

## **Geoscape**

### Lessons Learned from 15 Years of Geoscience Outreach

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[Aller au sommaire du numéro](#)

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# OUTREACH



## Geoscape: Lessons Learned from 15 Years of Geoscience Outreach

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### SUMMARY

Geoscape is the name for a long term geoscience outreach initiative led by staff of the Geological Survey of Canada (GSC) Vancouver office and designed to better connect people to the land they live on. Although largely focused on outreach in British Columbia, the initiative has been active across Canada and supported by a number of different GSC programs. Geoscape products, some 35 in total, include Geoscape, GeoMap, Waterscape, and climate change series posters, as well as geological highway maps and GeoTour booklets. A popular geoscience book and a national climate change poster series were inspired by Geoscape work. Begun in 1994, Geoscape has drawn dozens of Canadian geoscientists and

educators into outreach efforts. This paper summarizes the accomplishments of Geoscape and some of the lessons we learned along the way.

### SOMMAIRE

Géopanorama est le nom d'une activité géoscientifique de sensibilisation à long terme menée par le personnel du bureau de Vancouver de la Commission géologique du Canada (CGC) visant à créer des liens entre les gens et la terre sur laquelle ils vivent. Bien que visant largement la sensibilisation en Colombie-Britannique, l'activité a été menée à travers le Canada et soutenue grâce à un certain nombre de programmes différents de la CGC. Quelques 35 productions de Géopanorama ont déjà été réalisées, dont Géopanorama, *GeoMap*, *Waterscape*, une série d'affiches sur le changement climatique, ainsi que des cartes routières géologiques et des livrets touristiques *GeoTour*. Un livre géoscientifiques grand public et une série nationale d'affiches sur le changement climatique découlent directement de Géopanorama. Commencée en 1994, Géopanorama a inspiré les efforts de sensibilisation de dizaines de géoscientifiques et d'éducateurs canadiens. Le présent article présente un sommaire des réalisations de Géopanorama ainsi que certaines des leçons que nous avons apprises en cours de route.

### THE GEOSCAPE APPROACH

The Geoscape outreach initiative has been motivated by a desire to inform Canadians about geoscience issues with relevant, accessible, and well illustrated information. We coined the term *Geoscape* – a contraction of *geological land-*

*scape* – to describe our emphasis on the geology of today's landscape and its interplay with human society. Our goal has been to better connect the public to the land where they live, work and play, believing that a more geo-literate citizenry will lead to wiser stewardship of the land and its resources.

Geoscape has been possible because of the resources and mandate of the Geological Survey of Canada (GSC). A variety of different programs – energy, groundwater, mineral development – have supported different Geoscape products over the years (Fig. 1). This GSC leadership attracted partners who brought expertise, resources, and connections to communities and class rooms. Our advantage as a federal agency is that we produce most outreach products in both official languages. As use of the internet evolved over time, so too did our outreach products. Early Geoscape products were large-format posters and companion websites. Later Geoscape evolved to booklets distributed as electronic files on the internet. Central to Geoscape's success has been an investment in illustrations, such as Figure 2, because a good illustration can speak to a range of audiences and have a long and useful life.

Most of the outreach products described in this article can be downloaded at no cost from Natural Resources Canada's website, or from other websites. URLs for online products are included in the reference list.

### Early Days

Inspiration for Geoscape came in 1995. I was part of a GSC project team in South America, and happened



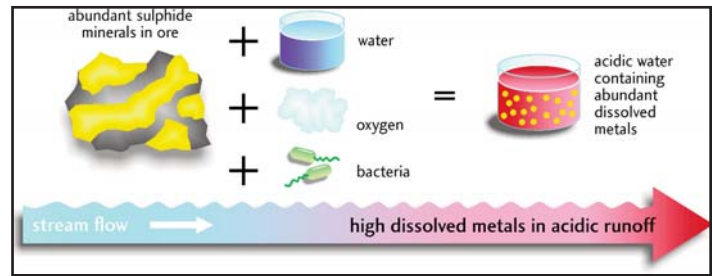
**Figure 1.** The Geoscape family embraces diverse outreach products created over almost two decades.

upon a map published by the geological survey of Bolivia that summarized the distribution of natural hazards and environmental issues throughout the country. The map was surprisingly simple with hand-drawn features yet clearly showed the distribution of a variety of features such as active faults, major earthquake epicentres, volcanoes, floodplains, drought-prone regions, and areas contaminated with mercury from artisanal mining. I was struck by how the map communicated, in a clear fashion, the major geoscience issues for the entire country.

Back at the GSC Vancouver office, I discussed with colleagues John Clague and Bertrand Groulx the idea of creating a similar map for the Vancouver area. We were influenced by the 'one-page atlas' maps of Louis Skoda, a Vancouver-based cartographer who produced attractive, information-rich technical posters during the 1980's for Environment Canada. These posters illustrated that with careful design, an information poster could be a powerful communication tool.

