



Educational Outreach and Public Engagement

A Guidebook for Geoscience
Conference Organizing Committees



Welcome to **Educational Outreach and Public Engagement: A Guidebook for Geoscience Conference Organizing Committees**. Within it you will find best practices for educational outreach program delivery by the Canadian geoscience community. It defines outreach, its value and benefits, target audiences, and approaches to setting up your events, and identifying grant funding sources. It also includes lessons learned, tips for coordinating with conference organizers and venues, and best practices for encouraging the participation of educators and the public in geoscience conferences. Examples of successful education and outreach programs held at past conferences are included, along with recommendations from their organizers and testimonials from past program participants.

The Guidebook is supported and made possible by members of Canadian Earth Sciences community, including:



Canadian Geoscience Education Network

The Canadian Geoscience Education Network (CGEN) is the education arm of the Canadian Federation of Earth Sciences. Its current membership exceeds 500 representatives from universities, colleges, primary and secondary schools, government agencies, and industry, across Canada. CGEN's goal is to promote Earth Science education and activities that increase public awareness of the Earth Sciences, and to help coordinate the efforts of the Canadian geoscience community in these areas.

Contact information

earthsciencescanada.com/cgen/



EdGEO

EdGEO is a national program that supports and funds Earth Science workshops for Canadian teachers. These workshops provide teachers with the classroom resources, enhanced knowledge, and increased confidence to teach Earth Science more effectively. Workshops are organized by local geoscientists and teachers to reflect local needs and curriculum. Grants of up to \$3000 per workshop are available from EdGEO.

edgeo.org/en_CA/



Introduction

This guidebook is for you!

Your university or community is hosting an Earth Science conference. You are a member of the Local Organizing Committee and you see the value in including educational outreach as a component of the conference. This is a laudable goal, but you may have questions or concerns about how you might best achieve it. Are you new to outreach and wondering where to start? If so, consider this guidebook as a “go to” resource to help you develop a program suitable for your conference with a strong impact on participating educators and the general public.

The membership of the Canadian Geoscience Education Network (CGEN) includes geoscientists and educators from a range of professional sectors and communities across Canada. Most CGEN members have been contributing to local, regional, and national outreach education, in some fashion, throughout their careers. Many of them have worked with Earth Science conference organizing committees in support of outreach activities since 2009. This guidebook is based on their experiences, lessons learned, and best practices.

This guidebook will give you ideas, tips, and examples that will help you plan and deliver a successful educational outreach program.

What is outreach and why it is important?

Outreach is a type of informal education, which is defined as learning that occurs outside of the formal education system. It can take place in museums or science centres, in enthusiast clubs, and at events such as professional conferences. It can take the form of public lectures, teacher workshops or field trips, or bringing Earth science experts into the classroom. Outreach activities can reinforce or complement formal curricula, or provide knowledge enrichment. Outreach is an impactful way to provide education to a variety of audiences including the public, students, and educators. It can provide opportunities for geoscientists to engage with and learn from other subject specialists, and for educators to build an awareness and appreciation of the Earth Sciences.

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Recognized benefits

There are many benefits to building outreach elements into your geoscience conference. Community outreach associated with your conference provides opportunities for local citizens, youth, and educators to learn about current advances in research, engage with scientists, and gain a deeper understanding of the importance of Earth Science to their everyday life. The bottom line is that it will make Earth Science more accessible and relevant to them.

Providing access for members of the public, youth and educators to conference events and activities provides a platform to network and an opportunity to build connections. It also allows participating geoscientists and conference attendees to gain insight into the K-12 education system.

Reaching diverse audiences

There are many possible ways to build a great informal education experience, and the ones you choose to use will depend on which audience (the public, students, or educators) you wish to reach.

Public outreach can include:

- public lectures delivered by Earth Science experts in non-technical language; these are, often linked to a conference theme or a local Earth Science issue;
- exhibitions and events that include booths or learning stations focused on providing education to a general audience;
- field trips led by local experts that provide education about local geological sites of interest or significance.

Educator outreach can include:

- professional development activities such as workshops and field trips that provide specialized Earth Science instruction with opportunities to learn and practice teaching methods using sample lesson plans and resource materials.

Student outreach can include:

- school visits by guest geoscientists or geoscience educators who can bring Earth Science learning directly into the classroom, linked to curriculum, or focused on enrichment or career learning;
- exhibitions where students visit a conference or associated venue for the purpose of enriched learning;
- field trips that provide experiential learning at local sites, focused on reinforcing concepts introduced in the classroom, possibly supplemented by such tools as rock, mineral and fossil kits, books, posters, and mineral identification tools.

Successful workshops can incorporate any or all of the following elements:

- expert-led teaching modules that include sample lesson plans and activity ideas;
- field trips featuring local and regional sites of geological interest that are easily

accessible and safe for teachers to later take their students to;

- opportunities to visit exhibitions, trade fairs, and scientific talks that can provide broad Earth Science or career education. As well, access to current scientific research can inspire the teachers and bring excitement to teaching of Earth Science in the classroom.

How this guidebook can help you

While planning for public lectures may be straightforward, planning other outreach events, especially those for local educators can be more complex. This guide is intended to provide assistance in planning teacher workshops and field trips, as well as ideas for public and youth engagement, based on best practices and lessons learned.

We have found that teacher workshops and field trips offer a unique opportunity for local educators to learn from and connect with conference delegates who are practicing geoscientists from across Canada. These professional development opportunities provide teachers with the confidence, tools, and knowledge to effectively teach Earth Science components to their provincial and territorial curriculum. Enthusiastic, inspired, and knowledgeable teachers serve to engage youth in our field of study, and encourage interest in a career in geoscience. By engaging with teachers, we increase our reach, as each teacher will take their knowledge and enthusiasm back to multiple classes over the many years of their careers.

Additionally, events that bring the public, especially youth and school groups, to the conference to experience activities and demonstrations of Earth Science concepts build interest and excitement about our field of study. Even a one-day event, although challenging to plan, could be memorable and inspiring for those attending.



Keys to Success

Involve local community members in planning

Engaging the target audience in the planning process is an important element to creating an effective and engaging education and outreach program. Enlist the assistance and participation of locally based educators, school boards, universities and colleges, and rock and mineral clubs. Invite them to assist in the planning process by becoming a member of your Outreach Program Planning Committee.

For educator engagement, consider collaborating with local and regional education stakeholders. For example, enlist representatives from Boards of Education, museum educators, or high school science teachers. Consulting with Board of Education officials and teacher associations will also ensure program content is relevant, connects to regional curriculum, and themes add value and authentic learning connections.

