Connections

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The journal of the Global, Environmental & Outdoor Education Council

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Global, Environmental & Outdoor Education Council

To promote involvement in quality environmental and outdoor education

What GEOEC Does

The Global, Environmental & Outdoor Education Council (GEOEC) is an interdisciplinary specialist council of the Alberta Teachers' Association. Our mission is to provide resources and venues for dialogue and networking, as well as to promote quality professional development for Alberta teachers in the area of global, environmental and outdoor education. Members receive current news items, teaching ideas, information about our workshop series and food for thought through our quarterly journal, *Connections.* We are also active on Facebook (www.facebook.com/geoecalberta) and Twitter (@GEOEC) with up-to-date information on PD opportunities and initiatives in Alberta.

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Message from the Editor

Connections Journal—Supporting Teachers Making Connections

What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another.

—Mahatma Gandhi

This issue of *Connections* features a range of topics, shared experiences and regional interests, including the outdoor classroom and rooftop garden programming, apiary appreciation, and environmental land and water resource management.

The Global, Environmental & Outdoor Education Council's (GEOEC) annual general meeting was held on April 21, 2018, at Barnett House in Edmonton, which included an excursion to the Métis Heritage Museum. The executive hosted professional development and strategic planning events.

You are invited to share your thoughts and suggestions for submissions with our teaching community. If you have materials or lesson plans, or if you are initiating new global, environmental or outdoor education efforts, please contact me at jennifer .connelly@cssd.ab.ca.

Jennifer Connelly

Editor's Note: Tammy Rollie wrote a wonderful article entitled "Beyond the Classroom" in the fall 2017 issue of the *Okotokian* (www.theokotokian.com). It outlines different ways that local schools have created outdoor learning spaces with trees, boulders, logs, plant life, benches, stepping stones, gazebos and so on uniquely created for learning moments that are enhanced by access to the sky, fresh air, weather and the comings and goings of living things. Students in these environments have a multitude of opportunities, such as learning about identifying tree species or animal tracks, xeriscaping and water conservation, mulching and weeding, along with yoga and relaxation. This article shows that use of an outdoor classroom is cross-curricular and serves that span from de-stressing, to artistic creation, through scientific observation. Even the creation of these spaces can become a team-building and student-learning experience, designed into curriculum and for project delivery. This article describes the many benefits of learning in the outdoors.

President's Message

This past year has been a busy one for the Global, Environmental & Outdoor Education Council (GEOEC), and it couldn't have happened without all of you teachers coming out and participating in so many of our workshops. Our Outdoor Education liaisons planned a wonderful weekend event, Solstice 2.0, in Calgary, featuring Will Gadd, followed by a day of workshops. Participants left certified in the Outdoor Leadership Winter Overnight module, Project Wild, or learned about the role of social media in nature. It was a great event to bring like-minded individuals together and create community. This year, our goal is to continue creating community by sharing ideas and bringing professional development opportunities to you. Last week, at our annual general meeting, we took time to discuss what is important for members and what we want most to provide for teachers. The Solstice series will continue, so please keep your eyes on our social media for events.

We will be participating at the October conference, "Grounded in Truth, Soaring with Knowledge," hosted by the ATA's FNMIE and Social Studies Councils. We hope to offer off-site excursions for participants and a site visit at the Musée Héritage Museum. The Musée has a lot to offer its visitors in the way of local history, hands-on activities, outdoor environments, buildings and art exhibits. They are able to share about reconciliation, connections to the land and how the relationships of the French, Métis and First Nations intertwined to create what is now St Albert. We hope to have a large presence at the Beginning Teachers' Conference in Edmonton, so if you are new to the field and need fresh ideas, please come and talk with a GEOEC representative. Our executive all love what we do, and we all have a passion for the outdoors, the global impacts of our relationships and how it all affects our planet. We want to help you feel comfortable teaching in those fields, as well as give you many opportunities to enhance your practice. Please keep up to date on all of our events by following us on Twitter, Facebook and Instagram, and send us a note with any questions you have or any interest you might have in helping at events. We welcome what you might have to add. I look forward to seeing you all at our events this year.

Breanne Oakie Carriere

Grounded in Truth, Soaring with Knowledge

The Social Studies Council, First Nations Métis & Inuit Education Council in conjunction with GEOEC (Global, Environmental & Outdoor Education Council) bring you the 2018 conference.

Soaring with knowledge

Grounded in truth

October 11 to 13, 2018
River Cree Resort and Casino,
Enoch, Alberta
website: www.rivercreeresort.com/hotel/

Located in Enoch, Alberta, this year's conference experience offers opportunities for professional learning, networking and adventure near our province's capital city.

Sessions will be of interest to any professionals including teachers, support staff, school and district administration, school counsellors, and social workers.

Keynote Speakers

Highlighted sessions include
land-based excursions and cultural experiences

Tzeporah Berman

Adjunct Professor of York University Faculty of Environmental Studies and works as a strategic advisor to First Nations, environmental organizations and philanthropic foundations on climate and energy issues. She is the former codirector of Greenpeace International's Global Climate and Energy Program and cofounder of ForestEthics.

Laura Grizzlypaws

Traditional singer and dancer who advocates for self-determination through cultural traditions, education, politics, leadership and personal health and wellness. Laura is of St'átèimc descent and she belongs to the people of Xwisten the Bear Clan.

Early Registration June 30/18 $300
Conference Registration: $350
https://goo.gl/qPqZgz

Feature Articles

Adventures of a Lifetime: My Outdoor Education Classroom

Emma Wolfson, Gabbi Bright, Lilly Burns, Lindsay Bracko and Bridget Ashworth

Life sure changes when you get to junior high school. You start to get more homework and more pressures, and the social aspects of your life seem more important than ever. It can be overwhelming and busy at times, but with the Outdoor Education and Outdoor Leadership programs at school, we get to have an escape from some of those tasks. Vincent Massey Junior High School is where all of the outdoor adventures begin, and the programs are offered for all three grades, seventh through ninth. Outdoor Ed at Vincent Massey is an option you can select, while the Outdoor Leadership portion is a club that is a further continuation of what occurs in the class. In the Outdoor programs, we are presented with the opportunity to go on many amazing trips, get away from technology and take our learning beyond the classroom. When we go on outdoor field trips or even just have a class during the day, we can recharge and focus much more clearly afterward because of the joy and fresh air it brings us. Even just a little trip away from reality can benefit us so much. Outdoor Ed and Outdoor Leadership impacts the lives of students on a daily basis by adding to our learning experiences and empowering us. This is a unique opportunity for students, because it is a chance to make new friendships and it allows us to better our school experience. These types of programs have shaped so many people's years in junior high, and as young adults it is a very valuable thing to have on a daily basis.