We brought together a group of geoscientists to produce a map of

the addition of each illustration and explanation, the remaining space available for the map was reduced. Eventually it became obvious that we needed two products: a poster that explained geoscience issues, and a separate map. And so the *Geoscape Vancouver* poster was born (Turner et al. 1996; Fig. 3) and *GeoMap Vancouver* followed closely thereafter (Turner et al. 1998). Together, *Geoscape* and *GeoMap* garnered significant public attention and GSC management support. Encouraged by this success, we shared our ideas and experience with the geoscience community (Clague et al. 1997; Turner et al. 1997; Turner and Clague 1999b; Clague and Turner 2000). Several years later, we built on this Geoscape foundation and produced a book for the public on the geoscience of the Vancouver area that has sold over 10,000 copies and become a popular text book for high school and university level courses (Clague and Turner 2003). Over the years *Geoscape Vancouver* and *GeoMap Vancouver* have been presented many, many times to teachers, particularly at EdGEO workshops. It is heartening to see the *GeoMap Vancouver* elec-



**Figure 2.** A good illustration conveys a clear message, provides no more information than necessary, is scientifically accurate, and is attractive.

tron file remains a very popular download almost 15 years after its publication.

key geoscience issues for the Vancouver area. Our discussion identified local natural hazards, and earth and groundwater resources. After the meeting, our core team of Clague, Groulx and I worked with the resulting map, adding illustrations and text to explain each issue. With

### A NATIONAL GEOSCAPE PROJECT

Though Vancouver is blessed with remarkably good geological stories, we believed that every Canadian landscape had interesting stories to tell. In 2001 we proposed to the GSC a project to create Geoscape posters for major cities across Canada. We put out a call and many geoscientists responded with interest. By the time of the Geological Association of Canada national meeting in Vancouver in 2003 we had eight draft Geoscape posters on display and Geoscape had truly become a national initiative. Interest in Geoscape spread and by 2010 a total of 15 posters had been published (Fig. 4; Turner et al. 1996; Hastings et al. 1999; Côté et al. 2001; Poulton et al. 2002; Prichonet et al. 2002; Yorath et al. 2002; Doyle and Steele 2003; Turner et al. 2003b; Aylsworth 2004; Turner et al. 2004a; Edwards et al. 2005; McColl et al. 2005; Douma et al. 2006; Schreiner et al. 2007; Douma et al. 2010). A GSC Geoscape Canada website brought much of this poster content together in one place.

The many local Geoscape working groups employed a variety of tools to promote use of the posters. For example, in Saskatchewan, copies of the *Geoscape Southern Saskatchewan* poster were delivered to over 900 schools in the province and *Geoscape Northern Saskatchewan* posters were distributed to schools throughout northern Saskatchewan. Hundreds of teachers also received posters at professional development workshops across Canada. Lesson plans linking Geoscape

