPS

Laura Dekker (Figure A–11) was able to rely on several modern geotechnologies during her solo voyage around the world. The first of these was a reliable and inexpensive **GPS (Global Positioning System)**. Dekker used an electronic chartplotter with a built-in GPS sensor for navigation.



◀ **Figure A–11**
Dutch teenager Laura Dekker onboard *Guppy*. She sailed around the world by herself between 2010 and 2012 using modern geotechnology tools for navigation. She was 14 years old when she left on her voyage and 16 when she returned.

GPS (Global Positioning System) a satellite-based system that provides location data

go online

Watch the trailer for *Maidentrip*, a documentary made about Laura Dekker's journey (2:08 minutes).

GIS

A **GIS (Geographic Information System)** is a computer system designed to gather and analyze particular kinds of data. It can be used, for example, to create a map showing changes to a community over time. GIS can allow a user to do a complex analysis of an issue. For example, it can be used to examine water quality in a particular area.

GIS and GPS are combined in navigation systems such as the one that Laura Dekker used to sail around the world. They are also combined in most smartphones. The GPS part of the system provides location and movement data. The GIS part is a database of information. All of these data have gone through a process called **georeferencing**. This means that a precise location was linked to each item. The device's control software combines the GPS and GIS data in a user-friendly fashion.

GIS (Geographic Information System) computer system that manages and analyzes geographic information

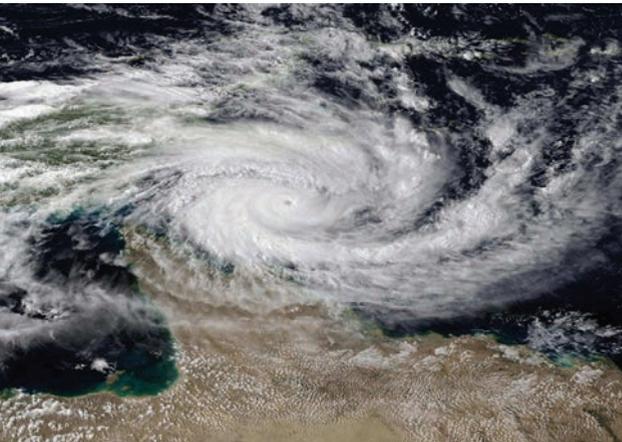
georeferencing linking geographic data to a particular location

APPLY IT!

1. Describe one specific way in which GPS and GIS could be used in each of the following industries:
 - a) farming
 - b) mining
 - c) forestry
2. You want to invent a GPS-enabled device for a specific use. Choose a problem you would like to solve, and work with a partner to answer these questions.
 - a) What kind of geographic information would you need to meet the purpose of the device?
 - b) How could GPS and GIS be used to give you that information?
 - c) Explain how your invention would use GPS (and possibly GIS) technology and why it is different than what already exists.

remote sensing seeing or measuring something from a considerable distance, often from a satellite

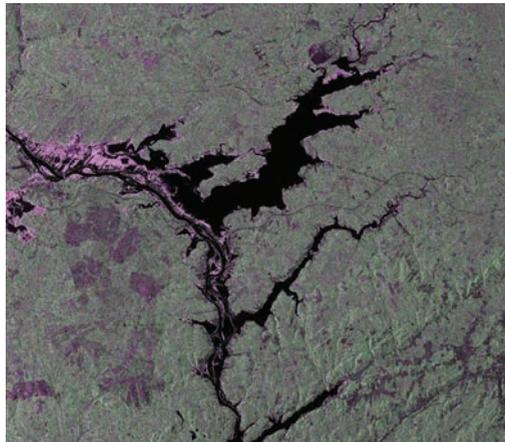
▼ **Figure A-12** We are used to seeing images of tropical cyclones (hurricanes in North America) on news and in weather broadcasts. What is unusual in this image for people used to seeing hurricane images in North America?