The community aspect of these programs is a huge part in the success and growth of the students who participate. The Outdoor Leadership program at Vincent Massey is way more than just a club that goes on trips. It is a family of previous, present and future club members that make it the way it is now. Students begin their journey at the end of elementary school, or even earlier than that, if they know someone who is in junior high or already went through the program. This form of word-of-mouth information is how most of the people in Outdoor Leadership joined. The reason for this is that all of us in the program now and the ones who already took part in it, all have a deep passion for the club and want to be involved even if they are no longer going to school at Massey. Most students who join don't quite know just how communal and family oriented it is. They soon discover the importance of

those factors and how much they value the members within the club as well. The overarching value that is instilled when you take part in this program is a sense of family.

Students who first join Outdoor Leadership are totally different people and leaders when they come out the other side in their final year during Grade 9. The main reason for this drastic change in views and responsibility is because of the leadership roles that they must take during their time as a club member. When completing assignments, preparing for trips, going on the actual trips and even debriefing them, a sense of leadership and trust is present during all aspects. You learn skills so that you can be self-sufficient and don't have to rely on others to complete tasks for you. You know how to step up and offer your assistance in any circumstance. This can be anything from setting up a tent when you arrive at camp or even a little gesture like helping fellow peers find the correct classroom for their particular class. All of these things make us push ourselves to become better people in our society and it makes us work hard to maintain trust from the whole Outdoor Leadership group. In Outdoor Leadership we go on many trips and different adult leaders always accompany us. The leaders are role models for us as students, and they are also there for us to implement some of the things they do when being leaders. The club instills the importance of responsibility, trust and leadership into all of the members regardless of their age or experience level.

Not only do the outdoor programs at Massey benefit us in the form of leadership teachings, they also affect our schooling as students. The lessons and even the skills we learn in the programs assist us in our core classes, math, science, social, language arts and gym. We look at maps, follow trail signs, make inferences on situations, exercise, write in journals and do assignments and so many more things that can connect to our schooling. We may not even notice when the connection between experiences in Outdoor Leadership and in our classes occurs. Having the outdoor programs in our lives benefits us so much that we can even improve our knowledge and grades in our core classes. The lessons and hard skills we take in also can apply to us later in life. The program itself runs off of volunteers who donate their time to make the club run as smoothly as it does. We have all spent countless hours cleaning gear, organizing trips or events, and spending our mornings before school having meetings. This type of volunteer work looks great on a resume, and you can come back to the school to be a leader for trips. Overall, the program benefits us as students in more ways than one and will stick with us for the duration of our lives.

The Outdoor Ed and Leadership programs at Vincent Massey are largely formed around the trips that we prepare for and go on. Since the bond between the members of the club is so strong, we are able to go on some longer trips that require more skill-based knowledge and overall trust. Grade 7 students attend skills days that are led by leaders from Mount Royal and by the Grade 9s. This is the first introduction to the whole trip experience within Outdoor Leadership. Later in Grade 8 is when the really skill-based and extensive excursions begin. The Grade 8s go on a hiking trip for 11 days to the Sunshine Coast Trail. They begin preparing for this trip in October and they don't actually go on it till the end of May, beginning of June. All of their early morning meetings, skill lessons, food prep, team building activities and dedication adds up so that they can go on a successful trip. They cook their own meals, set up tents, carry the gear for their individual groups and are required to use their leadership skills to be self-sufficient. There is a lot of trust and responsibility involved with the program, and we can go on these types of trips because of the community we have built. The Grade 9s go on a winter skills camp and then later in the year they build snow caves and stay in them for a couple of days. The trips within the Outdoor Leadership program bond students together as friends, and it strengthens the club with each and every adventure away from the school.

Everything that you want to achieve in life requires hard work and dedication to get there. Outdoor Leadership involves those two factors quite frequently because of the amount of work that has to be put into it. We come early to meetings, do extra projects that aren't for credit and, most important, we put our best effort into all that we do. As a student, being in this program

makes us value hard work, and it teaches us that if we want something we have to work for it. The club also is based around a lot of teamwork and that aspect of it really teaches us some valuable lessons. Empathy, kindness, humility, strength, friendship and trust are just a few of many virtues that will stick with us as students forever. Outdoor Leadership makes us grow as leaders and into better people for society.

Outdoor Leadership is a family. It's a group of incredible people who all share a love for the outdoors. We stick together through thick and thin. We learn from each other on a daily basis. We are a community that tries their best to be leaders in all aspects of life. We all want to learn more about nature and the skills required with that. Outdoor Leadership is an amazing club that brings students together and teaches them to be leaders. We all look forward to the trips, the meetings and even the assignments, because we really do have a deep love for it. Schools around the world should have programs like this because of the way it benefits the students' lives. We all love the program and it's one of the best things we have ever done. Rusty (Mr Rustemeyer), who started the club, always tells us on our way out the door after our morning meetings, "Make today great!" Those words will stick with every student involved and help us realize that we have the ability to make our lives amazing and the environment around us better each day.

Emma Wolfson, Gabbi Bright, Lilly Burns, Lindsay Bracko and Bridget Ashworth are Grade 9 students of the Vincent Massey Outdoor Leadership Class of 2018.

The Value of Reflection

Court Rustemeyer

> *Experience in itself is neither productive nor unproductive, it is how you reflect on it that makes it significant or not significant.*
>
> —Gavin Bolton, *Towards a Theory of Drama Education,* 1979

In many societies, people are not taught to be reflective learners. Adults are bombarded with endless items on their to-do lists. Children and students are programmed in 50-minute increments throughout their school days, followed by structured activities after school and homework in the evening. How often do people just sit down under a tree and rest, refresh, reflect, think, draw or journal? Background noise, schedules and other factors that pretty much consume all of our waking hours leave very little time for what we call the luxury of reflection.

Our goal as educators then is to swim against the current, to take participants and group members that live in a world with no time for reflection and help them find the time. To help them *make* the time. This is not just so we can check it off our to-do list.

The Experiential Learning Cycle (Kolb 1984) proposes that after activity comes reflection, followed by application of the new information we have learned. The complete cycle is required for learning to take place. Unfortunately, some educators interrupt the model after the activity segment and then are surprised when students fail to retain the information presented.

Processing helps learners make connections between their educational experiences, real life and future learning. It helps learners realize that they can apply the lessons they learn and skills they use in a "contrived environment," such as a classroom or challenge course to real life issues (resolve conflict with friends, coworkers or others).

