ALBERTA WATER REPORT 2015

Challenges | Research | Expertise | Innovation

BRIDGING THE GAP BETWEEN SCIENCE AND BUSINESS
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Water Challenges in Alberta

Pollution

- Sewage
- Agricultural runoff (fertilizers, pesticides)
- Power plant discharges (thermal pollution)
- Industry (chemical pollutants and organic wastes)
- Emerging contaminants (detergents, pharmaceuticals, etc.)
- Fracking
- Acid rain

Climate Change

- High variability and weather extremes
- Floods
- Droughts
- Glacial decline

Consumption

- Agriculture/Irrigation
- Mining
- Manufacturing industries
- Petroleum industries
- Oil sands industry (strip mining and in-situ processes)
- Population growth (urban/rural supply infrastructures)

Canada is home to thousands of rivers, lakes, streams and wetlands, providing the population with water for drinking, growing food, producing energy and sustaining the environment. While estimates indicate that Canada has one fifth of the world’s freshwater, Alberta holds approximately 6.6 percent of the country’s total water wealth. More generally, Alberta’s water situation can be described as one of high variability, shaped by extreme contrasts of environmental events such as floods and droughts. Most of the province’s water is located in the north of Alberta, where large rivers and lakes are abundant. Southern Alberta has considerably fewer lakes and rivers with lower volumes. Groundwater is another major source of freshwater in the province and can be found in abundant aquifers and channel systems below the land surface.

Industrial societies are particularly dependent on large volumes of water for the products that we make and consume every day. Agriculture, manufacturing, and the mining and petroleum industries use massive quantities of fresh water. In the province of Alberta, fresh water, fertile soils, forests, biodiversity, and wildlife have been key to the development of industrial society and to the welfare of humanity. Protecting these precious resources and ensuring that there is healthy water flowing in our lakes and rivers is essential in building resilient environments, communities and economies.
Water Opportunities
Small and Medium-Sized Enterprises (SMEs) as Actors for Sustainability-Driven Innovation

SMEs in Canada
In Canada, small and medium-sized enterprises (SMEs) are defined as businesses with fewer than 500 employees and an income revenue below $50 million. In 2012, SMEs employed about 10 million individuals, or 89.0 percent of the Canadian labour force. They represent the backbone of economic activity, and ensuring that there is a thriving local SME community is vital for growth. Promoting their success can have direct impacts on local income, employment and economic stability. SMEs are also known for their potential as innovators and their ability to adapt quickly to changes and new developments, as compared to larger and more established businesses. The province of Alberta has a particular need for SMEs as the continued focus on oil and gas entails a number of issues that are repeatedly highlighting the need for economic diversification.

SMEs and Water
What do SMEs have to do with water? Scientific research and expertise in the field of water is constantly improving and providing new insights into the various challenges that need to be addressed. However, this knowledge does not always translate into direct action. SMEs can act as trailblazers in turning research into practice through innovation and commercialization by providing environmental solutions, technologies and new opportunities for global eco-industry markets. While SMEs are becoming increasingly known for their potential to stimulate economic growth, they also prove to be key leaders in preventing environmental degradation, biodiversity loss and unsustainable natural resource use. Sustainability-driven innovation also has a substantial economic value as customer demands for healthy and sustainable livelihoods and living spaces are constantly rising. In Europe, for example, high investments in eco-innovative SMEs have lead to increasing exports of environmental solutions, representing higher percentages of total GDP each year.

The growing success of SMEs involved in environmental innovation is also becoming more visible in Alberta. Some of the most successful SMEs that the GCCIR supports under the Alberta-Germany Collaboration Fund for Product Development and Commercialization are operating in fields such as solar energy, emissions monitoring and remediation. The entrepreneurial opportunities for water innovation are equally promising and are receiving more and more attention at national and global levels. Water treatment, monitoring devices, remediation and infrastructure improvements, such as efficient pumping systems and pipelines are only a few of the many areas that entrepreneurs can explore.
Interviews