Schedule for maximum participation

The school calendar, schedules and timing are crucial considerations underwriting successful educator attendance. Consult with your local schools to ensure that proposed event dates will allow for maximum participation. Local educators will also be very helpful in advising the best timing for your event. Avoid

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scheduling your event during exam times, school breaks, holidays or the weekend.

Event timing is especially important with an educator-focused event. Although events may occur before, during and/or after the conference, workshops

or field trips longer than one day are best scheduled before or after the conference dates. If both a workshop and field trip are being considered, teacher attendance should fall over consecutive days.

Scheduling a technical session within the conference program, targeting educators as speakers or attendees should also be considered. Although, be mindful that they will need to seek substitute replacements if sessions are scheduled during the weekday.

A weekday during the conference might be great timing for an exhibition, if you provide sufficient lead

time to enable school groups to plan to attend. Again, if you engage with community educators at the outset, they will provide invaluable insight into best timing.

Critical planning timelines

There are several timeline milestones to consider while planning outreach events. The most critical are scheduling, promotion, and funding application deadlines.

Scheduling considerations

As soon as the Local Organizing Committee has been struck, members should locate and work with stakeholders to develop outreach program themes and content. After selecting these key elements, consider developing the outreach program schedule, relative to the wider conference program. Begin planning to develop a formal promotional campaign. This should involve creating an electronic information notice or bulletin (i.e. promotional flyer), identifying audiences, and setting registration deadlines.

Advertising and Promotion

Promotion of the outreach program should also begin well in advance of the conference and involve any national partner or sponsor organizations including CGEN and regional teacher associations. Information about your educational and public outreach program should be added to the conference website as soon as it has been finalized. A separate page should be devoted to the outreach events schedule, information and registration.

Be aware that it will be important to provide sufficient lead-time to events for which registration is required. This is the case for teacher workshops and field trips, in particular. Teachers may be required to seek permission from their institution or Board to attend your workshop and field trip, and may be required to arrange for a substitute for their class.

A sample planning schedule is provided on page 12.

Sources of funding

Funding is a critical component to planning and delivering a successful educational outreach and public engagement program. Identify potential funding sources and prepare a budget to map out your expected spending, to ensure you will have enough money for the things you need and the things that are important to your program.



In addition to corporate sponsorship, several sources of funding are available within the Earth Science community to support educational outreach programs in Canada. The key to success is to be aware of deadlines for grant and sponsorship applications. Some funding bodies and corporations only review applications once a year, and you need to know when those reviews take place. In many cases, you may need to submit your application more than a year in advance.

The Canadian Geological Foundation (CGF) provides grants annually in support of projects that promote public interest in the value of the Earth Sciences to society and training to teachers. The annual deadline for applying for CGF annual grants is March 31, with a decision taken by June of that year. You need to be aware that CGF grants are only paid out at the conclusion of your project, following submission of your report and full account of expenses, including receipts. CGF grants are really only an option where workshop planners have access to interim funds upfront.

The EdGEO Teacher Workshop Program for Canadian teachers, initiated in 1970, provides funding support up to \$3000 per workshop. Early application to EdGEO is strongly encouraged, ideally as soon as you have a general plan, but at least six months before (edgeo.org/en-CA). EdGEO funds can be used for field trip travel expenses (bus, museum, or park entrance fees), workshop activity materials, and teaching resource materials that are to be given to participants for use in their classrooms. EdGEO funds cannot be allocated to space rental, salaries, or honoraria or travel expenses for facilitators. Funds are provided to applicants immediately following the

approval of a grant, so they are available to spend prior to the delivery of the workshop. Any unused funds must be returned to EdGEO.

The Canadian Geoscience Education Network (CGEN) provides funds of up to \$500 in support of teacher workshops delivered as part of a geoscience conference. This funding is available upon request to the CGEN Secretary-Treasurer, and is typically provided to organizers prior to the workshop. These funds can be allocated to food and beverages, or other expenses not covered by other grants.

Corporate sponsorships are always worth seeking and many industry organizations have charitable foundations that support educational initiatives.

Finding the right corporate match will require some research and your application should be submitted as early as possible so they have time to consider your request. As with other sources of funding, it is important to know when you will have access to this funding.

Managing the timeline of your finances is critical. You will have to purchase workshop materials, ship posters, book buses, or place a deposit on a venue or cover museum entrance fees in advance of your event. If these expenses occur before your grant or corporate funding is available, you will need to have interim funding options lined up.

As in any situation where funding support is provided, be sure to recognize your sponsors in all your promotion and advertising documents, on websites, signage, and literature.

Planning your Education and Outreach Program

Successful outreach programs held at past events have included opportunities to engage members of the key audiences. Some examples are listed in the table below.

Activity	Target Audience	Details
Education/ outreach technical sessions	Formal and Informal Educators from all levels, researchers, University faculty and instructors, industry professionals	Invite speakers from all levels of Education; Provide registration to teachers and informal educators at a nominal fee
Public lectures	Local community	Invite speakers to discuss topics important to the local community
Teacher workshop and field trip	Local formal and informal educators	One- or two-day program that includes instruction, hands-on exploratory activities, networking, and a field trip to local sites of geological interest
Public exhibition event	School groups, families, local community, conference delegates and geoscientists	Booths from various geoscience organizations at the conference, geoscience education organizations, museums Provide opportunities to explore simple hands-on activities and geoscience investigations

Planning...

Education and outreach technical sessions

During the conference call for session proposals, consider including an education and outreach themed technical session.

There are many aspects of K-12 education that could be explored in the context of a scientific meeting, including the role of informal education, field-based learning, geoscience education theory and practice, educator professional learning programs, and more. Informal educators and K-12 teachers should be invited to propose talks and submit abstracts, so that they are represented as both speakers and attendees, building a bridge between geoscience researchers and educators at all levels. K-12 formal and informal educators should be provided the opportunity to attend these sessions at a significantly discounted one-day rate.

Should the Local Organizing Committee decide to offer a complimentary or highly discounted one-day pass for educators to the conference education and outreach technical sessions, fees can be collected on the regular registration page. There is a strong case for allowing complimentary/highly discounted registration fees for teachers/educators to attend the conference. Teachers have an impact on the career

decisions of students. By empowering teachers with current, accurate scientific information, they become the greatest advocates for our field of study.

Engaging teachers to learn about cutting edge research, industry advances, and various career paths provides relevant, accurate geoscience information. In turn, teachers can bring this first-hand experience to the classroom to share with students

Typically, only a handful of teachers will be able to spend a day at a geoscience conference. Although the number of discounted or complimentary registrations will be few, there is tremendous benefit and value added to this investment. Providing an interested group of educators the opportunity to participate in the conference will serve to increase our reach to the thousands of students they encounter during their career.

A public lecture

Once conference themes and technical sessions are determined, begin building a wish list of potential speakers. This may include well-known international Earth scientists, or a local academic whose research is relevant to a local geoscience challenge.