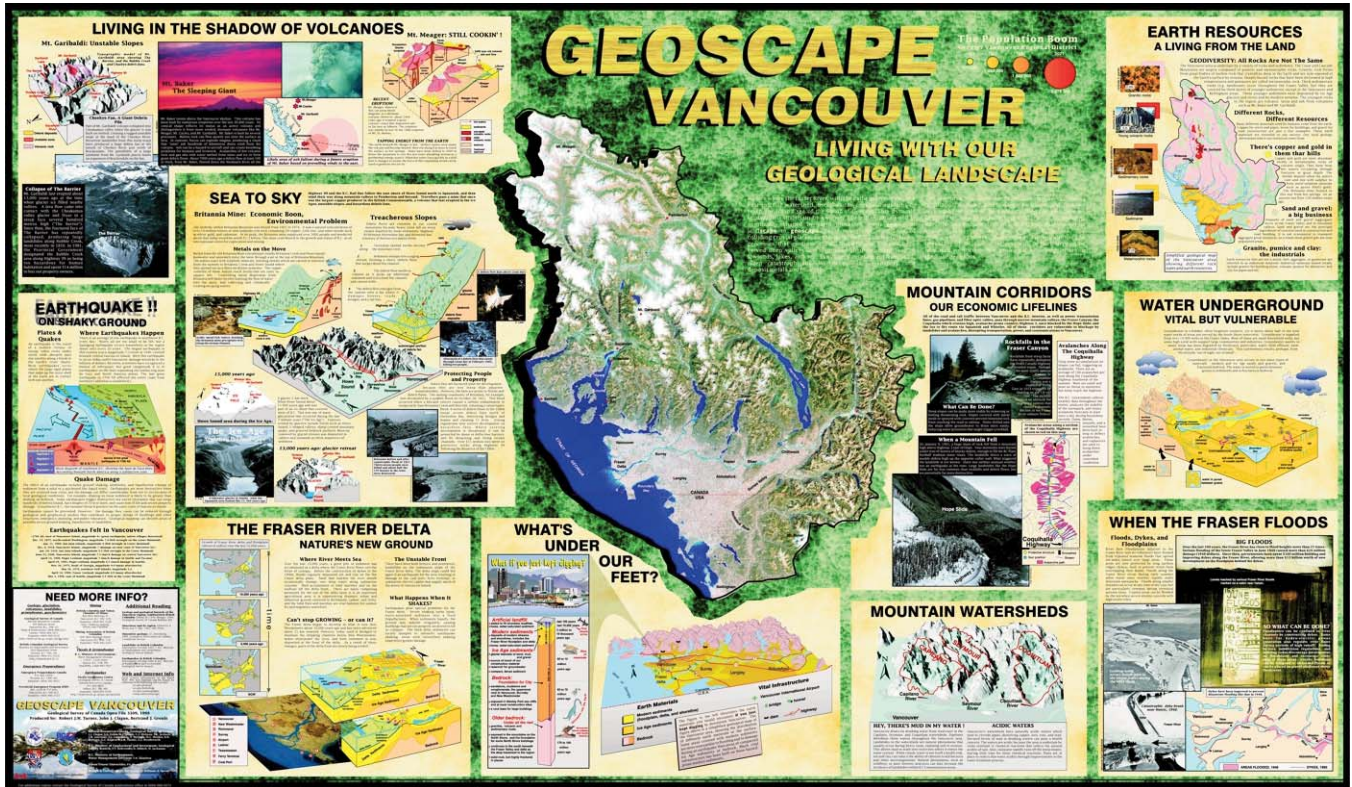


Figure 3. Geoscape Vancouver was a large format poster.



Figure 4. Geoscape posters across Canada.



Figure 5. The Geoscape Canada poster.

poster content to teaching curricula were also developed for several posters, including the Southern Saskatchewan and Toronto Geoscape posters.

We also pursued the idea of a national GeoMap for Canada. The GSC has long been proud of its geological maps of Canada but we wanted a more engaging version for the public. The *Geoscape Canada* map (Turner et al. 2003a; Fig. 5) displays the distribution of geological materials across Canada with an illustrated legend and surrounded with photographs of iconic Canadian landscapes.

**Creating a Geoscape Poster**

Each Geoscape poster was created by a local team of geoscientists and educators. Typically, a core team of 2 to 5 people produced the manuscript poster with a larger group of advisors that provided technical and educational and educational expertise. Most posters were published by the GSC, and GSC scientists contributed to 13 of the 15 posters. To initiate a poster-making process, teams would host a design workshop that brought together the core team and advisors. After establishing agreement on the intended audience and geographic area

for the poster, the group entered a three step process. First, we brainstormed and prioritized the geoscience issues such as local natural hazards, mineral and energy and groundwater resources, and geological explanation for prominent landscapes (Fig. 6). Once the issues were identified, our second step at the workshop was to identify a key message for each issue. For example, if groundwater resources were the issue, 'vital but vulnerable' was often our message given that many aquifers are vulnerable to contamination or depletion.

The third step was to find a local example to illustrate each geoscience issue. This completed, the core team would leave the workshop with the issues, messages, and examples identified, and advisors were tasked to provide specific reference materials to support writing and illustration of the poster content.