The GCCIR had the opportunity to speak with seven experts from various professional backgrounds about their work and knowledge on Alberta’s most pressing water challenges. An important aspect of our inquiry was to learn more about specific needs for technology and innovation that could help shape the province’s future. Developing a better understanding of the challenges and proposed solutions through a continuous dialogue with experts allows the GCCIR to grow its capacity as a successful funding organization and supporter of innovation on local and international scales. We would like to share the water research, projects and conversations that are taking place, as they will shape the future of Alberta and constitute an important resource for entrepreneurs, planners and government representatives.
Predicting Alberta's Water Futures (PAWF)

Water Initiative, University of Alberta
Dr. Greg Goss, Professor of Biological Sciences & Principal Investigator of the PAWF project
Dr. Monireh Faramarzi, Lead Investigator of the PAWF project

University of Alberta Water Initiative

The University of Alberta Water Initiative brings together researchers from across campus to participate in multi-disciplinary water projects. Engineering, public health, natural resource economics, law and business, chemistry and geology are only a few of the various disciplines involved in this water related work at the University of Alberta. Funded by grants, donations or sponsored contracts, the initiative provides leadership and research to present innovative solutions for water quality, use and supply.

Predicting Alberta’s Water Futures (PAWF)

Predicting Alberta’s Water Futures (PAWF) is a three year project, funded by Alberta Innovates Energy and Environment Solutions, and is a continuation of a previous AI-EES three-year project entitled Dynamics of Alberta’s Water Resources. Dr. Faramarzi is the lead investigator and Dr. Greg Goss is the project leader of PAWF’s multidisciplinary team, comprising climate change and SWAT model experts from around the world. The team’s work will help Albertans to effectively manage their most precious resource by providing reliable predictions of both the supply and demand over the next 50 years. It does so by taking into account not only the normal regional differences and seasonal fluctuation of our water resources, but also the ever-looming forces of climate change and global warming. The project aims to assess the supply and demand of Alberta’s water over the next 50 years under climate variability and global warming.

Objectives:

- Quantify blue, green and fossil water resources (under climate variability & change)
- Assess water demand of different sectors (including agriculture, oil & gas, industry, domestic and environment)
- Assess the water use intensity in different regions of Alberta based on the water resources availability-reliability
- Assess alternative management options
- Link climate change effects on Alberta’s water supply-demand to economic prospects

Dr. Greg Goss, Principal Investigator

Dr. Goss is the Scientific Director of the University of Alberta Water Initiative and has a broad program aimed at water research, environmental health and regulation. With over 100 research papers, one book and two patents, he is a recognized leader in the field of environmental sciences. The Water Initiative aims to promote multidisciplinary water research approaches to solve our problems of water management. Dr Goss is a Professor in Biological Science, is cross-appointed to the School of Public Health and is a Fellow of the National Institute of Nanotechnology. Dr. Goss is also Past-President of the Canadian Society of Zoologists, serves on the Council for numerous national and international societies and advisory boards, is an Associate Editor of the Canadian Journal of Zoology and on the editorial boards for Nanotoxicology and Environmental Science: Nano. He is also President of Aquosity Environmental Consulting.

Dr. Monireh Faramarzi, Lead Investigator

Dr. Faramarzi has a PhD in Hydrology and Water Resources Management from the ETH-Swiss Federal Institute of Technology. She has over nine years experience in applying hydrological models that assess water resource availability, reliability and water demand under climate variability and climate change. During the years 2010-2014, Dr. Faramarzi was involved in several multidisciplinary projects through which she developed close collaboration with scientists and renowned institutions in Iran, Switzerland, Germany and Canada. The collaborative nature of her work brought new opportunities in 2014, when Dr. Faramarzi came to Canada to work with the University of Alberta on the PAWF project. The results of the project will identify gaps that may exist in current policy, monitoring infrastructure, and management strategies. The PAWF results will inform future water policy for all stakeholder groups in Alberta, including the agricultural sector and the general public.
What are Alberta`s major water issues and how do you predict these will develop over the next 50 years?

Alberta relies on water like no other province in the country. In fact, Alberta's water use accounts for two-thirds of Canada's entire use, and our agricultural products – which account for 60-70 per cent of Alberta's water use – make up one-third of the country's agricultural exports. Fully half of the province's gross domestic product (GDP) is predicated on water availability. Because Alberta's economy and Albertan's well-being depend strongly on water, periodic water scarcity and frequent floods pose serious economic concerns as well as social and environmental consequences for many areas in the province. To minimize the risk attached to such water dependency, the PAWF project is underway to help Alberta plan for future uncertainties.