Choose someone to manage this event. Tasks will include sending invitations to your chosen speaker(s), determining the size of your expected audience, finding and booking an appropriate venue, advertising the talk, and handling the logistics of the venue (set up, audio-visual equipment and technicians, etc.) The event manager might also be the person who will introduce the speaker and moderate questions after the event, or should engage someone else to take on that role.

You may find that partnering with local organizations like mineral clubs, university Earth Science departments, or museums will be of assistance with details such as providing a venue, and help with advertising and promotion.

Public/youth engagement exhibitions

Organizing a public or youth event can be challenging and time consuming. Consider setting up activity stations involving hands-on activities or demonstrations to maximize engagement.

Models can be as simple as tables set up in a lobby area with simple hands-on activities covering various Earth Science topics, hosted by a local or national organization that promotes Earth Science education. Or you could have an exhibit hall with booths or tables for various organizations. While this would be substantially more effort, it would provide more opportunity for visitor engagement with the participating organizations and allow organized visits from school groups.

Either of these models has great potential to increase awareness of Earth Science in the local community and add tremendous value to the conference. They are also a lot of work. Identifying someone on the Local Organizing Committee willing to take on event planning for such a project early in the conference planning process is important. They will need to invite organizations to participate, find a venue, deal with all the logistical requirements such as access to electricity, tables, the space for set up and tear down, advertising, and organizing the school visits.

If you choose to encourage school groups to visit as a school trip, you will need to engage local teachers and school boards early in the process to schedule the event for maximum participation and ensure buy-in to the project. A group that has had success

putting on this type of event is Earth Science for Society, and, if you are interested in getting their advice check out their website for contact information esfscanada.com.

A teacher workshop

The teacher workshop should be organized by a local team comprising local teachers, formal and informal geoscience educators, and geoscientists attending the conference. If possible, participants in the teacher workshop should be provided with discounted conference day passes allowing them to take part in the education and outreach technical session, visit any associated trade show, and access any other opportunities to engage with geoscientists at the conference.

Effective teacher workshop programs provide instruction in basic geoscience concepts, and include hands-on learning activities. Other important features include the use of expert presenters, and opportunities for networking. The workshop organizers typically provide a range of teaching resources that participants can take back to their classrooms. Popular items from past workshops include rock and mineral collections, posters, and maps.

From past experience, field trips are very popular with the participants and they encourage teachers to build field investigations into their classroom teaching. Field trips can involve visiting safely accessible local outcrops, an operating or reclaimed rock quarry or sand and gravel pit, or a museum. The teachers' field trip can be set up as part of the conference field trip program and include spaces for conference delegates. This usually helps with field trip expenses and provides another opportunity for teachers and geoscientists to connect.

You will find examples of workshops delivered at geoscience conferences in the appendix. These will give you an idea of the type of themes, content, format, and facilitator team compositions that have been employed in the past.

The next section highlights some lessons learned in planning teacher workshops and field trips at past geoscience conferences.

Teacher Workshop 101

Build your team

For more than a decade, the Canadian Geoscience Education Network (CGEN) has partnered with geoscience conference Local Organizing Committees, in varying degrees, to support the delivery of teacher workshops. Our participation has included collaboration, leadership, support, and observation. It is up to the Local Organizing Committee to determine the type and degree of CGEN involvement, but be aware that we are a resource that you can call upon.

The most critical part of your team is its leader, and the ideal candidate is someone local who has an interest and appreciation of educational and public outreach. Nothing can replace the capability of someone with feet on the ground. The Local Team Leader will liaise with the Local Organizing Committee and be responsible for all locally relevant issues such as:

- engaging with local stakeholders, teachers, school boards
- finding and booking a venue
- advertising and promotion
- organizing any required lunches, coffee, snacks
- acquiring locally sourced activity resources
- engaging transportation for field trips
- scheduling and seeking permissions/admission to any field trip locations or museums
- handling all other local logistics

Your team will also ideally include other local individuals such as teachers, university and college geoscientists, retired geoscientists, or museum specialists. This group will be able to determine a theme or content that will serve the needs of local teachers by making connections to the regional curriculum and local issues. This group can then reach out to augment the team with geoscientists who will be attending the conference from across Canada, to help facilitate specific components of the program. Perhaps someone can lead a session on renewable resources used in green energy, or a primer on rock identification. And don't forget to use the CGEN members who attend your conference; they can be relied upon to assist as required for your event.

Teacher workshop formats

Past successful teacher workshops have been full or half-day programs, usually followed by a field trip. Workshop schedules generally have 90-minute or two-hour blocks devoted to a particular topic, with time for instruction and an opportunity to explore activities and delivery ideas.

Content should address the topics teachers need to understand and teach, as well as the expertise available on the day. Presentations delivered by enthusiastic and passionate geoscientists are usually very well received. You could also include a short keynote talk by an expert at the beginning of the day. Be sure to provide some time for networking, perhaps over lunch.

Any activities undertaken by the participants during the workshop should be reproducible in the classroom, and if possible, the resources needed to run the activities should be provided in the Teaching Resource Package participants take away with them. If you provide rock, mineral and/or fossil collections to participants, be sure to use them in the activities you present.

We have found it useful to leave at least a half hour at the end of the workshop to receive feedback, discuss challenges to delivering geoscience curriculum in the classroom, and to ensure participants fill in evaluation forms before leaving so you receive feedback from all the participants.

One final note, don't forget to leave some space in the day. We have often had feedback from participants who wished the day had not been so jam-packed and that there had been time to have had discussions with their fellow participants and the facilitators.

Please take a look at the examples of past workshops in the appendices for more ideas.

Field trip considerations

We have found field trips are most successful if they are planned and delivered in conjunction with a workshop. Field trips that were scheduled to immediately follow a half-day or full-day workshop were usually well-attended, engaging most or all of the same participants. The field trip itineraries were planned to complement workshop content and featured local and regional geological sites that were easily accessed by educators. Sites such as parks or museums are good choices as they are accessible, safe, and well-suited to school-led excursions.

Notes about registration and fee collection

It has been our experience that registration and fee collection for teacher workshops is most effectively managed separately from the conference registration. The conference website should advertise the workshop and provide a description of it. However, it should not direct interested participants to the on-line conference registration portal, rather it should provide the name and email contact for registration information, and that person should be part of the team organizing the workshop.

This allows your team to receive inquiries and be able to manage distribution and collection of application forms, contact information, field trip waivers as necessary, dietary restrictions, answer questions, and provide any other information that needs to flow from the workshop organizers to participants. At past conferences, we have used email or fillable application forms, and mailed cheques and on-line pay portals for fee payment. This will require the cooperation of your Local Organizing Committee which will need to have the capacity to receive and hold workshop fees, and redistribute those funds back to you for your use as needed.