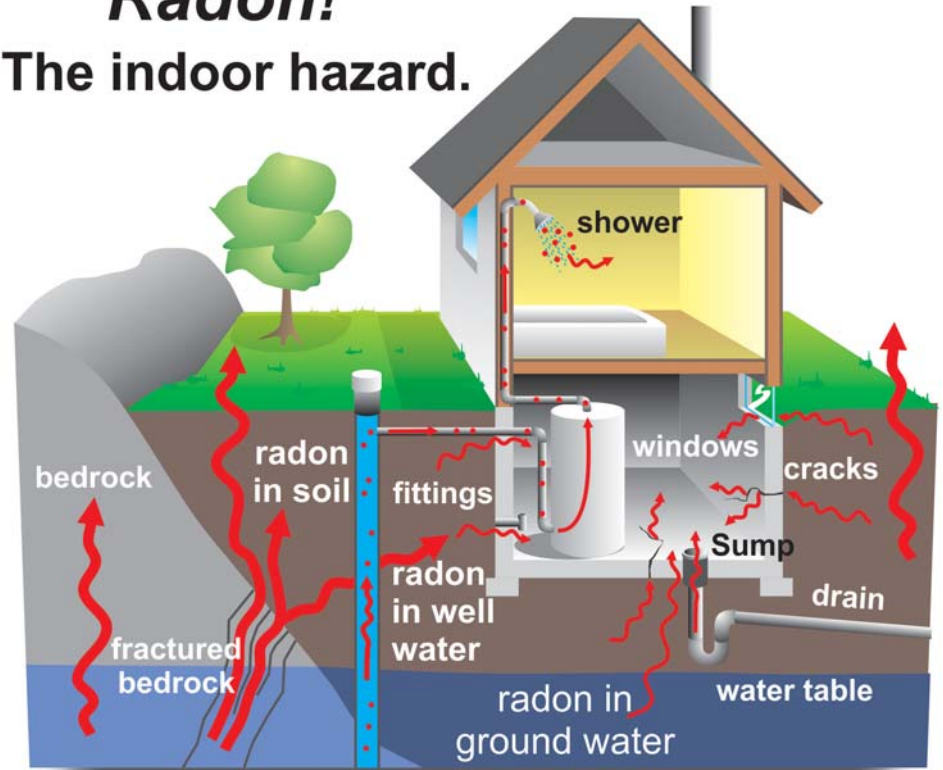
### Climate Change Posters

Geoscape took a major step forward in 1998 when Sandy Colvine, director of the GSC's Pacific Division, convinced his federal counterparts in British Columbia to collaborate on an outreach poster about climate change in BC. He volunteered our Geoscape team to lead a multiagency effort that brought together scientific and communications staff from seven federal, provincial, and regional government agencies. The resulting *Temperature Rising* poster (Turner et al. 1999a; Fig. 7) garnered media attention and inspired the Greater Vancouver Regional District to produce a companion teacher resource kit that they delivered at teacher workshops for many years. This poster became the inspiration and template for a national series of climate change posters for all regions of Canada. By 2008, over 170,000 climate change posters had been distributed to educators and others across Canada, and these posters introduced a generation of students to the potential impacts of climate change.

### Waterscape Posters

In 2005, we took the Geoscape poster concept and started to apply it to water issues in western Canada. The GSC groundwater program was conducting an assessment of major aquifers across

## Radon! The indoor hazard.



**Figure 6.** Radon hazard was a geoscience issue identified by both the Whitehorse and the Ottawa-Gatineau poster teams.

Canada and wanted to engage and inform the communities dependent on these aquifers. We developed Waterscape posters to explain the science of local groundwater and surface water and to promote best practices for water conservation and aquifer protection. Broad partnerships and extensive public consultation became the norm. For example, the Bow River Basin poster was built on a partnership with the City of Calgary, two Calgary school boards, Bow River Basin Council, Province of Alberta, University of Calgary and the local science centre (Turner et al. 2005a; Fig. 8). The Okanagan poster team included representatives from 21 different agencies and organizations including municipal, federal and provincial agencies, the local boards for water and health, First Nations, and non-governmental organizations to ensure we developed a full understanding of issues, and had many partners that were committed to using the poster as a communication tool (Turner et al. 2006).

### GEOTOUR – A TOOL FOR SMALLER COMMUNITIES

In 2004 there was an opportunity to create outreach products to complement a GSC hydrocarbon energy project in northern BC. We designed virtual field trips to explore each community's dependence on its local land and water through a series of questions (Fig. 9). With local educators as partners, we completed GeoTour guides for three northern BC communities, Terrace (Fig. 10), Prince George, and the Hazeltons, and made them available as free downloads from the internet (Turner et al. 2010b, c, e).

GeoTours further evolved under a GSC mineral resource development program in southern BC. We created a more elaborate community Geotour guide for the city of Kamloops (Turner et al. 2008) and GeoTour guides for two regions, West Kootenay and East Kootenay (Turner et al. 2009, 2010a). These regional GeoTours focus on popular sites with interesting geological stories. Popular sites have the advantage of an estab-