In this research project we apply the widely used process based model so called Soil and Water Assessment Tool (SWAT) and will develop hundreds of simulations of Alberta's river basins, attempting to create a computer model that mirrors exactly where and how much water we have had in the past thirty years, before moving on to predict our water future. These simulations require constant tweaking through the use of a supercomputer equipped with a Parallel Processing program.

According to your research, what are potential solutions to these issues?

After the first year calibration-validation procedure, our interactive modelling project has now established a sound base to quantify the impacts of climate change and assess alternative options in managing water resources in the province where the dynamic interactions of water-food-energy-environment and the impacts of climate change will be examined.

This overwhelming task is underway and requires direct consultation with stakeholders at the provincial level. Bringing the stakeholders together will allow us to develop various planning scenarios and by weaving together these seemingly separate but rather interconnected pieces of the puzzle, we will be able to identify regions and sectors in Alberta that are most at risk in their water needs, based on any mismatches between the predictions of water supply and the expected water demand according to the five major sectors' plans.

What role does technology play in these solutions? How could SMEs confront and assist in solving future water challenges, i.e. by developing innovative technologies?

SMEs are vital to solving our water management issues not only through the development and promotion of new technologies for improved environmental management, but also as partners in research and development in collaboration with University researchers. Through interaction with University level researchers, SME’s provide new perspectives and practical ideas on the use and applicability of new technologies, and in return, University based researchers provide access to research and development grants as well as advanced training of new personnel to fill the skilled positions necessary for growth of innovative, successful SMEs.

Do you know of any innovative water technologies that are currently being implemented or developed in Alberta?

Through his interactions with Industry, Dr. Goss and his partners have worked with a number of unique SME industrial partners. These include the Clearflow group, who have developed more environmentally friendly novel polymer formulations and delivery methods for suspended sediment removal; VITA water technologies who have developed floating island technologies (Biohaven) for cleaning naturalized waterways; and Source2source, who use novel Nautilus designed to improve urban storm water pond design. These are but three examples of Alberta based SMEs that are applying their business locally and internationally; Alberta has so much more.
Irrigation Innovations for Alberta’s Agriculture Sector

Department of Civil and Environmental Engineering, University of Alberta

Mohamed Ammar, Water Resources Engineer & PhD Candidate

Why is irrigation planning important for the future of Alberta?

A glance into history shows the eminent role of irrigation in the evolution of civilization 6,000 years ago on the banks of the Tigris and Euphrates in Iraq. It is also evident in Egypt’s cultural evolution by the River Nile between 4000 and 2000 BC. Similarly, one cannot deny its role in recent history and Alberta is one example. The irrigated area within the province represents about two thirds of the total irrigated land in Canada. Irrigation occurs on less than five percent of the cultivated land of Alberta, however it produces almost one fifth of Alberta’s agri-food gross domestic product – three times the productivity of dryland farming. That shows how important irrigation is, not only to Albertans, but to Canadians, assuring them food security and contributing to the province’s economic welfare.

Irrigation is the largest consumer of surface water in Alberta and any expansion may drive increasing demands on water and land while increased weather variability and climate change alter the natural flow regimes. These changes will occur within a larger context of ongoing socio-economic development. Consequently, identification and quantification of linkages between irrigated agriculture and economic, environmental, social and policy factors is essential for sound irrigation planning. Humans often take actions that make natural disasters more destructive if they don’t have enough information about the complexity of the system they are dealing with, which can cause them to overlook the damaging impacts on the environment. That is why decisions should always be made with sufficient understanding of the different interconnected variables that affect a system. Understanding the effects of different irrigation methods on water use efficiency, or the complexities of maintaining a social license to operate, are only two of many examples.

What role do you think innovation in agriculture could play in diversifying Alberta’s economy? How can policy makers support this process?

Innovation is described by Cambridge dictionary as “a new idea or method, or the use of new ideas and methods”. Other scientific descriptions include “new products, new processes, new markets, and new organisational methods”. Innovations generally seek to promote sustainability and ensure the wellbeing of both current and future generations. In this context, in Alberta, one example is the introduction of the VRI (Variable Rate Irrigation) that ensures the soil receives a sufficient amount of water for the crop to grow with minimum water losses, thus increasing water productivity and providing more room to expand.