If this is not possible and registration for your teacher workshop is required through a conference website on-line portal, you will face many challenges, notably, limited access to the list of participants and their contact information as well as ready access to the funds needed

to run the workshop. In a worst case scenario, we had a workshop where organizers had no idea how many people had registered until days before the event, and had no access to contact information and so could not communicate with the registrants prior to the workshop. This meant that registrants did not receive information about how to get to the venue, program details, or food options. This was distressing for registrants and we feel, was partially responsible for a low attendance and several no-shows.

If it is not possible to manage the registration outside the conference on-line registration system, you will need to impress upon those who receive the information to provide it to the workshop team as it arrives in the portal. We strongly encourage you to speak to your Local Organizing Committee early and arrange for a way to manage registration outside of the conference website registration portal.

Organizing a teacher workshop and public outreach event is a very rewarding and satisfying experience. We wish you the very best with this exciting endeavour.

Good luck with your planning!



Appendix 1

Sample Planning Schedule

~ 18 months or more prior to the conference
Striking of Local Organizing Committee (LOC)
for the conference

- ☐ Appoint an Education and Outreach Chair to the LOC
- ☐ Reach out to previous Education and Outreach Chairs for advice and guidance as needed
- ☐ Determine wish list of education and outreach program components, including public lecture, special technical session, teacher workshop and field trip.
- ☐ Build a preliminary budget
- ☐ Appoint a teacher workshop local team leader, if Education and Outreach Chair is not going to do it.
- ☐ Apply for funding for outreach and education programs from the Canadian Geoscience Foundation (annual CGF deadline for applications is March 31, with approval in May of same year)

One-year prior

- ☐ Add other local team members (teachers, university/college/museum/retired geoscientists)
- ☐ Reach out to CGEN to determine which of its members might be at the conference and their background or expertise (this might help determine content) and enlist assistance as required
- ☐ Plan the workshop theme, content, and format (this might match conference themes)
- ☐ Determine venue for the workshop (this might not be at the conference venue)

- ☐ Determine dates for the workshop, based on advice from local teachers about best timing for maximum participation by educators and in consultation with the LOC – if a field trip is also planned, ensure the workshop and field trip run on consecutive days
- ☐ Determine a preliminary budget for the workshop (and field trip if included)
- ☐ Arrange with LOC the management of teacher workshop funds such as registration fees, sponsorships, grants or donations. You will need a mechanism to receive and hold these funds, and to release them for your use as needed (to pay invoices such as deposits on buses, venues, purchase of teacher resources, shipping, etc.).
- ☐ Post preliminary details for workshop on conference website and in other promotions
- ☐ Ensure conference sponsorship options include the opportunity for sponsors to help fund education programming
- ☐ Arrange for participating teachers/educators to have access to the Education and Outreach Technical Sessions, or a one-day pass that will provide access on the day of this session as well as access to the trade show (this may be included in their fee, but should be substantially discounted, if not free, to encourage maximum possible participation)
- ☐ Begin researching and sourcing any materials required for the workshop activities and for the participants' take-away resource kit (rocks, minerals, fossils, books, posters, ID tools...)

9 months' prior

- ☐ Apply for EdGEO funding (this funding can be applied for at any time, and is provided ahead of the conference)
- ☐ Ensure you have a mechanism to see applicant details such as numbers and contact information as it comes in – you will need to communicate with registrants leading up to the workshop to provide more information, to send field trip waivers, to determine food allergies, etc.
- ☐ Plan any intended teacher field trip – this will be governed by the conference field trip planning process
- ☐ Arrange for a bus for field trip

6 months' prior

- ☐ Finalize details of workshop
- ☐ Initiate registration and collect fees and participant information
- ☐ Begin purchasing or acquiring any needed workshop activity and teaching resource kit materials

3 months' prior

- ☐ Confirm participation of facilitators at workshop and technical session
- ☐ Purchase any materials that need to be shipped to your location
- ☐ Visit venue and determine the layout, if this is not known, and determine any needs such as electrical cords, A-V and computer equipment and technical support, access to the venue, etc.
- ☐ Finalize any activity materials including printing
- ☐ Build an evaluation form that will provide information for sponsors and funders about the value of the experience
- ☐ Reach out to registrants with preliminary information

1-month prior

- ☐ Monitor registration and reach out to participants with any information they need, provide field trip waivers, ensure dietary restrictions are known and communicated, ensure mobility issues are known and mitigated
- ☐ Reach out to workshop facilitators to ensure they are ready to participate in your program as previously arranged
- ☐ Arrange or plan for any catered lunches, especially for field trips

- ☐ Ensure you have all needed workshop activity and teaching resource kit materials and begin building teaching resource kits

1-week prior

- ☐ Reach out to workshop participants and facilitators with last minute information and answer any questions they may have
- ☐ Ensure all logistical issues have been dealt with and all required materials have been purchased and/or delivered
- ☐ Ensure teaching resource kits are ready to use/gift to participants
- ☐ If there is a field trip, ensure bus company has itinerary and pickup/drop-off location

Day of event

- ☐ Ensure access to the venue and assist with set up
- ☐ Ensure all materials and services are in place
- ☐ Welcome facilitators and participants, provide name tags, programs
- ☐ Receive lunch, set up, and clean up
- ☐ Provide evaluation form for participants to fill in before departure and collect
- ☐ Tear down and clean up after completion
- ☐ If there is a post workshop field trip, ensure everyone has information required
- ☐ For the day of the field trip: greet participants and facilitators, communicate with bus driver and company, bring or receive lunch items, provide field trip evaluation form to be filled in before end of day and collect it, manage group movement and needs (note: the workshop and field trip leaders may not be the same person)



Sample Outreach Programs

■ GAC-MAC 2011 - Ottawa Education and Outreach Program

Excerpted from gac.ca/wp-content/uploads/2018/11/2011_Ottawa2011_final_report.pdf

The Geoscience Education and Outreach Program at GAC-MAC Ottawa 2011 consisted of a Special Session on Geoscience Education including a poster session in the Technical Program, a public lecture on the 2010 Val-des-Bois Earthquake, two Geoscience and Society Breakfasts for Members of Parliament and senior decision makers, and a teacher workshop with field trip.

Special Session on Geoscience Education

This was co-sponsored by CGEN and the Ottawa Gatineau Geoheritage Project (OGGP). It was chaired by Erica Williams, a British Columbia secondary school teacher, and Blyth Robertson, Geological Survey of Canada and OGGP. The session examined recent progress in existing and new initiatives for the enhancement of public geoscience awareness, including through elementary and secondary school curricula. Emphasis was placed on reviews of geoheritage values, stressing the continued need to preserve and promote unique and iconic geological sites, including those associated with Canada's mining history, plus the future of geotourism, especially through establishing Geoparks. The 15 oral presentations, which fell nicely into geoheritage and education half-day sessions, were well attended, and the 35-seat lecture room was generally full throughout the day. Having a teacher as one of the co-chairs greatly facilitated in ensuing discussions on the needs and means to significantly improve the geoscience knowledge of teachers and the development of new texts and learning concepts to assist in this.