Processing helps create the purpose, meaning and focus of an activity as it helps learners take advantage of teachable moments.

Why is the reflective side of experiential education often skipped in education programming?

Why is reflecting, debriefing and postactivity discussions one of the most challenging aspects of leadership for facilitators?

Processing is not the norm in many educational settings. It requires that the facilitator give up some power, giving control of learning directions to the participants, who are the main focus of the experience.

The destination might change, which is the value of what we do—helping individuals and groups create meaningful learning experiences that will enrich their lives.

The Art of Reflection

Facilitator Tips and Style Notes

- Allowing group members to pass during processing discussions empowers participants to have control over their learning and practise reflective feedback at their own pace.
  - Participants can experience valuable reflection even if they do not share it with the group. When they are given the power to pass, they learn to trust the facilitator and group and often end up offering a great deal to the group at their own pace.
- Creating a safe and positive learning environment is key. It is always risky for people to share their ideas, reactions and opinions in any environment where they feel exposed or unsafe. Creating behavioural norms regarding comments and judgments during group activities and discussions

increases the amount of sharing and interactions and enhances the depth of reflection.

- Start small. Begin with simple conversational prompts, such as one-word quotes or phrases that lead into more in-depth discussions. Reflection is an art that needs to be practised by both the learner and the facilitator.
- Allow for some superficial answers and comments during reflection activities. This is practice. Give it time. They might start with surface-level comments and observations! Groups will increase their level of sharing and reflection as they develop through continued participation.
- Silence is OK and even necessary. Allow time for group members to think and formulate their ideas.
- Be prepared for the group to take reflection somewhere different than you had in mind. You, too, might learn something new.
- Mix up your methods. Novelty and the use of different learning tools and methods also facilitate learning.
- Processing can happen at any time—not just after an activity is over.
    - Sometimes a group will experience a pivotal teachable moment in the middle of a problem-solving initiative. Immediate feedback and reflection can be valuable.
- Treat debriefing activities as an initiative in itself.
- Take time to reflect yourself. Reflecting on your own practice as a facilitator enhances your learning about what works and what does not.
    - Reflecting helps to see the long-term benefits of your program.
- Use your creativity; use activities you already know as reflective tools. Icebreaker activities can be used to process an experience.
- The facilitator does not have to hear it for it to be quality reflection. Try activities that do not involve the facilitator by dividing the group into smaller reflection groups, or allow the group to "self-process."
- Allow for individual reflection and group consensus activities to reach different learning styles.
    - Take a risk. Experiment. Allow for the chance that an activity might flop.
    - There is always something to be learned. Some effective debriefing tools have been created purely by accident.
- Let participants know *why* they are reflecting. Talk about the value of reflective practice. Be honest and open with them.
- In group discussions use open-ended questions. Summarize or restate what was said or, even better, have a group member restate the discussion.
- Leave time for processing. Be patient.
- Allow closure at the end of the program.
- Keep a facilitator journal of all your groups and your learning progress.
- Process yourself!

Resources

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The Wonder of Bees

Diana Daunheimer

Ask any student to name a flying insect, and the magical honeybee will likely be the first answer. Bees are the most identifiable pollinators on the planet. The common honeybee (*Apis mellifera*) is a complex and amazing creature. Existing for over 20 million years, virtually unchanged by evolution, honeybees are considered a superorganism, which is a collective of eusocial animals or insects. The bee can only survive as part of the highly organized and social unit of a colony and cannot exist as a solitary organism.

Honey is the only food product insects produce that humans eat, and bees are the only insects that we employ and rely on for commercial pollination of agricultural crops, making our relationship with bees even more exceptional. Nearly 90 per cent of the earth's plant species and over 30 per cent of all cultivated crops require cross-pollination to survive. Without the assistance of pollinating bees, our food sources would be critically affected and the natural environment forever altered. One out of every three bites of food we eat is thanks to the pollinating activities of the hardworking honeybee.

Not only do bees provide us with their essential pollination services, their colonies produce honey, wax, pollen, propolis and royal jelly for our consumption and use. Raw goods harvested from beehives are often transformed into a range of value-added products, from candles to mead (the oldest known alcoholic beverage made from fermented honey) and are even used in medical applications.

According to the *2017 Alberta Provincial Apiculturist Annual Report*, our province has 1,591 registered beekeepers, tending to 315,128 colonies. The average yield of honey from each colony is 130

pounds/59.0 kilograms. This totalled an impressive 40.2 million pounds/18.2 million kilograms of honey produced in the province last year, making Alberta the number one producer of honey in Canada and ranks us fifth in the world.

Winter mortality of bee colonies in the province during last season was 28.8 per cent, the highest winter hive loss reported in the last five years. This was largely due to the coldest April on record in the last 20 years. When spring temperatures are seasonally cold, this chills the brood (eggs, larva and pupa in the hive) causing the hive to fail.

Imagine if 30 per cent of Alberta's cattle perished each winter, this would be cause for concern. Now consider how much more fundamentally crucial pollinating bees are to our overall food production and natural environment than cattle. It stands to reason that we need more careful consideration and enhanced policies and practices to guarantee the viability of beekeepers in the province.

Poor weather conditions are a contributing factor to colony failures in Alberta, but several other dynamics and the combinations thereof are affecting bee populations worldwide. Numerous pests and pathogens, most notably Varroa mites and *Nosema apis* parasites, adversely affect bee colonies. These impediments weaken colonies and contribute to hive mortality.

Additionally, conventional agricultural practices, such as mono-cropping and the increased use of pesticides and insecticides, affect the lifecycle of all pollinating insects, particularly honeybees. For instance, canola just recently became the most seeded crop in Canada, unseating wheat for the most acreage planted in our nation. However, almost all canola seed is treated with neonicotinoid insecticides (NNIs). NNIs are systemic, neurotoxic pesticides, designed to be taken up by all parts of the plant, including the roots, stems, leaves, flowers, pollen and nectar. Certain NNIs have been proven extremely toxic to honeybees. Imidacloprid, the most commonly used NNI, is so inherently toxic to bees that insects perish from paralysis, just by flying through the residue-contaminated dust generated from crop seeding.

In 2013, the Commission of the European Union (2017) severely restricted the use of certain NNIs to protect honeybees. Unfortunately, despite the known effects to flying and aquatic insects, the Pest Management Regulatory Agency of Health Canada is still conducting a scientific review and assessment of numerous NNIs.