Another example is improving crop genetics resulting in greater yields and higher production. Other options include the adoption of innovative water policy options and management strategies as tools to address water scarcity or water conservation – creating an opportunity for a sustainable agricultural expansion and giving the province an economic resilience against future plunging oil prices, beside its social welfare.

Adopting innovative technology can often be quite expensive and overwhelming for some producers. However with adequate incentive, change can be seen quickly, assuming that people know the technology exists. Accordingly, education and agricultural extension programs can help encourage producers to integrate new innovations, technologies and management strategies into their operations.
What are the most important contributions that SMEs could make in solving future irrigation challenges?

Aside from the demographic changes and population growth, Alberta has a different nature in terms of the challenges it faces in the irrigation sector. One challenge is competition from other sectors in the labour market and the low profile in terms of career choice – young ranchers often view the work as unfavourable and tedious, which adds more pressure to the agricultural labour market. How the public views agriculture in Alberta, alternatively known as the “social license to operate”, is another challenge. There is also increasing pressure from environmental lobby groups, which urge farmers to limit use of water for anything agriculture-related. As such, small and medium-sized enterprises have to be not only competitive on the basis of costs, but also by meeting changing public requirements for sustainability.

SMEs could invest more in product innovations or in market and organizational innovations. Increasing their innovation capacity and building up a reputation as an innovative enterprise could significantly contribute to their business growth and to the province’s as well.

The public is now more aware and demands for transparency in the supply-chain of their food products, as well as their carbon and water footprints, which often elevates the quality production norms to a level even higher than those set by the government.
Who are the main users of geographic information systems?

A geographic information system (GIS) is a tool that aims to create, store, analyze and map spatial data. This simplistic definition hides different levels of complexity and specific types of users taking into consideration different interests and financial capacities. Companies, for example, usually have an existing information system containing large volumes of data, and therefore want GIS tools to be fully integrated into this architecture to take advantage of interaction capacities. Such integration requires a team of GIS analysts working in synergy with IT managers, as well as the development or purchase of integrated solutions that are usually very expensive. But this investment is often required to enhance a company’s commercial solidity as it enlarges prospecting capacities and productivity. Using those cutting-edge technologies is also a good way to advertise and highlight that the company is aware of modern challenges.

Public agencies are important GIS users, from municipalities to governmental offices. In many aspects they share common features with companies, as they often have an information system they want to use as a development base for their GIS. Sometimes, the development of a GIS is also the primary step toward the creation of an information system, especially in small offices. Although they have common needs, the most important difference is the absence of commercial interests for public agencies. This is replaced by a deep need for cohesive management across their jurisdictions. In a few words, I would say that GIS in this case is mainly oriented toward regulation and monitoring of the environment, with social well-being as the principal goal.

Consultancies also are among the principal users of GISs, which they usually combine with other geospatial tools and methods such as image analysis and spatial modeling, all necessary to perform sound analysis. They usually conduct this analysis commissioned by public agencies or private companies. It is important to keep in mind that many companies or agencies do not have a GIS yet, or do not have the workforce, or the level of expertise or tools internally. Consultancies can offer support to set up GIS, to analyze data, to create custom tools, to provide specific outcomes. Based on my experience, they are essential at bridging the gap between science and business, as they always have to create innovative solutions to handle many complicated issues.

Research labs in universities are critical users, especially because they use GIS technologies to create unprecedented solutions and make discoveries, which is really exciting. However, goals like publications and funding are really different from the previous user.

The use of GIS is much more oriented toward stand-alone projects, which could make the world of research less structured regarding this tool. Although the value of the work achieved in laboratories is critical to create knowledge, I think it is sometimes disconnected from operational questions, which consequently impairs the will to translate theoretical findings into practical (and commercial) solutions.

Finally, regular people have a part to play. The development of crowdsourcing projects like Open Street Map or the expansion of geo-apps on smartphones make them important data contributors and consumers. They are obviously not GIS analysts or spatial scientists, but they are important players to consider in the development of future business applications.

Obviously, this list is not exhaustive, finer details could be added, and the frontiers between those user profiles are porous. For instance, some big companies have research and development capacities, some public agencies are actually giant laboratories, which develop highly complex solutions, and some university labs became real research institutes with commercial activities. Moreover, many other factors can play a role in the development and the use of GIS.
How can geospatial tools enhance Alberta’s land and water management?