The Special Session also included three poster presentations and, as part of its post-meeting report, CGEN recommended that organizers of future sessions try to significantly increase the number of posters as they provide a focus for discussion.

Teacher workshop and field trip

The annual EdGEO-funded Carleton University Department of Earth Sciences Teacher

Workshop was rescheduled to coincide with the GAC-MAC 2011 meeting to take advantage of conference events and provide the opportunity for teacher participants to attend the conference. Workshop organizer Beth Halfkenny, Carleton University, negotiated a full pass for workshop participants to the Ottawa 2011 GAC-MAC conference. The LOC asked for cost recovery for creation of badges and providing delegate bags, so a \$15 fee was included in the workshop registration. Teachers paid \$60 for one day of in-house activities and presentations at Carleton University's Earth Science Department, a one-day field trip to see the local geoheritage, and full access to Ottawa 2011. They were encouraged to attend the Special Session on Geoscience Education, which 9 of the 24 did, participating fully in discussions following the talks.

During the in-class workshop day, elementary and secondary school teachers were provided with instruction, lesson plans, activities, classroom resources and field trip ideas that will assist and encourage them to integrate Earth Science concepts into their teaching. They also received a teaching resource kit to take back to their classrooms, along with a USB Flash Drive containing digital files of workshop activities and other ready-to-use resources. They were able to pick up a number of posters, maps, pamphlets and other materials provided by various agencies including the Geological Survey of Canada, Natural Resources Canada, EdGEO, the Mining Association of Canada, and the Geological Association of Canada, at the conference's trade show. Teaching resource packages were worth about \$200 per teacher. Carleton University's Dean of Science provided \$5000 of financial support for travel and accommodation expenses, enabling three First Nations educators from Northern Ontario to join the workshop and the related Ottawa 2011 events. Their participation was a great benefit to all involved.

The Ottawa 2011 fieldtrip on Geological Highlights of the National Capital Region, co-led by Al Donaldson (Carleton, CGEN, OGGP) and Beth Halfkenny, was offered both before and

after the conference. The post-meeting trip allowed workshop participants to learn more about local sites of interest that they could incorporate in their teaching. They were joined by several conference delegates, further elevating the educational and networking value

of the trip for all participants. The fieldtrip organizers received very appreciative comments and positive feedback at the conclusion of the daylong outing, and in e-mails afterward.

■ GAC-MAC 2012 - St. John's Education and Outreach Program

Excerpted from the St. John's 2012 Geoscience at the Edge, Geoscience Education and Outreach Report submitted by Amanda McCallum.

The St. John's 2012 meeting's outreach component consisted of the following events:

1. A two-day EdGEO Teacher Workshop and field trip, taking place May 25 -26, prior to the conference
2. A Special Session entitled "Preservation of Geological Heritage and its Contribution to Education and Economic Development" concluding with a panel discussion entitled "Geoheritage Protection in Canada: A Multitude of Solitudes"
3. A three-day field trip to the Bonavista Peninsula entitled "Geotourism and the Coastal Geological Heritage of the Bonavista Peninsula"
4. The GAC-MAC Public Lecture entitled, "Iceberg Alley" by Dr. Stephen Bruneau, Memorial University of Newfoundland, on May 29; and
5. Partnership with the Johnson GEO CENTRE, a local geological interpretation centre.

EdGEO Teacher Workshop and field trip

As in previous years, EdGEO scheduled its Teacher Workshop to coincide with GAC-MAC's joint annual meeting. The workshop's organizer and St. John's 2012 Outreach Chair, Amanda McCallum, negotiated a full pass for participants to the conference. Roughly a third of participants stated that they intended to attend the conference and just as many stated they would have gone if logistics had permitted. Amanda also applied for, and received, a grant of \$12,700 from the Jérôme H. Remick II Endowment Trust from the Canadian Geological Foundation. The funds were used to cover numerous costs including, but not limited to, visiting participant conference registration fees, facility rental costs, lunches, workshop equipment and consumables, teacher resource kits, printing, transportation and teacher travel subsidy funds. The funds provided the opportunity for eight teachers from rural Newfoundland and Labrador, representing five school districts, to participate.

The workshop took place on May 25 at the Johnson GEO CENTRE under the theme, "Exploring Earth Science in your Classroom and Beyond," attended by 38 teachers and educators. The NL curriculum-linked program workshop provided a unique opportunity for educators to discover teaching strategies and tools to make Earth Science topics relevant, engaging, and fun. The workshop saw the delivery of two concurrent workshops: one designed especially for junior teachers (Grades 4 and 7) that incorporated many of the EdGEO lessons and activities; and the other, a senior teacher workshop, was planned for high school teachers, and incorporated newly developed activities and lessons to support the Earth Resources: Real-Life Applications unit of Earth Systems 3209, a high school earth science course. A team of 17 facilitators from across Canada provided demonstrations and hands-on lessons tailored for elementary and secondary school students.

Teachers received an extensive activity-based resource kit, in addition to NL curriculum linked instruction, lesson plans, and activity ideas. Resource kits were prepared for the junior and senior workshops and a small number of kits were also prepared with limited resources being available in French. Learning resources included posters, pamphlets, books, maps, a mineral testing kit, and numerous rock and mineral samples indicative of Newfoundland and Labrador's mineral resources.

Exxon-Mobil also donated learning resources so the total value of classroom resources was in excess of \$1000 per teacher. ExxonMobil donated more than 20 items (i.e., mineral and rock lab activity kits, meteorite starter sets, physiographic relief globes, diamond crystals, large muscovite sheets, T-Rex skull models, etc.) to be given to teachers as door prizes. Teachers also received a USB-memory stick with additional activities, lesson plans, resources, and links.

The EdGEO Teacher Field Trip took place the following day and consisted of numerous stops in St. John's and surrounding areas. The field trip was sponsored by Research and Development Corporation Newfoundland and Labrador (RDC). Stops included Signal Hill National Historic Site,

Fort Amherst, Outer Cove and Middle Cove Beach. The beach stops illustrated sedimentary structures, graded beds, large folds and also provided good examples of exposure of the St John's Group and the Conception Group.