As soon as the weather warms in spring, bees need a constant supply of flowering forages to survive. In native areas, dozens of varieties of plants have naturally staggered bloom times to provide sustenance for pollinators. However, significant areas of our natural spaces are being replaced by developments, landscaping and agricultural crops, which provide little to no forage opportunities for pollinating insects.

Environmental and nutritional stressors, pesticide use, along with various pathogens and pests are all factors in declining pollinator populations, but we can support and help sustain vital bee populations in many ways. Considering how vital and unique bees are to our food system and the environment, we must make concerted efforts to protect their sustainability and survival.

Planting gardens or containers with bee-friendly plants is an easy contribution, but it remains imperative to avoid using treated seeds and starter plants. Most

garden retailers will disclose on the labels of seedlings if the plant has been treated with NNIs.

For teachers and students who would like to take their curriculum content further, several interesting opportunities are available to experience beekeeping and colonies first-hand.

Chinook Honey, near Okotoks, Alberta, has interactive tours, complete with observation hives, where staff tailor the tour information for the grade level curriculum (www.chinookhoney.com).

The Edmonton Valley Zoo provides tours through the 100 Voices Program, which includes observing a hive and pollinator gardens on the grounds. The Northlands Youth Beekeeping Club offers a rare opportunity for next generation beekeepers, where participants spend time each week from spring to fall,

tending 10 urban hives, while learning all the essentials of operating an apiary. Dustin Bajer with Northlands Edmonton is an excellent resource for all the programs mentioned, including in-house presentations to schools. He can be reached at 780-235-0223.

Fascinating Facts About Bees and Honey

1. Honey is the only food that contains all the essential substances to sustain life, including vitamins, minerals, enzymes, water and the antioxidant, pinocembrin, which improves brain function. Honey is also the only food on the planet that does not spoil. Two thousand-year-old edible honey was discovered in King Tut's tomb.
2. The buzz of an approaching honeybee is created by the incredible speed of their wings, which move at over 200 beats per second. Honeybees can fly at a speed of 25 kilometres an hour and will often travel over 5 kilometres from the hive to forage. To produce just one pound of honey, a hive will collectively fly the equivalent of three times around the globe in search of nectar.
3. Male bees are called drones and aside from mating with queen bees in spring, they serve no other purpose in the hive. Drones have no stingers and do not even feed themselves. In the fall, female worker bees remove all the drones from the hive, where they will perish in the cold.
4. Bees use a waggle dance in the hive to communicate the location and distance of food sources, and they navigate using the sun.
5. Bees do not hibernate in winter. Instead, they cluster in the hive and perform thoracic crunches to create heat, maintaining the internal temperature of the hive at about 32 to 35 degrees Celsius, regardless of the outside temperature. In the summer, if the weather is too hot, bees will use their wings in a back-fanning motion to cool the hive.
6. Bees have four wings and five eyes, and they never sleep.
7. Honeycomb is often revered for its geometry, efficiency and strength. Worker bees secrete wax scales from their abdomen, which they gather, chew and then form into comb. The colour of honeycomb changes with time. New comb is nearly white while comb that is years old has almost a black appearance. This is largely due to the propolis (the sticky resin bees collect from budding trees and bushes) that accumulates and alters the appearance of the comb.

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The Climate and Environment Student Action (Student Action Challenge) is back for the 2018/19 school year, and it's up to you to take action!

Students from kindergarten to Grade 12 in Alberta can apply for up to $1,000 to make their environmental action projects a reality. Alberta Environment and Parks will award up to $10,000 in funding to support successful applicants' environmental action projects.

The Student Action Challenge asks Alberta students in kindergarten to Grade 12 to develop initiatives or projects that promote healthy environments and ecosystems or reduce carbon emissions. The program encourages stewardship in Alberta youth as they gain hands-on experience tackling environmental issues that directly impacts them, their schools or their communities. Plan a project for the school year, make it happen and share your results with Alberta.

For more information or to apply for a grant visit http://aep.alberta.ca/about-us/education-resources/student-action-challenge.aspx.

The deadline to apply is October 31, 2018, at 4:30 PM.

Reconnecting High School Students to the Power and Grace of Nature

Warren Lake

Not too long ago, a student told me that a lot of beauty can be found in this world just by looking up to see it. As it turns out some of my best teachers have been my students—and the natural world that surrounds us both. Thomas King said, "If we change the stories we live by, quite often we change our lives." The idea I would like to share with you in this brief article is about changing our stories and introducing high school students to new connections in the world around them. As it turns out, these connections are more important then ever.

I had the privilege of starting my teaching career at Canmore Collegiate High School in the Canadian Rockies and stayed for 18 years before I was offered an opportunity to help open a new high school—Robert Thirsk High School in Calgary, Alberta—and this is where I have hung my hat for the past five years. The hook that brought me in from Canmore was the possibility of creating a new natural science program that did not exist at the high school level. As it turns out, the timing was excellent, as there is a lot of cool work to be done, and being done, in this area. The program started as an experiment in 2013 with one small class of Grade 10s offering five credits in Natural Science and has now grown to five classes running

from Grades 10–12 and offering 15 Natural Science credits.

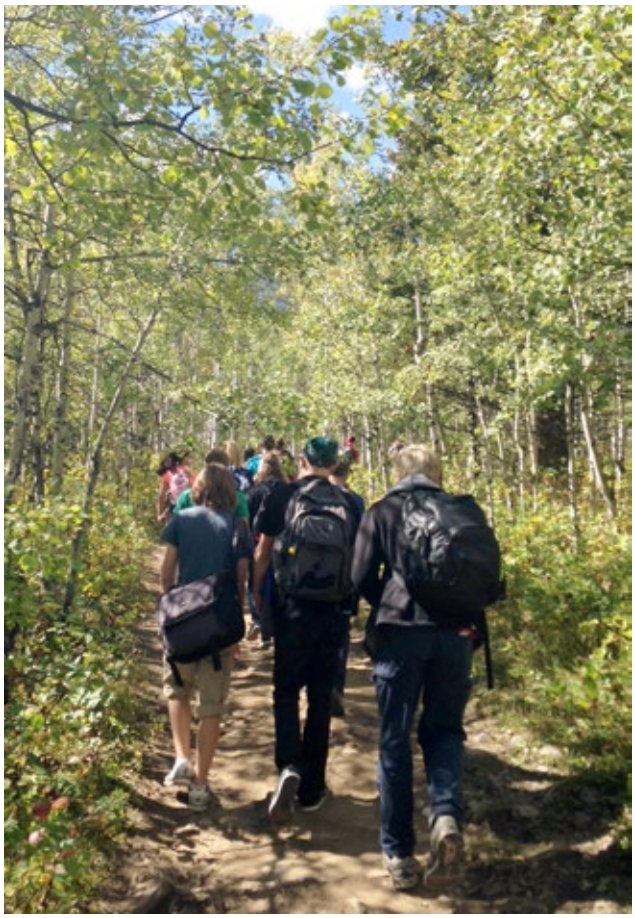
There is a movement afoot to focus more time and energy on the importance and necessity of better environmental education for all children in an effort to increase the levels of nature literacy in the next generation. Why is this important? We expect this generation of kids to solve many of the issues that are in front of us today. How can we expect them to do this if they are not invested in the natural world? When a lot of competing values, interests and demands are placed in front of these kids, how do you get nature to take a front seat?

