Volume 2, Issue 1

Knowledge Insider

Where business meets opportunity | **Water**

Farm Credit Canada
Advancing the business of agriculture

Canada

“When the well is dry, we learn the worth of water.”
Benjamin Franklin

“A wise man adapts himself to circumstances as water shapes itself to the vessel that contains it.”
Chinese proverb

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Business insight from FCC

Make better decisions with better information. Use Knowledge Insider to help track global shifts and industry trends. For more knowledge that you can use to plan for success in your business, visit www.fcc.ca/learning.

Farm Credit Canada is proud to present Knowledge Insider, a semi-annual publication offering thought-provoking information to producers and other agriculture entrepreneurs. Trends described in this document are supported with facts and figures and examined in the context of what's on the horizon for Canadian agriculture.

Please direct questions and comments to FCC's Customer Service Centre at 1-888-332-3301 or email csc@fcc-fac.ca.

Knowledge Insider is produced by Knowledge at FCC.

Our special thanks for contributions from all of our FCC partners and industry experts who generously contributed their time, talent and knowledge to the creation of this publication.

Cette publication est également offerte en français.

Read on for examples of Canadian businesses that are growing more 'crop per drop' through strategic investment in innovative irrigation technologies.

Water, water everywhere . . .

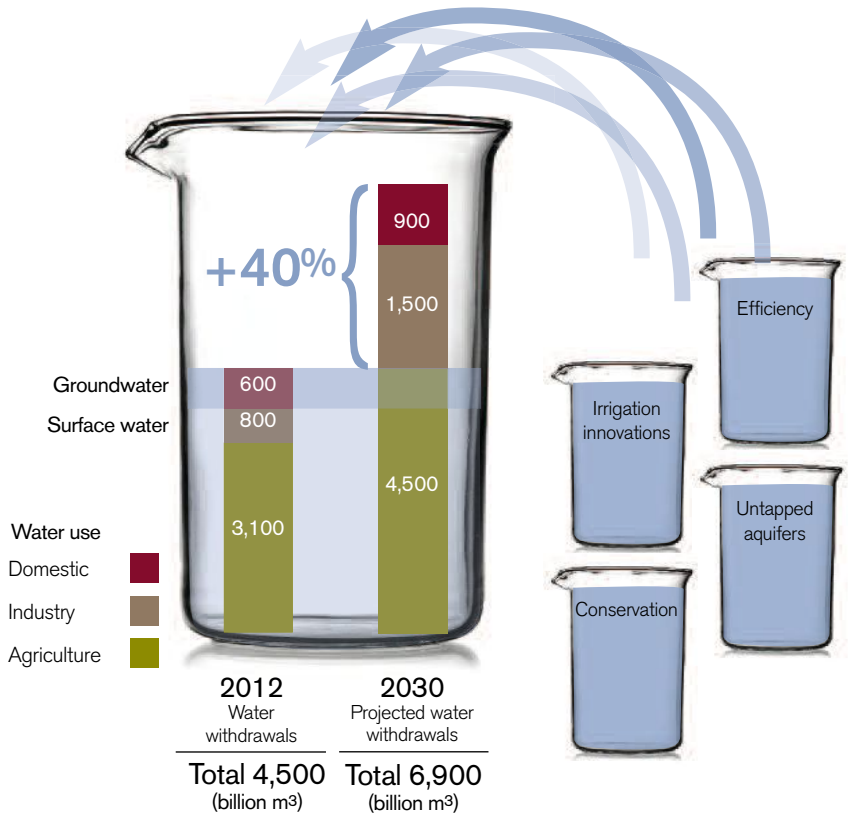
Water is on the agenda of governments, industry groups, multinational corporations and many businesses. Is it on yours?

As a major water consumer and food producer, agriculture is critical in helping to shape a secure water future and develop innovative solutions. This edition of Knowledge Insider can help agribusiness owners navigate through the uncertainty to better manage risk and harness opportunities.

Water quality and availability are changing, and global water systems are pressured to keep up with the burgeoning demand of humans and the earth. In the coming decades, global freshwater demand, primarily from agriculture, industry and urban expansion, is projected to outpace supply. Figure 1 is based on one projection of a 40 per cent gap between the existing accessible and reliable water supply and the projected global demand.