A lunchtime visit to the pyrophyllite mine in Manuels was led by the Operations Manager of Trinity Resources & Energy Limited, where the group learned about the crushing, grinding and sorting process, and uses of pyrophyllite, and also visited the stockpile

and back-pit. Afternoon stops included a visit to the Steep Nap Gold Prospect and the beach at Worsley Park at the outlet of the river into Conception Bay, as well as the Manuels River Linear Park. Field trip participants learned how to distinguish between features of ancient and modern beaches and to see firsthand the fundamental geologic principle "the present is the key to the past." Response from the participants to both the expertise of the facilitators and the variety of resources was overwhelmingly positive.

Teacher Testimonials



It was by far one of the best workshops I have ever attended. The field trip on Saturday was another great learning experience as well. You and your organizing committee are to be commended. The resources provided will help considerably in the classroom. I am actually exploring the possibility of attending the conference in Winnipeg next year. My administration is supportive especially after I told them about the PD sessions I participated in this year.
—Teacher, Clarendville High School (St. John's 2012 EdGEO Senior Workshop)

I am so thankful for having participated in this session, the resources, the expertise, the enthusiasm and support from EdGEO. Thank you.
—Teacher (St. John's 2012 EdGEO Junior Workshop)

Once again I would like to thank you for an amazing two days. I feel I have an understanding ready to share with my fellow teachers and students- an amazing opportunity!
—Teacher, Stephenville Elementary (St. John's 2012 EdGEO Junior Workshop)

I wanted to personally thank you for this wonderful opportunity. Today was the best in-service I have ever taken part in. The work you are doing is invaluable, especially for a young teacher in an isolated community. I hope I can take part in more of the workshops and in-services in the future. I can't wait to share with my fellow teachers everything I have learned.
—Teacher, Sheshatshiu Innu School (St. John's 2012 EdGEO Junior Workshop)



■ GAC-MAC 2013 - Winnipeg Education and Outreach Program

Excerpted from gac.ca/wp-content/uploads/2018/11/2013_GAC-MAC_Winnipeg_2013_LOC_Final_Report1.pdf

The GAC-MAC 2013 Winnipeg Education and Outreach Program components included a First Nations Geoscience Special Session as part of the Technical program, a Geoscience in our Lives Public Lecture, and a full-day teacher workshop for grade 4 and 7 teachers with a full-day field trip.

Special session on First Nations geoscience

A special session entitled First Nations Geoscience was part of the conference's technical program and held on May 23. It was attended by up to 50 people representing First Nations, professional geoscientists and educators. The objectives of the session were to share perspectives and explore the design of Earth Science outreach and teaching programs and to better understand how Earth Science education is currently delivered. The session started with presentations from three elders and a smudge ceremony. The elders delivered their understanding of First Nations science applied to the Earth. Two aboriginal speakers following the elders spoke on First Nations history, colonial to recent times, and the merging of their traditional knowledge with western science. The final two speakers summarized two recent projects used in the minerals industry, which looked to develop necessary skills in First Nations communities. One-hour breakout learning circles were scheduled for both the morning and afternoon sessions, but were cancelled due to a lack of time. The Canadian Geoscience Education Network (CGEN) sponsored the special session and Vale committed to financial sponsorship of the special session about two weeks before the conference.

Geoscience in our lives public lecture

Dr. James T. Teller, Professor Emeritus at the University of Manitoba, delivered the Geoscience in Our Lives Public Lecture entitled *The Drowning and Draining of Manitoba: From Lake Agassiz to Today*. The lecture was held at 7:00 p.m. on Wednesday, May 22 in the Presentation Theatre at the Winnipeg Convention Centre. About 75 people attended the lecture and ranged from conference registrants to the general public. The Clayton H. Riddell Faculty of Environment, Earth and Resources at the University of Manitoba sponsored the lecture.

Teacher workshop and field trip

The EdGEO Teacher Workshop was held on Friday, May 24, the last day of the GAC-MAC 2013 joint

annual meeting. The field trip was held on Saturday, May 25. These days were selected after consultation with Manitoba Education and Literacy, who distributed two advertising flyers promoting the workshop and conference activities to 800 recipients (schools, consultants, etc.) and sent out additional email targeting science consultants at the school division level. The workshop registration fee was \$60.

The workshop was held in the Millennium Room on the second floor of the Winnipeg Convention Centre. There were 38 teachers in attendance. About 60% were grade four teachers and about 40% were grade seven teachers. In the morning all the teachers attended a single session focusing on rocks, minerals, Earth structure and the geological history of Manitoba. In the afternoon two different programs were delivered to reflect the grade 4 and grade 7 science curricula. A final presentation of the day was given to both groups that connected Earth Sciences to society and resources.

Workshop facilitators included

- Charly Bank, Senior Lecturer, University of Toronto
- John Danko, Teacher, Argyle Alternative School
- Beth Halfkenny, Curator and Outreach Coordinator, Carleton University
- Janice Williams, Educator, Mining Matters
- Lesley Hymers, Environment and Education Specialist, Ontario Mining Association
- Linda Murphy, Geologist, Manitoba Geological Survey
- John Murray, Director, Industrial Research Consortium, Manitoba Innovation, Energy and Mines
- Godfrey Nowlan, Geologist/Paleontologist, Geological Survey of Canada
- Erica Williams, Teacher, Riverside Secondary School, Port Coquitlam, BC

Additional assistance was provided by

- Mark Fenton, Senior Scientist, Alberta Geological Survey
- Kate Grapes Yeo, Geoscience Education Consultant, Saskatchewan
- Sam Lewis and Matt Demski, Students, University of Manitoba

At the end of the day teachers received a teacher resource kit containing geological maps, posters, books, pamphlets, minerals, rocks and glacial sediment. Many of the resources were linked to the Manitoba science curriculum and included lesson plans and activity ideas. Free resources were acquired from the Manitoba Geological Survey, Natural Resources Canada, the minerals industry and the Department of Geological Sciences at the University of Manitoba. Additional resources were purchased from various vendors.

CGEN sponsored the workshop, with funding for it and the resource kit supplied by a grant from the Canadian Geological Foundation.

The EdGEO-funded Teacher Field Trip was held on Saturday, May 25. It toured the Cretaceous rocks of the Manitoba escarpment and explained their relationship with the overlying Pleistocene glacial deposits. Bill Mandziuk (University of Manitoba) led the field trip. A bus was used for transportation and lunch and admission to the Morden Museum were supplied. There were 10 participants on the trip, but only 3 were teachers.

General comments and recommendations

The geoscience education and outreach component of the joint annual meeting of GAC-MAC is a conference within a conference. It services the general public, the K-12 teaching community, and geoscience educators or professionals interested in geoscience education or outreach projects.