One way is to engender a sense of gratitude for nature, in nature, with students. I have always known that the power of a simple thank you goes a long way in this world. The idea of gratitude can be timeless if you let it, and it has tremendous power to reconnect people to not only nature but also to their sense of place and purpose with the people around them. I have used this concept of gratitude to get kids to reflect on the world around them, and continue to build the concept into daily practice when outside and when writing in their nature journals that I will discuss later. If the kids can find a genuine sense of gratitude and thankfulness for the natural world around them, it puts nature back in the front seat.

What is important is that children have an opportunity to bond with the natural world, to learn to love it before being asked to heal its wounds.

—Jon Young

It seems to be the case that a few good books or articles always seem to underlie the design or development of a new idea, or in this case, a new Natural Science program at the Grades 10–12 level. One concept I remember running across was the term *nature deficit*, in Richard Louv's (2008) work, *Last Child in the Woods*. I was introduced to this idea when I was teaching in the Rockies, but it didn't really resonate, as I sat in my office, looking at the Three Sisters. Since coming back to Calgary, I have used this idea as the guiding principle for reconnection with high school students. I see the reconnection piece as having three major components: nature literacy, exposure to nature in nature and building always on the concept of wellness. While Louv's work set the context for the importance of reconnecting kids, the real work began when I was introduced to the work of Jon Young, Ellen Haas and Evan McGown (2010) in the *Coyote's Guide to Connecting with Nature* at a conference in Canmore, where I was introduced to an afterschool nature program. The authors discuss the concept of the core routines of nature connection, and I have begun the process of finding ways to incorporate some of them at the high school level; some fit better or can be altered more freely to allow for the difference in high school maturity levels. Three core routines I have tried to build into the program at Robert Thirsk are sit spot, story telling and nature journalling.



Using these ideas, the reconnection process, at least in my eyes, involves three key pieces: (1) bring it in, (2) get them out and (3) take them away.

The idea of bringing nature into the classroom involves many aspects. Foremost among them is the building of a strong sense of environmental literacy so that conversation can occur regularly within the classroom walls. Talk about all environmental issues and solutions, but tie them back to the most important tenet to develop—the responsibility to develop a sense of stewardship. Couple this by introducing the idea of the dreamer and let kids see what people are doing in the natural world. Always find ways to give kids the voice to discover their own interests. Finally, develop a space that really explores the concept of wellness in nature.

Another facet to connection is what I refer to as hands in the dirt. We have created many opportunities within the classroom for students to grow their own plants and food that they can eat. Nothing is more satisfying for me when kids remark at how they did it—they didn't kill it—or their amazement when they eat what they grow. The creation of learning gardens and the use of tower gardens and grow racks to introduce kids to microgreens has been the entry point to this work in the classroom. Some students just remark on how the green in the classroom or the smell of the cedar benches after watering or the smell of the soil makes them feel better. The wellness effects of bringing nature into the classroom have been very evident given the high levels of stress carried at times within the high school building.

Once you have a little bit of nature culture within your building, the effort shifts to building more capacity, pushing beyond the boundaries of the classroom and finding ways to get high school kids out into nature. The first project was to expand the nature classroom outward by increasing our growing capacity onto the roof. The students have helped to develop 40 elevated box gardens, create a wellness space and are working on bringing a greenhouse on the roof in the near future.

Getting outside allows a further development of some of the core routines alluded to earlier, which become important when kids get outside and in touch with nature. The routine of sit spot and the idea of being still and quiet are incredibly important. Students go outside to a green space, park or trail; find a spot separate from others; and simply sit and reflect on their surroundings with no use of technology or voice—just be still for a moment. They then get to reflect in their nature journals. The nature journals have been evolving over the last four years. The gratitude piece we started with is one way that we have practised reflection in these journals. The idea is to get the kids to find a way to reflect on their new knowledge and experiences, and turn this into a habit that becomes impossible to neglect. The kids are filling them with photos, objects and poetry. The hope is that students will use the journal both within and beyond the classroom.

The last piece of the puzzle is to take them away and expose them to new places and new pieces of nature. To be really connected, the kids must see as much of the natural world as we can show them using the Internet and documentaries and taking them for walks

in the community and especially into natural areas (which may require distance travel). We call these trips opportunities to bathe in nature. We have established hikes to Kananaskis, Banff, Lake Louise and Jasper as a part of the program. From Grade 10 to 12, the kids work their way up the Rockies and get an appreciation for a piece of nature in their backyard.

Use other opportunities that you can bring to bear to establish trips that will show them new pieces of their world. When I was a kid in high school, I had the opportunity to experience nature at the Bamfield Marine Sciences Centre. I established a program for this trip during my time in Canmore and have carried it with me to Robert Thirsk. This experience stuck with me as a teen, and now I get to share this remarkable place with a new generation of students. Students are immersed for seven days in marine and temperate rainforest ecology, and in many cases, this kind of adventure can be life changing. We are now looking at taking the first group of students to the Yukon in 2019 to expose them to yet another piece of nature that few would seldom visit.

So to bring this conversation full circle, the program that has been established at Robert Thirsk High School is a very dynamic piece of work that puts students front and centre and develops with their help and presence. The trick in reconnecting students to nature is to be open to opportunities that bring back the awe and wonder into their lives. I am beginning to look at nature as a replacement dopamine trigger for some of the distractions placed in students' paths in this generation. This reconnection to nature for high school kids is very much a work in process but relies on the following thoughts:

- If we want kids to save, shape, fix or guide the future of the natural world, they have to be invested in it, and we need to give them pathways that allow them to find their passion and spirit for this work. Discussions, walks, hands in the dirt.
- We need to let them see the power of dreamers and that true power can be realized when a little nature is allowed into your life. Trust me when I say that this is no easy sell to high school students—they are a discerning lot.
- It all comes down to giving them the opportunity to find their passions in the natural world by bringing it to them, getting them out into it and taking them away to find it.