Alberta is a very large piece of land in a country that boasts the fourth largest land area in the world. In this respect, it’s not surprising that Canada was a pioneer in the development and use of geospatial tools, quickly becoming mandatory for national land management. Nowadays, the provincial scale level plays an important part in this mission, with the emergence of conservation needs linked to urban expansion, industrial activities, and climate change. The Alberta Ministry of Environment and Sustainable Resource Development (AESRD) is one of the most influential stakeholders for land and water management, and their involvement led to the release of many interesting solutions such as the Landscape Analysis Tool, or the production of high-resolution wetland data through the Alberta’s Wet Areas Mapping Initiative. The ASRD website is a gold mine of resources that play in favor of better environmental management.

Silvacom is a very good example of a consulting company specialized in the provision of geospatial solutions for forestry and environmental management. The development of the Landscape Ecological Assessment & Planning tool is proof that cutting-edge technologies and scientific knowledge can be translated into operational and valuable solutions. One could also explore many other examples online: GeoEdmonton which is the GIS initiative for the City of Edmonton, the Alberta Biodiversity Monitoring Institute that has developed human footprint spatial data for monitoring purposes, AlbertaWaterSMART which works on innovative solutions for sustainable water management, the Regional Aquatics Monitoring Program which focuses its management action in oil sand extraction areas, or Alberta Parks and many more.

They are facing the challenge imposed by Big Data/data mining science, which is a sector experiencing an incredible growth. Not a day goes by where one does not hear about it; the market is worth billions of dollars. Companies are chasing qualified data miners, in other words, people having a combination of statistics and computing skills. Simultaneously, GIS software providers are working hard at developing spatial tools for Big Data analysis, as well as solutions to quickly update and share information through internet and collaborative applications. Indeed, the democratization of web mapping applications, the abundance of open spatial data, and the use of cloud computing lead to the emergence of a new market where the mastery over spatial information can be a source of discoveries and profits.

However, even if all industry sectors are able to take advantage of GIS systems and other geospatial tools, I think that the historical users will remain at the top of technology development and integration for a long time. I’m especially thinking of oil & gas, forestry and other natural resource exploitation, as well as agriculture, urban planning, ecosystem conservation and water management. But many other sectors have large opportunities for progress: crisis and risk management, marketing, medicine, sports, arts, archeology and so on. The number of new applications is absolutely incredible when you start exploring the web and checking out what people are doing.

Looking into the future, which industry sector will benefit most from these rapidly evolving systems?

Potentially all! It seems easy to say, but 80% of the data that the world produces every day has a spatial component and therefore could be drawn on a map. That said, the difficulty resides in the will for developing adapted capacities to gather, transform, analyze and share the mass of available information coming from sources as diverse as smart phones or high-resolution Earth Observation satellites. From this perspective, geospatial solution providers will probably benefit most of this wide market.
How does industrial growth in Strathcona County affect freshwater resources?

Our larger threat is the residential growth which consumes 63% of the County’s potable water resources. Single-family homes have a larger footprint, less tree cover and might encroach onto natural land that had not previously been developed, such as wetlands. Fortunately, industry has started looking for non-potable alternatives for their water use in processing and manufacturing. For example, Suncor and Air Products use nano-filtered wastewater effluent from the Gold Bar Wastewater Treatment Plant in Edmonton.

Industrial growth can cause stress on the landscape, which ultimately affects water quality from surface runoff and creates possible contamination from leaks and spills. There is more risk because these areas are not readily monitored and rely on companies to respond to pollutant issues where they are hopefully notifying Strathcona County and the Province. Additionally, the Federal Government may require notification as the North Saskatchewan River and many of its tributaries are fish-bearing. Additionally, a lot of area by the North Saskatchewan River is tree covered, which offers a carbon and water retention/treatment benefit. Development can often mean loss of wetlands and tree cover. The freshwater issue when it comes to industry in the County is not always a quantity concern, but more about the costs of infrastructure maintenance for Strathcona County. If we extend the system to reach new industries in the Heartland, there are more and more pipes to transport water and more and more costs for treating and transporting sufficient water supplies to satisfy industry, commercial, and residential needs and for firefighting. As a response to this concern, Strathcona County has implemented full-cost accounting to plan ahead for infrastructure needs of the system.