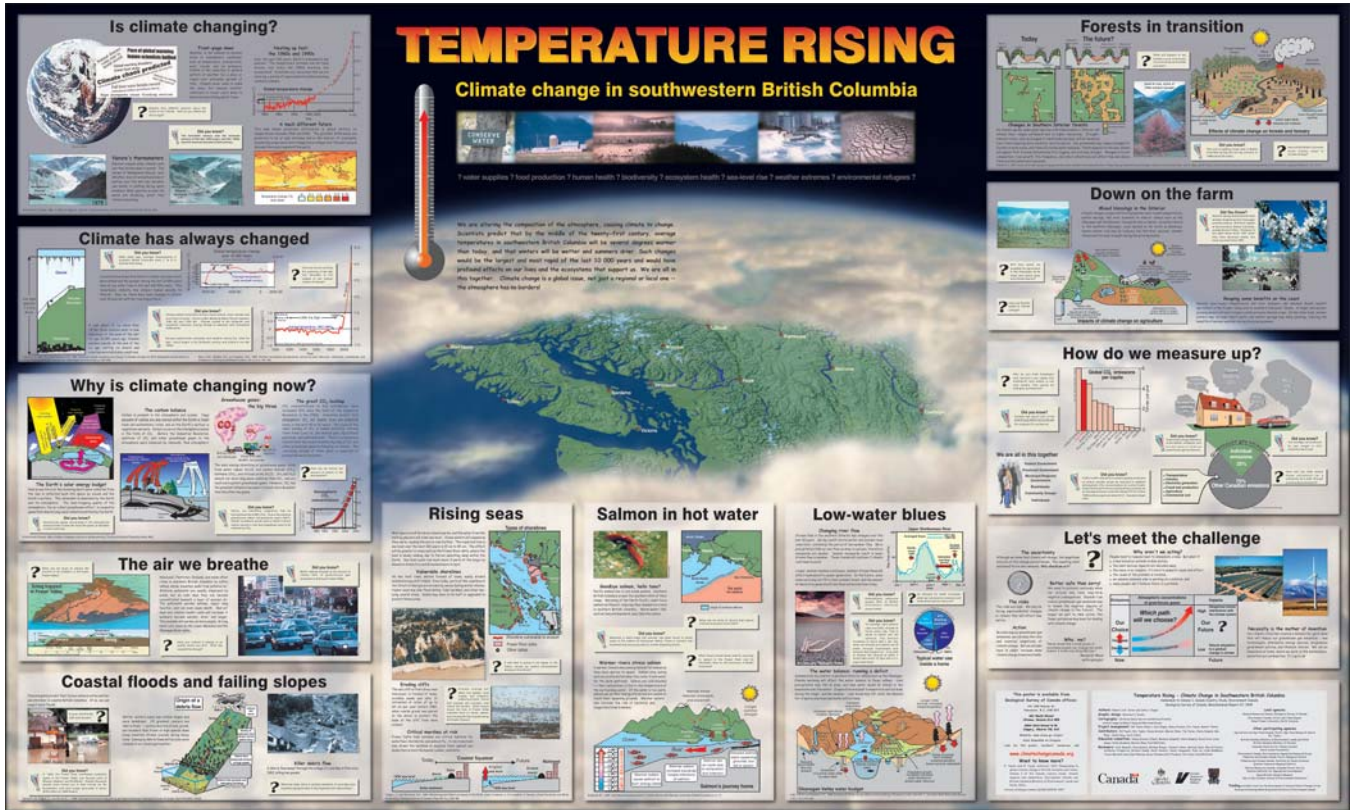


Figure 7. The Temperature Rising poster.



Figure 8. The Bow River basin Waterscape poster.



**Figure 9.** GeoTour guides highlight the dependence of communities on the land and its natural resources.

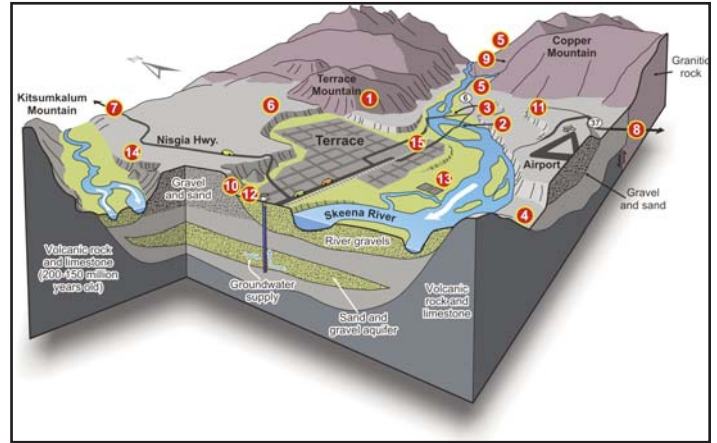
lished audience, parking and signage, and staff or volunteers who can make use GeoTour materials for their own interpretive work. For example, the West Kootenay GeoTour guide includes visits to a commercial hot springs, two provincial parks, a municipal park viewpoint, three museums, an underground mine tour, and a mining ghost town. Collectively, these stories tell the tale of the region’s geology and mining history.