This journey has many different paths to follow, and I wish you the best on the ones that you choose. Thank you to the guides who have opened up so many pathways for me—you know who you are!

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This article is based on a February TEDx Talk in Edmonton (www.youtube.com/watch?v=uJejydhAyms).

Warren Lake is a biology and natural science teacher at Robert Thirsk High School in Calgary.

Planting the Seed: Helping Students Find a Career in the Alberta Forest Sector

Carly Peters

Ideas are like tiny seeds—plant them, provide them the required necessities and they'll grow. For over six years, the Alberta Forest Products Association has been giving Alberta students the insight and tools to grow their career in forestry.

The association's Work Wild program informs youth and job seekers about the diversity of employment opportunities in forestry and the benefits of working in this sustainable sector. With 60 per cent of Alberta being covered in forest, and longterm forest management plans going up to 200 years in the future, the career opportunities are as vast as the treeline.

Ann Normand, program manager for Work Wild, says while they used to have to reach out to schools in order to showcase this exciting sector, they're now fielding calls for their in-class presentations.

"We're seeing a lot more teachers coming to us because they want students to see the variety of career paths out there," she explains. "There has been a shift in the schools. Teachers and counsellors seem to be informing students about opportunities in the skilled trades more than they were a few years ago."

While the forest sector does boast some interesting skilled trades options, there are also many other facets to the sector—a key point brought up in Work Wild's 45-to-80-minute school presentations. Targeted at Grades 6 to 12, the free sessions are presented by forestry educators who will cover the variety of opportunities for students in forestry, including training programs, scholarships and jobs. Students will also come out of the presentation with a better understanding of sustainable forestry practices.

"Careers in the forest sector can range from environmental sciences to engineering to industrial nurses," explains Normand, adding that there are roughly 19,000 Albertans employed in the sector, and as the baby boomers are retiring there will be opportunities to move into the field and move up the ladder.

Along with class presentations, the Work Wild program offers curriculum-supporting material and interactive resources for the classroom, such as lesson plans that allow students to examine an interactive

map of the forest, and consider numerous factors including wildlife, bodies of water, recreation and logging.

Normand adds they've recently developed three new videos for the classroom on the importance of forestry in Alberta. Additional material can also be found at workwild.ca where students can take a career quiz, read job profiles, learn about scholarships and browse job postings.

Along with in-class resources, Work Wild offers information on some great hands-on opportunities for high school students. The Junior Forest Rangers (JFR) program is a summer job perfect for students who love the outdoors and want to get some work experience. JFR crew experiences can range from thinning trees in order to reduce the threat of wildfire, constructing trails, planting trees to engaging in wildfire management scenarios. JFRs also receive training in bear awareness, radio operations, first aid and CPR, and wildfire orientation. Some of these skills can be applied toward high school credit.

While a love of nature and the outdoors is ideal for both the JFR program and a career in forestry, it's not a prerequisite.

"The quality you need to work in the forest sector is an open mind," concludes Normand. "There are a lot of options and career paths; it's not just about planting trees outside. There's so much more to explore."

Something worth noting that is new for the Work Wild program is that we are now providing curriculum-supporting lesson plans for the Grade 6 Trees and Forests unit, CALM 20, and CTS Forestry. We also provide forestry careers presentations in Grade 6–12 classes (with an option to go outside for hands-on forest-related activities).

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Understanding Hydraulic Fracturing in Alberta

Diana Daunheimer

Hydraulic fracturing, or fracking, is an industrial process used to extract oil and gas resources embedded within impermeable hydrocarbon-bearing formations. For over a decade, fracking has been a necessary stage in the production of oil and gas, and nearly every new well licensed for drilling in Alberta must be hydraulically fractured to produce any marketable hydrocarbons.

After over a century of accessible and inexpensive conventional fossil fuel extraction in the province, these resources are exhausted. In response, industry developed and broadly implemented fracturing techniques, which facilitate the release of hydrocarbons tightly embedded into shale, carbonate, sandstone and other unconventional geologic formations. The process has transformed and disrupted the supply and demand dynamics of the oil markets.

Although technically complex and varied, fundamentally, hydraulic fracturing involves multistaged, intensely pressured injections of high volumes of fluids and/or gases, which generate enough force to fracture and fissure a normally stable geologic formation in the earth's crust. These induced fracture propagations create permeability in the hydrocarbon-bearing zone so that fossil fuel products can be produced. Fracture fluids often contain proppants, such as crystalline silica or ceramic beads, to ensure fractures remain propped open, allowing for the migration of formation products from the target zone.

By its very nature, hydraulic fracturing is a series of induced microseismic events, which are often monitored at the surface with seismic testing to determine the success, position and length of resulting fracture propagations. On January 12, 2016, a Repsol fracture event induced an unintended 4.8 earthquake near Fox Creek, Alberta. Over 900 more induced events are on record at the Alberta Energy Regulator (AER) (in partnership with the Alberta Geological Society), generated from a pilot monitoring program in the Fox Creek region (AER, nd). Fracking is such a powerful industrial process that each time it is performed, a series of anthropomorphic earthquakes occurs. In addition, the common practice of injecting high volumes of fracturing wastes and produced waters into disposal wells causes induced seismic events.

Prior to fracturing, a resource well must first be drilled, cased and cemented into a hydrocarbon-bearing formation. Depths of well bores in Alberta range from less than 100 metres below surface to over 4,000 metres deep. Fracture events are permitted within the Base of Groundwater Protection in Alberta, commonly with coal bed methane wells. Resource wells also vary in direction and can be drilled vertically, horizontally, directionally, deviated or slanted, into varying and, at times, multiple hydrocarbon zones. Often, fracking is inaccurately categorized as only being employed on very deep, horizontal industry wells when in practice, fracking has occurred in Alberta at all depths and directions in which hydrocarbon resources are in place.

If a well is drilled horizontally into a target formation, that lateral section can range from 500 metres to upward of 10 kilometres. Industry has been pushing the limits of technology to drill deeper and longer wells to increase initial production and mitigate steep decline rates of declining production, a customary rollercoaster of fracked well dynamics.

After the drilling rig is released, a new crew and equipment will complete the well by perforating holes in the formation, hydraulically fracturing the well, well testing—which involves the flow-back of fracture fluid and flaring or incinerating waste gases—and pressure testing the well for production. If the well produces commercial volumes of hydrocarbons after fracturing operations, equipment will be installed to produce the well.