There is a need for community champions who inspire change among members of their communities by choosing a condo over a large, single home lot, and smaller more walkable roads instead of wide roads for faster vehicle commuting. Finding toilet leaks, maintaining a pesticide and potable-water free landscape and minimizing waste are all individual things residents can do to make a large difference in the way water is managed in Strathcona County. But there needs to be programs in place that guide and provide resources for this kind of education and awareness opportunity.

Do you see innovation and entrepreneurial activity related to sustainability emerging in Strathcona County?

I can speak to water innovations in my Utilities Department of Strathcona County. In 2006 we were experiencing serious sediment loading into a fish-bearing storm facility from land clearing and home construction. We partnered with a local entrepreneurial company called Clearflow Consulting who designed a water treatment program using flocculating logs in the moving stream of water upstream from the pond.

We recognized early on that metered buildings use 40-60% less water than un-metered buildings, so we have been 100% metered for many years. We are now implementing Smart Meters that detect leaks in real time. 7.5% of our municipal treated water is lost to leaks in buildings and throughout the system. In order to encourage residents to value water infrastructure and services more, Strathcona County developed full cost accounting to ensure we can continue to provide water and wastewater services to residents in the future as well as now.

As an alternative to pesticides in our storm ponds, we stopped controlling weeds and algae through chemical means and instead used a vegetable-based blue dye that, when added to the water, blocks the sunlight from reaching plants at the pond bottom, thus impeding their growth.

What challenges do you see jurisdictions like Strathcona County facing over the next 20-50 years?

Demand for land, resources and services is an ongoing concern for municipal management as more rural residents move into the urban landscape. We have created an Environmental Sustainability framework, a Municipal Development Plan and the SUN Design Living team for a holistic and collaborative approach to community design. However, unless the residents make their concern for more sustainable planning, resources and services known to the Mayor and Council, these frameworks and plans may not be followed as intended. There is a need for increased support from administrative initiatives to lower the community’s footprint; however, these changes may not occur in time to mitigate environmental, social and economic risk in the long-term.
What are the focus areas and priorities of the Canadian Water Resources Association (CWRA)?

CWRA’s mission is about promoting effective water management in Canada by making a commitment to environmental, economic and social sustainability. Its core priorities gravitate around the following principles:

a. Practice integrated water resource management by:
   • linking water quality, quantity and the management of other resources;
   • recognizing hydrological, ecological, social and institutional systems; and
   • recognizing the importance of watershed and aquifer boundaries

b. Encourage water conservation and the protection of water quality by:
   • recognizing the value and limits of water resources and the cost of providing it in adequate quantity and quality;
   • acknowledging its consumptive and non-consumptive values to both humans and other species; and
   • balancing education, market forces, and regulatory systems to promote choice and recognition of the responsibility of beneficiaries to pay for use of the resource.

c. Resolve water management issues by:
   • employing planning, monitoring and research;
   • providing multidisciplinary information for decision-making;
   • encouraging active consultation and participation among all affected parties and the public;
   • using negotiation and mediation to seek consensus; and
   • ensuring accountability through open communication, education and public access to information

How is the province of Alberta preparing for the future with regard to water management taking into consideration a quickly growing population and urban sprawl?

In Alberta, it is not cities or local authorities that typically bound water management planning, but watersheds. In this sense, Alberta’s Land-use Framework (LUF) sets out the approach to managing the province’s land and natural resources (including water). In there, the LUF divides the province into seven land-use regions and calls for the development of a regional plan for each. For the province of Alberta, regional planning is the selected approach to bring the policy integration, direction and clarity needed to support responsible development of the province’s resources and realization of its desired outcomes.

What relationship does CWRA have with Alberta’s business sector? Can local companies benefit from the information provided by CWRA?

CWRA has an active membership of water professionals representative of industry, education, government, and NGOs. CWRA’s diverse members work together towards an effective management of water. CWRA offers a wide array of resources (e.g., conference proceedings, journals, books, seminars) of interest to its members, members of the water resources community and the public.

How can we use our growing knowledge about the environment as an inspiration for technology innovation?