The 2010 Olympics in Vancouver and Whistler provided another outreach opportunity. The Sea to Sky Highway from Vancouver to Whistler has outstanding geoscience stories and has long been a popular field trip route. When communications staff with Natural Resources Canada (NRCAN) offered to support an outreach product for the Olympics, we jumped at the chance to upgrade our field guide for the highway (Turner et al. 2010d; Fig. 11). NRCAN produced a second related GeoTour guide (West-nedge and Goodall 2011) for the Salish Sea region between the Lower Mainland and Vancouver Island, and high-

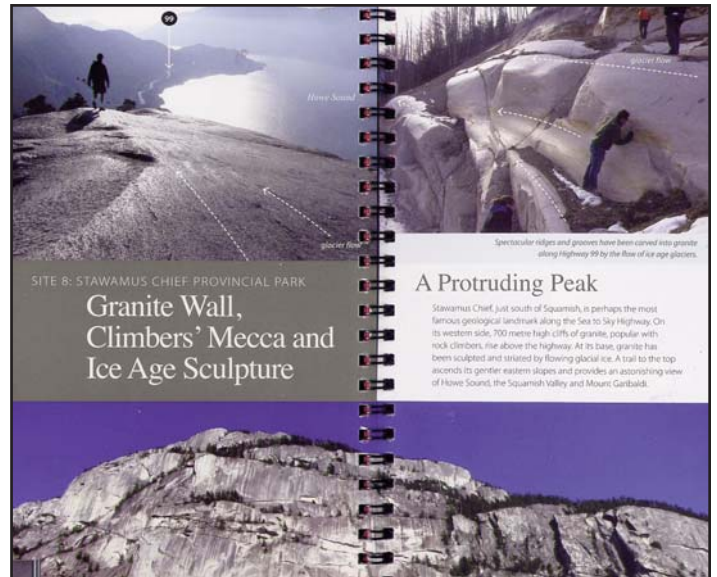
lighted it during a coastal tour by a research vessel.

**A New Venture: Geotours Northern Ontario**

Recently, GeoTours has headed east to Ontario. In 2011 under a GSC mineral development program, we partnered with the Ontario Geological Survey, Science North science centre in Sudbury, and Laurentian University to produce GeoTour guides for geological sites across Northern Ontario. The first five guides for the Sudbury area are available at <http://sciencenorth.ca/dynamic-earth/geotours/>, and other GeoTours are underway for the historic mining communities of Cobalt, Timmins, and Kirkland Lake, major provincial parks such as Lake Superior, Killarney, and Killbear, and the areas near Thunder Bay, Nipigon, and Temiskaming Shores.



**Figure 10.** The GeoTour guide for Terrace, BC, visits 15 sites around the community. These community sites (red numbered dots) and subsurface geology are illustrated on this block diagram of the Terrace area.



**Figure 11.** Part of the site description for Stawamus Chief Provincial Park in the GeoTour Sea to Sky guide.

**GEOLOGICAL HIGHWAY MAPS FOR BRITISH COLUMBIA**

In 2005 we set about creating two new geological highway maps for British Columbia. We were inspired by the Saskatchewan Geological Highway map and its rich illustration of sites of geological interest throughout the province (Maxeiner et al. 2002). We started with a map of Northern British Columbia as we had support from a GSC energy project in northern BC. The map presents the distribution of bedrock and surficial materials on a shaded relief base. To simplify the map, bedrock units are lithologic without reference to age. Other features of