Resource wells commonly produce a combination of raw formation gas, natural gas liquids, crude oils, condensate and produced waters.

Since formation pressures are very low on these wells, systems of compressor stations, pump jacks and hydraulic lifts are needed to pull formation products to the surface and push them along to one of nearly 800 processing plants in the province, where contaminants such as hydrogen sulfide (H_2S) must be removed prior to use in market.

Regulating Hydraulic Fracturing

The AER governs all fossil fuel activities in the province. The AER came into force in 2013, under the *Responsible Energy Development Act* (*REDA*) (AER 2013a). The AER operates as a corporation that is 100 per cent industry funded. Under *REDA*, the AER is not an agent of the Crown or beholden to the *Public Service Act* and has immunity from any legal action. When legislative changes were made in 2013, the public interest mandate of the regulator, which previously existed under the Energy Resources and Conservation Board, was removed. The AER operates with no public health mandate.

The AER enforces the *Water Act, Public Lands Act, Environmental Enhancement and Protection Act* and sections of the *Mines and Minerals Act*, with respect to all hydrocarbon resource extraction in the province. Along with these legislations, numerous other statutes and directives govern the oil and gas industry in Alberta. The AER is mandated to implement, inspect and enforce regulations to ensure that licensed companies operate compliantly and all energy infrastructure is decommissioned and reclaimed properly.

The AER employs over 1,200 people. Approximately 70 are inspectors, who must manage 167,000 operational wells, 83,000 inactive wells, 4,965 orphaned assets, 431,000 kilometres of pipelines and more than 700 gas plants and processing facilities as well as significant infrastructure related to bitumen and coal operations (AER, nd).

Concerns have been expressed that the AER operates in a conflict of interest with a mandate to both regulate and promote an industry on which it is entirely fiscally dependent. Additional challenges of the AER include increasing reclamation liabilities, which are estimated at $30 billion, lack of compliance and enforcement, inadequate incident and emergency response, and incomplete environmental and public health monitoring.

Fracturing and Water Use

The AER directive that pertains to protecting water wells is limited, only stating that hydraulic-fracturing events are not permitted within 200 metres of a water well, and the licensee's operations must not have an adverse effect on water well quantity or quality (AER 2013b). However, no directives exist to address surface or groundwater contamination and no baseline testing guidelines for water wells have been established for fracturing operations. Appropriate testing is impossible for water well owners when the AER does not enforce disclosure of all drilling and fracturing chemicals prior to operations.

Companies are required to submit fracture fluid disclosures to the Frac Focus Canadian Registry, one month after completion of the hydraulic fracturing operation (BC Oil and Gas Commission nd). Requirements still permit nondisclosure of chemicals with trade secret or other confidential submissions. Prior to 2013, fracture fluid disclosures were not mandated.

You will often hear or read that fracture fluids are 99 per cent water, sand and some chemicals, most of which are harmless. Based on actual fracture disclosures, this is not true. In fact, thousands of fracture events in Alberta used no water at all. Instead, a mixture of hydrocarbons-kerosene, diesel fuels, benzene, xylene and other toxic compounds were the fluids used to fracture formations (BC Oil and Gas Commission 2013). There are also operations that used gelled propane or nitrogen gas for completions. In a typical gel or slick water fracture, water is the primary component at 50–80 per cent, 10–20 per cent is proppant, and the remainder is usually a mix of hazardous and nonhazardous compounds, such as biocides, surfactants and corrosion inhibitors. Fracture fluids are further contaminated by additional chemicals such as breakers, used to return fluids to surface, and

compounds from the target formation such as produced water, heavy metals and hydrocarbons.

Canadian Drinking Water Guidelines fail to set limits for many of the contaminants used and produced by oil and gas operations, including methane, gasoline and other petroleum derivatives (Government of Canada 2016). Proper legislation, guidelines and comprehensive water testing and monitoring for the protection of nonsaline water resources are currently absent from federal and provincial policies.

Unconventional resource extraction is water intensive. The average well bore uses 15 million litres of water for drilling and fracturing operations. Returned fracture fluids are often disposed of into deep injection wells, removing trillions of litres of water each year from the hydrologic cycle. Only 6 per cent of fresh water used in fracking is recycled, largely because of the significant levels of adverse pollutants present in fracture flow-back (AER 2016a, 2016b). In general, 50–80 per cent of fracture fluids injected into formations are returned to surface; however, thousands of wells across the province failed to return any fracture fluids and these unsuccessful wells are abandoned.

From June 2013 to March 2018, the AER have issued 19,029 total diversion licenses of fresh water for commercial resource activities. About 300 applications for large volume water withdraws are approved each month (AER 2018).

Water contamination resulting from fracking operations could be considered the most prevalent concern expressed by landowners and environmental organizations. Fracturing events have caused water contamination in Alberta; however, most information is not publicly available because of nondisclosure clauses in surface lease agreements with landowners, and the confidential processes in place with AER Advanced Dispute Resolution and legal proceedings (EPA 2016).

Water contamination can occur from any number of stages of exploration and production of unconventional resources and include casing failure, lost circulation events, fluid migration, spills and releases, and well communications. Fracking is so pressure intensive that fracture events can communicate with other adjacent infrastructure, abandoned wells and natural faults, or fracture propagations can travel much farther than anticipated, reaching into fresh water zones.

Fracking and Air Quality

The Alberta Ambient Air Quality Objectives (AAAQO) establishes some 50 priority pollutant parameters, identified to manage air quality, for the protection of public and environmental health (AEP 2017). The AAAQO were developed under the EPEA; therefore, regarding resource extraction, the AER is responsible for executing air quality regulations for the energy industry.

Exploration and production of unconventional resources is highly emissions intensive. A varying range and significant volume of priority pollutants are released during drilling, fracturing, well testing, producing, processing and transmission of oil and gas resources in the province. Further emissions are generated by gas migration, surface casing vent flows and fugitive emissions from well sites and facilities. Within the 2016 Upstream Petroleum Industry Flaring and Venting statistical report, the AER reported a known 18,191 well sites with surface casing vent flows or gas migration, in which formation products are escaping to the environment (AER 2016d). Nearly 7 per cent of all active and inactive well sites in Alberta are leaking uncontrollably. The AER recently identified numerous compromised well bores in urban areas, in which the concentration of gases released pose a serious risk to public health. The AER has not investigated the risk of well sites with unmitigated releases in rural areas.

Provincial legislation generally requires only dispersion modelling or the prediction of endpoints for source emissions from industrial operations. Comprehensive testing of industrial emissions is very seldom performed. Despite AER directives mandating that oil and gas operations must not exceed AAAQO guidelines, the AER does not enforce inclusive on- and off-site testing for well site and facility operations.