A growing knowledge about the environment helps us better understand the complex dynamics behind the availability of critical resources like water. For instance, we live in a globally urbanized society that faces fast-paced challenges, including uncertainty and shocks associated with climate change. Alberta has one of the fastest growth rates in Canada, and many of its urban hubs are almost equally susceptible to droughts and to flooding. A clear exacerbation of catastrophic events has triggered the use of concepts like resilience in the context of governance and decision-making. Resilience could work as a catalyst for technology and social innovation. Resilience reconciles the environment and societies as a one unit or social-ecological system, where management strategies and transformative changes are built upon adaptation and mitigation.
What kind of companies use CSR and what benefits can it bring?

From my experience any company can engage in Corporate Social Responsibility (CSR), as long as they are able to offer something that is needed. Depending on what kind of CSR the company is pursuing the benefits will be different. If a company is doing strategic CSR, the benefits may include getting into new markets and/or getting free advertising of their products. If the company is doing CSR altruistically the benefits will be less tangible, but could also include getting into new markets, getting free media coverage, and attracting new customers and employees whose values align with the CSR initiative. My graduate thesis is on pursuing a CSR initiative for IDEXX, a company in the United States that makes user-friendly kits for testing water. For IDEXX the benefit will be mostly the added value of engaging in philanthropy. In the long run it could also get IDEXX into new markets.

Do you see this model becoming important for SMEs?

I honestly do not think CSR will ever become an expected practice, and, in fact, I think that there is some aversion to CSR because of how many companies cover up their mistakes or try to look good by pursuing CSR initiatives. I could see having a social purpose within the company’s model becoming important, as it differentiates a company and it is attractive to customers.

What importance will CSR play in the future? Is this a promising model that will be applied by an increasing number of companies?

I do not think that CSR has a future, however I think that the values that drive CSR do have a future, and will become increasingly important as consumers become more aware and conscious of the impact their purchases can have. I realize that this may seem ironic, since I am working on CSR and I am planning to continue to pursue it with this company, however I think that it will only be the older, more established companies that will take up CSR and newer companies and SMEs will benefit more from using a social purpose model. This means rather than trying to pursue a socially responsible initiative after the company is established, the social purpose is engrained into the company from the very beginning. I think there is more of a future for social purpose than for CSR.
Albertans have developed an increasing awareness of and appreciation for water. This is also reflected in the province’s most recent research activities, events, seminars and conferences focusing on solutions and expertise in the field of water protection, sustainable management, technology innovation and policy regulations. The GCCIR had the opportunity to participate in a number of these water-related dialogues in Alberta and across Canada.

**SMART City Symposium**  
SMART City Alliance, St. Albert (10/2014)  
Themes: The challenges of modern communities, entrepreneurship and growth in Alberta, technology, driving innovation

**Energy and Water Efficiency Conference**  
Canadian German Chamber of Industry and Commerce, Calgary (03/2015)  
Conference themes: Policies for industry, wind/solar battery systems, water pumps in oil & gas, more efficiency in industrial waste water treatment, integrated water management in the oil sands sector, best practices and solutions from Alberta and Germany

**Water and Climate Security in a Changing Canada**  

**Water and Innovation Events**

**Connecting Water Resources 2015:**  
From Knowledge to Action  
Canadian Water Network, Ottawa (03/2015)  
The Canadian Water Network (CWN) is an organization that connects researchers and those involved in roles related to managing water in the public and private sector with the goal of translating water research into action. “From Knowledge to Action” was also the key theme of CWN’s most recent conference (Connecting Water Resources 2015) that took place in Ottawa, from March 9th to March 12th. The 4-day event explored issues and opportunities in the areas of urban water management, resource development, agriculture, and Aboriginal communities in Canada. Coming from Alberta, the GCCIR was particularly curious about new technology developments in the areas of wastewater recycling, improved infrastructures and water efficiency in irrigation systems. The conference also offered new ideas and examples of best practices in the areas of policy regulations and water trading, as well as more philosophical questions around people’s value systems and moral obligations towards the environment.

**WaterTechnologies Symposium**  
Environmental Services Association of Alberta, Delta Kananaskis (03/2015)  

**Agriculture Technology Innovation**  
BioAlberta, Edmonton (05/2013)  
Themes: Opportunities for investors in the rapidly advancing agricultural technology sector
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