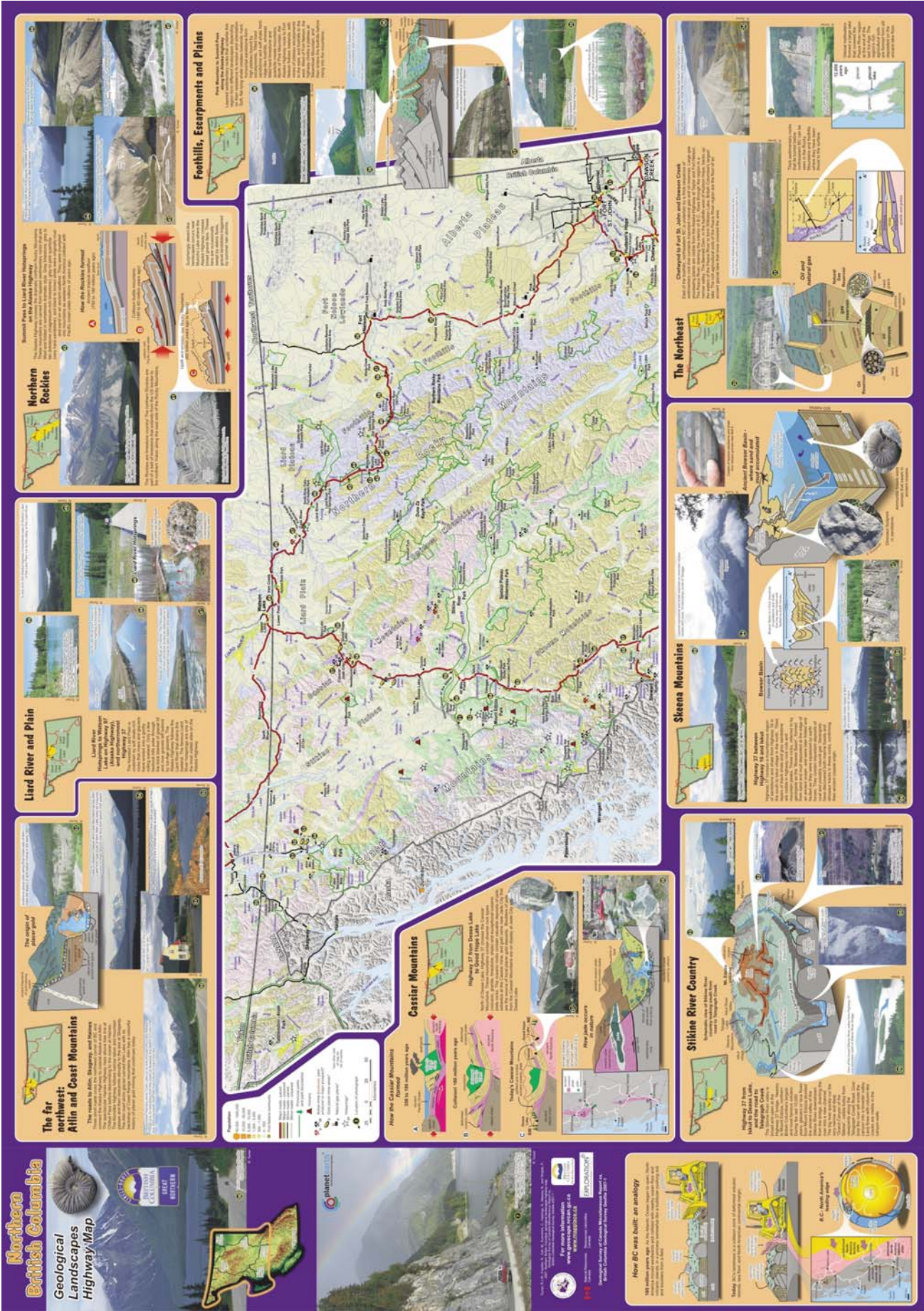


Figure 12. The Northern British Columbia Geological Landscapes map is surrounded by photographs and figures of geological sites of interest.

interest such as volcanoes, hot springs, mines, oil and gas fields, gas refineries, major hydroelectric dams and parks are also identified. The Northern BC Geological Landscapes Highway Map was published with a print run of 20,000 copies (Turner et al. 2007; Fig. 12). The maps are distributed for free at BC Tourism visitor centres and community tourist information centres throughout the province, as well as online.

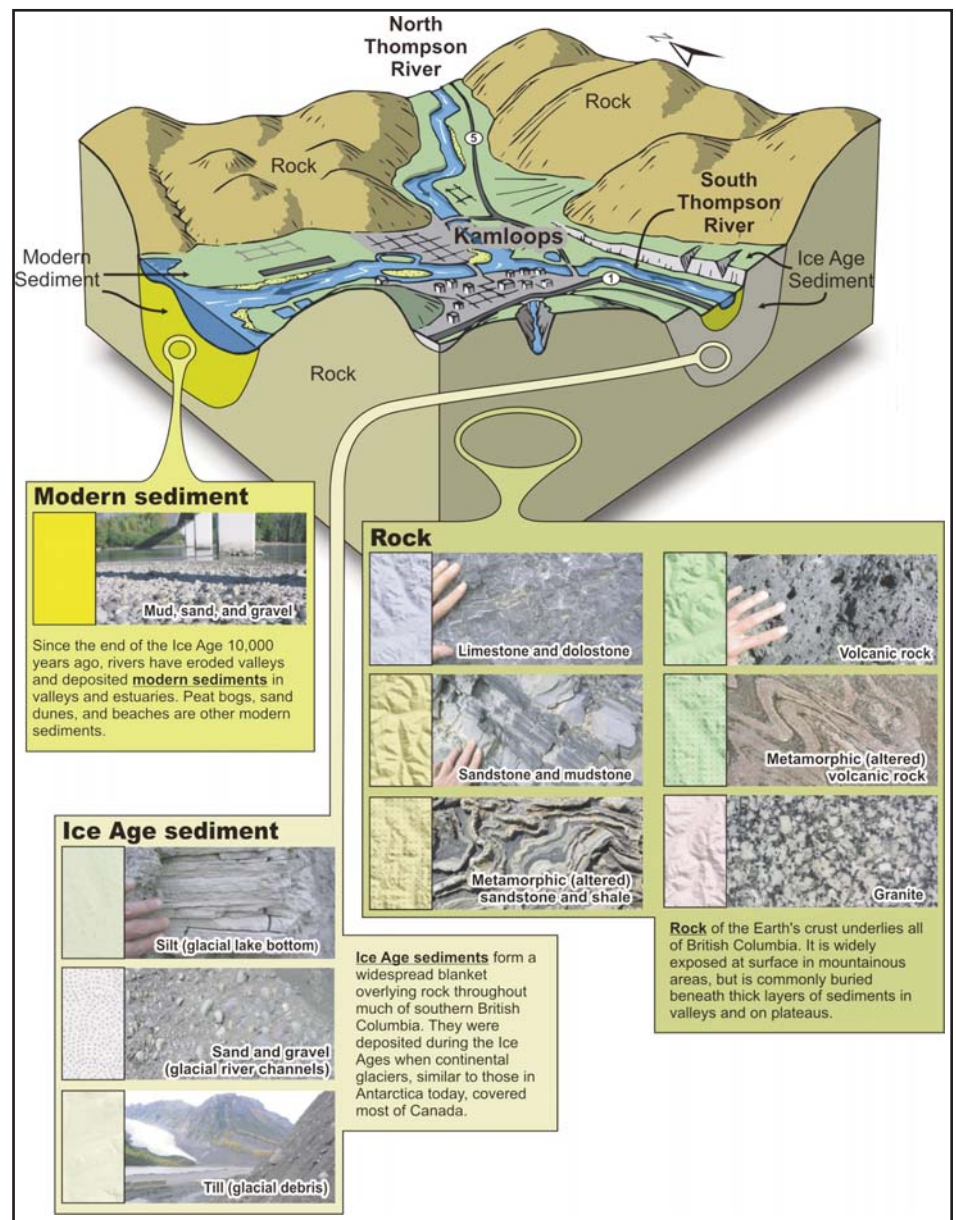
In 2008, there was an opportunity to complete a companion geological highway map for the southern half of BC under the support of a mineral resource development project. The Southern BC Geological Landscapes Highway Map was released in 2012 online and with a print run of 40,000 copies (Turner et al. 2012; Fig. 13).