1. Past outreach program chairs are a wealth of information. Winnipeg 2013 outreach chair Jeff Young received invaluable support from Amanda McCallum (Outreach Chair, St. John's 2012) and Beth Halfkenny (Outreach Chair, Ottawa 2011). It is suggested that the outreach program chair contact the previous chair more than one year before the meeting. The outreach chair for Winnipeg 2013 was put on the email distribution list for St. John's 2012 in December 2011, but even earlier would have been more beneficial.
2. Registration is a complex problem for the outreach program. Registration for GAC-MAC conference delegates is done online through the national GAC office starting in March. The teachers and general public were also required to use the same registration process. The national GAC office was unprepared for web registration for the outreach program. Editing of the web registration was completed in mid- March.

Although staff at the national office did a great job of responding to issues throughout the registration process, it is recommended that registration for outreach program activities be done locally and coordinated by the outreach program chair because:

- i. The registration process used by the GAC is not familiar to the teachers or general public. The outreach chair was contacted numerous times on how to register. A step-by-step instruction sheet was created and sent to teachers to ease registration problems.
 - ii. Registration deadlines used by the GAC-MAC conference are not compatible with the deadlines needed for the teacher workshop and field trip. As an example, in order to create the teacher resource kits, an accurate number of participants is needed to ensure enough materials are collected. Registration for the teachers needs to start in January and be completed by March.
 - iii. Planning for catering and resources is difficult without knowing relatively accurate numbers. The number and names of registered teachers for the workshop, field trip, and special session on the web database and in updated registration spreadsheets did not match. At the beginning of the conference the registration numbers for the teacher workshop ranged from 23 to 37
3. The budgetary process for the outreach program is complex. The outreach program at Winnipeg 2013 used conference rooms, some audio-visual, catering, and information packages supplied by the local organizing committee (LOC). The outreach committee did its own fundraising, publicity (except for the public lecturer), development of the technical program and field trip. The outreach program was also used to leverage conference funding by the LOC and all parts of the outreach program were financially sponsored.
 4. The Geoscience in Our Lives Public Lecturer was selected by the outreach chair in cooperation with the LOC. A formal invitation was sent to the lecturer in December 2012. Advertising the lecture was done in cooperation with the Publicity Committee a couple of weeks prior to the conference. Local organizations thought to be interested were contacted and information about the talk was widely disseminated.

5. First Nations Geoscience was a special session organized to bring together indigenous Elder knowledge holders with professional Earth Science educators and teachers to share their perspectives and explore the design of Earth Science outreach and teaching programs. An important component of the session was the breakout learning circles. The learning circles were cancelled because all speakers exceeded their time limit and two significant technical problems that pushed back the program about 45 minutes. Financial sponsorship from Vale is gratefully acknowledged. Unfortunately, sponsorship just prior to the conference means that little can be done with the money to ensure success of the program. At the same time there is an onus on the conference to represent the sponsorship to the participants properly. Sponsorship deadlines for specific parts of the program need to be completed at least one-month prior to the conference.
6. The EdGEO Teacher Workshop is a highlight of the outreach program and a significant amount of human resources go into the workshop.
 - i. CGEN members were exceptionally supportive and highly willing participants who readily volunteered to facilitate the workshop. Charly Bank, CGEN president 2013, helped coordinate conference calls and volunteers. CGEN members should be contacted early (during the previous GAC-MAC meeting or no later than September of the previous year) through the CGEN president. Although some members were not able to fully commit until the last minute a program schedule can be created and used for advertising
 - ii. CGF supplied funding for the workshop and the teacher resource kit in particular. Note that the funding proposal must be submitted by the end of March of the year previous (i.e., March 31, 2012 for Winnipeg 2013). Winnipeg 2013 received \$14,900 from the CGF for the workshop.
 - iii. Development of the resource kit is a significant job that should be coordinated by a committee member in cooperation with the outreach program chair. We received free contributions from the Manitoba Geological Survey, Natural Resources Canada, and the minerals industry. Resources necessary to complete the kit were purchased from various vendors or collected by members of the outreach program committee.



- iv. CGEN facilitators used the teacher resource kit to deliver Teacher Workshop activities. Putting the resource kit together took a significant amount of time. The bulk of the kit should be completed at least two months prior to the workshop and facilitators notified of its contents. Earlier notification will allow facilitators to streamline their presentations.
- v. A review of teacher comments varied from good to excellent, with the most common problem identified as time management. Teachers identified both the need for a better time balance between facilitators and sticking to break schedules. Due to the interactive nature of the activities at the workshop, presentations inevitably go overtime. Facilitators need to be kept on time, particularly for breaks. It is recommended that the program should have flexibility built into it to allow for time management problems
7. The EdGEO Teacher Field Trip was advertised along with the other activities of the outreach program. Twelve teachers registered for the field trip but only three attended. Discussions with Manitoba Education and Literacy suggested that turnout might be much lower for weekend activities. It is recommended that:
 - a. all teacher activities be done during the week; and
 - b. advertising for the field trip be undertaken separately and more aggressively.

Each part of the outreach program should have its own subcommittee, because the program is a conference in itself, including the public lecturer, two days of sessions of which half of one day there were concurrent sessions, and a field trip.

Sample Teacher Workshops

■ One-day workshop: GAC/MAC 2014 Fredericton

Venue: Quartermain Earth Science Centre, University of New Brunswick | **Date:** May 27, 28, 2014
Total Cost: \$2015 | **Funding:** \$2015 EdGEO

Focus

Teachers had the opportunity to explore the geology around New Brunswick and the Maritimes with professional Earth Science educators, going back in time to examine and discuss why we think we “know what we know” about the evolution of Eastern Canada. Continental collisions, active volcanism, glaciers and the beginnings of life itself were presented using “hands-on” activities and interactive instruction in the Quartermain Earth Science Centre. The program also included discussions about approaches to Earth Science education. Teachers received a resource package that can be used to deliver workshop activities in their own classroom. The workshop registration fee included a day pass to the GAC-MAC conference.

Schedule

Concurrent Session 1: Building Blocks of the Earth (Rocks/Minerals)	9:30 - 10:50 Grades 4 to 6	11:00 - 12:20 Grades 7/8	1:00 - 3:00 Grades 9 to 11
Concurrent Session 2: Time Travel (Fossils and Geologic Time)			

Resource Package (\$175 value)

Each participant received a teaching resource kit that included rock, mineral and fossil specimen identification handbooks, mineral identification tools, USB flash drives loaded with teacher resources activities and handouts from all workshop sessions, and other digital and paper resources provided by the Mining Industry Human Resources Council, the Mining Association of Canada, Mining Matters, and the Geological Survey of New Brunswick.