REMOTE SENSING

Remote sensing is essentially a one-way process. A satellite does the sensing and sends the results to a ground station for analysis and use. Various satellite technologies are used. Figure A-12 shows the type of remote sensing that most of us are familiar with. Images of weather events are a common feature on television and the Internet.

Canada is the world leader in one particular aspect of remote sensing. Figure A-13 shows flooding in New Brunswick in 2008. The image comes from a Canadian satellite called Radarsat-2. This satellite uses radar energy (long-wavelength, low-frequency radiation) rather than any of the forms of light energy that are used by most satellites. Radar beams are able to capture images through clouds, rain, snow, and haze, and at night. Note that the image is a false-colour image. This means that the satellite captures digital data only, not a picture of what it is seeing. The colours are added on the ground.



◀ **Figure A-13**
On this Radarsat-2 image, black areas are lakes and rivers. The light purple colour shows flooded areas.

APPLY IT!

Look at Figure A-14. In geography, we always want to work toward the simplicity that comes from solving a problem or from answering a question. What clues can you use to decipher this image?



◀ **Figure A-14** This image was taken from the International Space Station and shows part of the United States and Canada. What is the green, uneven line along the top of the image?

1. What are light areas and dark areas?
2. Where is this? What evidence did you use to identify the location?
3. What specific natural and human features can you identify here?
It will help a lot if you can refer to a map showing the location you identified in question 2.

TELEMATICS

The word **telematics** is short for **tele**communications **informatics**. Telematics are an important part of what is called the Internet of Things—a network that exists to link machines rather than people. It is growing so rapidly that experts suggest there will be 50 billion M2M (machine-to-machine) connections by 2020. You are already familiar with some of these links. For example, your family car may have a navigation system.

M2M connections are becoming common in environmental management. For example, a traditional weather station needs a trained observer to take readings of temperature, humidity, precipitation, and other measures. Robot stations are now being used. These stations take measurements throughout the day and transmit them every few minutes to a central location using cellular service or satellite communication. This allows weather stations to be positioned in remote locations. Similar systems can be used to monitor air and water quality, as well as the operation of landfills and wastewater treatment systems.

telematics any technology that involves the long-distance transmission of digital information



You will learn more about the use of Google Earth and ArcGIS as you proceed through the book. Just to give you a sample of what is in store, however, take **GeoFlight A.1** for a quick tour of Canada.

What Is the Future of Geotechnology?

No one can predict with any certainty what will come in the world of geotechnology in the next 10 to 20 years. Two separate but related factors will influence the developments that do occur.

- The first is the ongoing development of existing technologies, such as smaller and cheaper GPS computer chips.
- The second is the potential of human imagination. What new technologies might emerge? What new uses will be found for existing technologies?

One prediction is pretty certain, though. We are not too many years away from having cars that are self-driving. Strangely enough, the company most responsible for this is not an automaker. It is Google, a company famous for encouraging its employees to search for innovations far beyond the company's core business (Figure A-15). Remember that Google started as an Internet search engine company before becoming the world leader in bringing important and useful GIS products, such as Google Maps and Google Earth, to the general public. Which geotechnologies are fundamental to the driverless car?



▲ **Figure A-15** Google cars have driven more than 644 000 kilometres without an accident. Many aspects of driverless cars have already appeared in production cars. Can you name any? Where do you think this technology may lead?

Geotechnologies at School and Beyond

Geotechnologies have now become a routine part of studying geography. In this course, you may be using Google Earth or ArcGIS Online (or both), along with remote sensing images to study Canada and the world. Each application provides you with capabilities that only a generation ago would have seemed like something out of a sci-fi movie. Outside school, geotechnology applications are becoming so common that we may not even think about them. Can you suggest some examples? As for the future—only time and human imagination will tell us.

APPLY IT!

1. Create four big questions that explore the possible benefits and problems that M2M might have.
2. How will driverless cars integrate the following geotechnologies?
a) GPS b) GIS c) telematics
3. What are the advantages and disadvantages of driverless cars?
4. Time to let loose your imagination. What innovations in geotechnology would you like to be able to use 25 years from now?