Normally, testing and monitoring done in the industry relates to only two parameters, hydrogen sulphide (H_2S) and sulphur dioxide (SO_2) the byproduct of combusting H_2S. Both compounds are very hazardous to

public health and SO_2 is the chemical in the compound responsible for acid rain. There is no air quality station operating in the province that monitors the full compliment of AAAQO guidelines.

Airshed groups in Alberta are almost exclusively funded by the oil and gas industry. About one quadrillion litres of fossil fuel emissions are reported released into Alberta each year, and proper monitoring and testing to ensure guidelines to protect health are not exceeded does not occur. Additionally, it has been recently determined by independent studies, that oil and gas emissions in the province are under-reported (Carleton University 2017).

Fracking, Land Use and Property Rights

Albertans have no right to refuse oil and gas operation on their land. Right of entry legislation mandates resources can be exploited by companies through orders issued by the Surface Rights Board (nd). Landowners sign agreements with oil and gas companies and are fairly compensated for leasing their property for operations.

Residents and landowners can expect numerous adverse effects during exploration and production activities, including exposure to intense noise, light, vibration, traffic and emissions pollution.

It is standard for industry to dispose of drilling wastes on nearby land or the lease site as well as draw water for operations from local water sources. Liquid drilling wastes are land-sprayed and solids, such as cement returns and horizontal cuttings, are mixed, buried and covered on lease sites. Drilling wastes are only subject to minimal testing prior to disposal and endpoints of contaminants are predicted. From industry records, just three wells sites near Didsbury, Alberta, generated 975 million litres of drilling waste, which was disposed of onto local agricultural land.

Follow-up testing to confirm compliance of disposed wastes is uncommon, unless there is an obvious contamination event. Land use conflicts, property rights, inadequate reclamation activities, failure of lease payments and livestock, and environmental impacts are current difficulties encountered by landowners in Alberta with respect to resource extraction.

Trends and Future Considerations

Beginning in 2015, the AER has implemented a play-based regulatory approach to energy applications. Formerly, one application was submitted per well site or facility. New lifetime applications permit companies to submit one application for whole resource formations, spanning entire municipal districts, including all aspects of operations, from the infrastructure, water, land and consultations required, waste and emissions generated for potentially hundreds of resource wells, to the reclamation of the project, decades in the future. There are currently seven such applications before the AER and several are approved and operating. This was a very bold move by the AER to de-regulate the industry.

Furthermore, in February 2018, the AER and Alberta Environment and Parks (AEP) announced a directive that provides industry greater flexibility regarding water licensing and withdrawal for hydraulic fracturing operations, most notably, increasing the validity of an approval from one year to ten years (AEP 2018).

The Climate Leadership Plan (CLP) of the New Democratic Party in Alberta anticipates that 70 per cent of the electricity retired from coal generation will be replaced with natural gas extracted with hydraulic fracturing techniques. Natural gas is frequently referred to as "clean," as is the case in the CLP (Alberta Government nd). This statement is only correct when referencing the combustion efficiency of the processed natural gas we consume commercially in our homes and businesses. When the entire life cycle of unconventional natural gas products is considered, from exploration, production, processing, storage and transmission, fossil fuel natural gas cannot reasonably be considered clean, healthy, efficient, inexpensive or without significant adverse effects to both our environment and public health.

Industry developments and provincial policy considerations indicate a continuing and increasing reliance on unconventional resource extraction in Alberta, resulting in amplified public health and environmental risks. The Citation Database on Shale and Tight Gas Development, from the Physicians, Scientists and Engineers for Healthy

Energy, now hosts over 1,487 studies and reports on the impacts of fracking, yet the provincial regulator and governance have failed to mandate and enforce comprehensive public and environmental health protections (PSE, nd).

Hydraulic fracturing is a very disruptive practice, occurring across the province. Accurate information on the process and impacts of hydraulic fracturing are needed to facilitate increased environmental and energy awareness for students. Moreover, oil and gas companies should not be given the opportunity to influence curriculum in Alberta since their input tends to be more propaganda than education. Greater provincial oversight and regulatory reforms for industry are much needed at this time to protect and preserve the quality of life and land for all Albertans.

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The views and opinions expressed in this article are those of the author and do not reflect those of the Alberta Teachers' Association.

Global, Environmental & Outdoor Education Council

Mission Statement
To promote involvement in quality global, environmental and outdoor education

Objectives
- To provide a vehicle for Alberta teachers for professional development and communication in global, environmental and outdoor education
- To study and make professional recommendations about global, environmental and outdoor education issues
- To network with other provincial organizations that have similar concerns

Membership
- Regular member—Active and Associate members of the Alberta Teachers' Association, as specified in ATA bylaws, are entitled to full privileges of council membership including the rights to vote and to hold office.
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- The GEOEC recognizes the wide range of interests among members and strives to foster the exchange of ideas and provide information and articles relating to the various components of the elementary and secondary curricula through the publication of *Connections*.
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- The annual conference features a blend of activities, indoors and outdoors, ranging from hands-on workshops to social gatherings. All grade levels are represented in sessions. The emphasis is on practical information and application. The annual general meeting of the GEOEC is held in conjunction with the conference.

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Notify the ATA privacy officer immediately of ***any*** incident that involves the loss of or unauthorized use or disclosure of personal information, by calling Barnett House at 780-447-9400 or 1-800-232-7208.

Maggie Shane, the ATA's privacy officer, is your resource for privacy compliance support.

780-447-9429 (direct)
780-699-9311 (cell, available anytime)

The Alberta Teachers' Association

Consent for Collection, Use and Disclosure of Personal Information

Name: _____ (*Please print)*

☐ I am giving consent for myself.

☐ I am giving consent for my child or ward.

Name: _____ *(Please print)*

By signing below, I am consenting to The Alberta Teachers' Association collecting, using and disclosing personal information identifying me or my child or ward (identified above) in print and/or online publications and on websites available to the public, including social media. By way of example, personal information may include, but is not limited to, name, photographs, audio/video recordings, artwork, writings or quotations.

I understand that copies of digital publications may come to be housed on servers outside Canada.

I understand that I may vary or withdraw this consent at any time. I understand that the Association's privacy officer is available to answer any questions I may have regarding the collection, use and disclosure of these audio-visual records. The privacy officer can be reached at 780-447-9429.

Signed: _____

Print name: _____ Today's date: _____

For more information on the ATA's privacy policy, visit www.teachers.ab.ca.

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