■ One-day workshop with field trip: GAC/MAC 2016 Whitehorse

Venue: Yukon Geological Survey, H.S. Bostock Core Library | **Date:** Friday June 3, 2016

Total Cost: \$3388.16 | **Funding:** \$2888.16 EdGEO, \$500 CGEN

Focus

Weathering and erosion, rocks and minerals, rock cycle, mining cycle, crustal movements/plate tectonics, earthquakes, chronological time scale

Schedule

AM	9:00 – 9:30 Introductions, Ice Breaker activity	PM	12:00 Lunch
	9:30 – 10:00 Geology of Whitehorse talk, smart phone microscope introduction		12:30 Depart for field trip
	10:00 – 10:15 Coffee Break		4:30 – 4:30 Return to H.S. Bostock Core Library, wrap-up, feedback forms, hand out resource kits
	10:15 – 12:00 Chris King, Geo Discovery		

On Friday morning, workshop instructors led participants through hands-on EdGEO activities that can be used by the attendees when teaching the major topics. A geologist from the Yukon Geological Survey presented a short talk on the geologic history of the Yukon and the current status of mining and mineral exploration in the territory. In the afternoon, participants were guided on a field trip of key teaching outcrops in the Whitehorse region. Teacher resource kits were provided.

The depth of material was tailored to suit the grade levels taught by the majority of the attendees.

The attendees acquired an increased understanding of Earth Science topics outlined in the prescribed learning outcomes in the curriculum. The field trip component of the workshop highlighted some of the excellent local geologic exposures that can be used to illustrate and reinforce key topics. The attendees were also provided with information on how to source additional teaching materials and resources.

Resource package: (\$150 value)

4 Billion Years and Counting book
Simon & Schuster's Guide to
Rocks and Minerals
Blue Marble periodic table poster
Pebble guide

USB with Earth Learning ideas
and EdGEO activities
Smart Device microscope
Polarizing film and thin section
Physical testing of minerals kit

Minerals of Canada poster
Mining Makes it Happen -
set of 3 prints
Amazing Story of Gold poster
Rock Cycle poster

■ Two-day workshop, including field trip: GAC-MAC 2011 Ottawa

Venue: Carleton University, Department of Earth Sciences | **Date:** May 27, 28, 2011

Total Cost: \$10602.78 | **Funding:** \$3000 EdGEO, \$1320 teacher registration fees, \$897.78 field trip fees, \$385 CGEN, \$5000 Dean of Science, Carleton University (travel funding for 3 Northern Ontario First Nations teachers)

Focus

The teacher workshop, on Friday, May 27 provided participants with ways to work Earth Science concepts into their teaching. Attendees included elementary and secondary teachers from across Ontario and Quebec, along with three teachers from northern Ontario. The day included a keynote address, various workshop sessions and a group activity at the end of the day. The program for each group included hands-on activities appropriate to elementary or secondary curricula and was delivered by Earth Science professionals and educators from across Canada. Participants received an extensive resource kit to take back to their classrooms. The workshop registration fee of \$60 included a day pass to the GAC-MAC conference.

An optional field trip, held the following day (May 28), provided a tour of the geological history (geoheritage) of the Ottawa region. A variety of Precambrian and Paleozoic outcrops in eastern Ontario and western Quebec were included, along with sites where Pleistocene and recent events are recorded in the unconsolidated cover. This trip also provided ideas for conveying basic geoscience concepts via field-based activities.

Schedule

May 27, Carleton University Earth Sciences Department

AM		PM	
9:00	Keynote address: Earth is Our Home - Godfrey Nowlan	12:00	Lunch, networking
10:00	Concurrent Sessions: Rocks and Minerals; Climate Change; Geologic Hazards	1:00	Concurrent Sessions: Exploring Mineral Resources; Discovering Diamonds, Mining Matters workshop: Using Earth Science to understand important issues in communities
11:00	Concurrent Sessions: What's Shaking- earthquakes; Telling Geologic Time; Changing Earth; Tectonics	3:00	Competing Values: should every deposit be a mine, role-play activity
		4:00	Evaluations and feedback

Field trip: Geological highlights of the National Capital Region

This one-day excursion outlined the geological history of the Ottawa region by offering visits to a variety of Precambrian and Paleozoic outcrops in eastern Ontario and western Quebec, along with an overview of Pleistocene and recent events recorded in the unconsolidated cover. Emphasis was placed on how best to interpret a region's geoheritage, so the field trip was of special interest to educators seeking ways to convey basic geoscience concepts to the public.

Resource package (\$200 value)

Participants received teaching resource kits appropriate to the afternoon workshop they chose to attend. Both Mining Matters workshops came with kits that would allow teachers to replicate activities from those resource sessions. Teachers who attended the Rocks and Minerals session were provided with a kit that included rock, mineral and fossil specimens, identification handbooks, and mineral identification tools.

All workshop participants received USB flash drives with activities and handouts from all workshop sessions and other digital resources provided by the Prospectors and Developers Association of Canada, EdGEO, Scientists in Schools Geological Survey of Canada, Geoscape, Carleton University and others. Hand lenses, posters, flyers, and brochures were also included.

A Sampler of Resources

Education, lesson plans and classroom activities

Canadian Geoscience Education Network

earthsciencescanada.com/cgen/

The *CGEN Archive* provides a wealth of resource materials. Of note, *Earthlinks* is a teacher-developed collection of the best Earth Science educational websites available to Canadian teachers. *Geoscape* is a series of posters and resources materials that look at the geology and related issues for a variety of communities across Canada.

EdGEO edgeo.org/en_CA/

Under “Resources” there are two downloadable manuals with hundreds of lesson plans and activities. *Putting the Earth in Earth Science* provides materials that integrate Earth Science into core curriculum sciences of chemistry, biology, physics, and mathematics. *Bringing Earth Science to Life* is a compendium of classroom-ready activities that have been used successfully and fine-tuned in EdGEO workshops all over Canada.

Four Billion Years and Counting: Canada’s Geological Heritage

fbycbook.com

This book looks at Canada’s geology from the science of it to its economic implications, and to the geological component of pressing social concerns such as climate change, water resources, and natural hazards. The website provides free downloadable access to the book’s more than 700 colour illustrations for use in the classroom.

Mining Matters

miningmatters.ca

This group provides a wealth of educational and youth-focused materials to develop awareness of the Earth Sciences, the minerals industry, and their roles in society.

Resources for other topic areas to incorporate into your workshop

United Nations Sustainable Development goals (UNSDG) un.org/sustainabledevelopment/sustainable-development-goals/. Consider having the UNSDG’s poster in the workshop venue and linking workshop topics to ways in which Earth scientists work to solve the 17 goals.

Geoscience and Canada published by Geoscientists Canada in 2018 can be used to highlight the important role of Earth scientists in ensuring the quality of life we enjoy in this country. (geoscientistscanada.ca/wp-content/uploads/2018/06/Geoscience-and-Canada-1.pdf)

The topic of Earth Science literacy can be introduced using resources available at earthscienceliteracy.org.