**LOOKING FORWARD**

The technologies that enable geoscience outreach will continue to evolve over time. However, I believe there are basic principles of good geoscience outreach that will continue to apply regardless of the technological platform: build teams that combine individuals with a breadth of geoscience and educational expertise and a will to champion the use of the product; invest in illustrations and story telling; and deliver important knowledge that benefits communities. Connecting people to the land where they live, work, and play will always be in demand and always will be relevant.

**ACKNOWLEDGEMENTS**

I want to thank my many managers over the years at the Geological Survey of Canada for their continued support of the Geoscape enterprise. Dirk Tempelman-Kluit and Sandy Colvine took a chance and encouraged us when Geoscape was still an untested and exploratory activity. Cathie Hickson, Steve Irwin, Carmel Lowe, and Christine Hutton have continued to be advocates for this outreach. Various GSC scientists have championed Geoscape outreach activities within their research projects and I am particularly thankful to Bob Anderson, Carol Evenchick, Steve Grasby, Murray Journey, Bert Struik, and Alfonso Rivera for their belief in, and support



**Figure 13.** The illustrated legend used to explain the different geological materials and their setting on the Southern British Columbia Geological Landscapes Highway map.

for, Geoscape outreach. John Clague was my partner on all the early Geoscape ventures and his knowledge, energy and general good spirits were vital to these projects. Rob Cocking, Louise Fox, Bertrand Groulx, Nicky Hastings, Shashi Kapoor, Melanie Kelman, Marianne Quat, Kaz Shimamura, Malaika Ulmi, and Bev Vanlier in the GSC Vancouver office have each assisted with Geoscape projects and have been a great team to work with. Richard Franklin illustrated and designed almost all of our products, creating the Geoscape 'look'. David

Lemieux in GSC Ottawa was very helpful putting together the Geoscape Canada website. Mike Sigouin in the GSC cartography group in Ottawa oversaw publication of the posters and maps with a cheerful can-do attitude. Eileen van der Flier-Keller, Fran Haidl, and Malaika Ulmi provided helpful comments that improved the manuscript for this paper. And to my many outreach colleagues around BC and across Canada, and in particular John Clague, Fran Haidl, Godfrey Nowlan, Marianne Quat, Eileen van der Flier-Keller, Christy Vodden, and Jane

Wynne, it has been a great and rewarding pleasure to work with you over the years. Thank you. I believe we have done something important together.

### Geoscape Products:

The Geoscape Canada web content is no longer accessible on the Natural Resources Canada website <http://www.nrcan.gc.ca/>. Please use the search engine on the bilingual [www.geogratias.gc.ca](http://www.geogratias.gc.ca) site to connect to English and French language versions of NRCan geoscape, waterscape, and climate change posters.

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