Some countries are experiencing water crises through shortages, floods or poor water quality. Some of the world's rivers no longer reach the ocean, deserts are expanding, water aquifers are

Figure 1: Filling the gap



Adapted from McKinsey & Company. To learn more about strategies to address global water scarcity and find more detail on the projected 40 per cent gap by 2030, see *Charting our Water Future* by the 2030 Water Resources Group. Its 40 per cent projection is based on existing accessible, reliable supply, assuming no efficiency gains.

Harvest Power's low solid anaerobic digester in London, Ont., shown here as it was nearing completion, took into account the high water content of its feedstock and developed processes to both reuse water and return treated wastewater to the local water system.

Photo courtesy of Harvest Power

Making it work – Harvest Power London, Ont.

When Harvest Power built its London, Ont. energy-from-waste plant to convert food waste to energy and fertilizer, it strategically invested 25 per cent of the project cost on wastewater treatment. Harvest co-founder Paul McMenemy explains why water became a key element of this plant. "Roughly 95 per cent of the 60,000 tonnes of food waste processed each year in the London operation, which we call an 'energy garden', is composed of water." The plant uses anaerobic digestion to convert food waste to energy, and then feeds wet food waste into a centrifuge to separate the grey water from the sludge. The grey water is then treated, tested to the appropriate standards and returned as clean water to the local water system.

Harvest worked closely with the Ministry of the Environment and the City of London on its water-return processes. McMenemy considers the plant a net exporter of water and adds that it also recirculates treated water for use in its anaerobic digestion process.

McMenemy advises other companies to involve the local community early and often. "As an industrial company in a mixed residential-industrial-farming area, we recognized the importance of being a good neighbour and also of minimizing environmental impacts. Our public liaison committee helped local residents understand the project."

www.harvestpower.com

drying up and drought is affecting world grain belts. Even Canada, one of the most water-rich countries in the world, is not immune to drought and flooding.

Canada is among the largest global consumers of water per capita. Canadian agriculture can play a pivotal role in helping Canada and the world become water-smart by developing solutions for a world facing an uncertain water future. Many Canadian agribusinesses are already finding innovative solutions, ranging from water conservation or wastewater treatment to growing drought-resistant crops.

This edition of Knowledge Insider leaves the debate over water rights, policy and ethics to another forum and focuses on how Canadian agribusiness owners can strategically monitor water trends.

What risks will agribusiness owners face by not making water part of their bottom line today? And what opportunities will be harnessed by those who do?

In this edition:

- Consider how human impacts and climate change alter the quality and availability of global water resources.
- Understand the role of agriculture, as a major consumer of water and producer of food and energy, in the water-food-energy nexus – the interplay between the energy and water needed to create food, or the water needed to create energy and food.
- Consider how the projected supply-demand gap in water resources could affect your business or industry.
- Explore how Canada, a water-rich country and among the largest global consumers of fresh water per capita, can become more water-smart and provide solutions to a world facing an uncertain water future.
- Learn from Canadian experts in water and agriculture about water-related opportunities and risks for your business.
- Be inspired by Canadian agribusinesses that are taking action for a more secure water future.

The world faces an uncertain water future

You are already hearing about the economic and political impacts of water quality and availability, and the effects of climate change. States such as California, Arizona, Georgia and Texas have implemented water restrictions and price increases in response to extreme drought. Some regions of Canada have experienced their own water issues, such as the eutrophication of Lake Winnipeg, flooding in southern Saskatchewan and drought in northern British Columbia.

Although industries and countries are affected differently, they all share the reality that water is finite, water quality and availability are changing and more fresh water is needed to meet projected global demand. There is no substitute for water.

A number of Canadian agribusiness owners and industries are already taking action. For example, greenhouse operators in Ontario and British Columbia and farmers in southern Alberta have innovated to address challenges such as changing wastewater regulations, drought and flooding. Some food manufacturers are implementing water efficiency measures in the wake of escalating water prices.

Signs of an uncertain water future:

- Voluntary disclosure of water usage is rising. In 2011, more than 3,000 corporations around the globe reported carbon emissions and water management practices to the Carbon Disclosure Project.[1]
- Water prices are increasing – water and sewer rates in Canada have risen since 2006 and single family U.S. residential water rates have risen 18 per cent since 2010 in 30 major cities.[2]

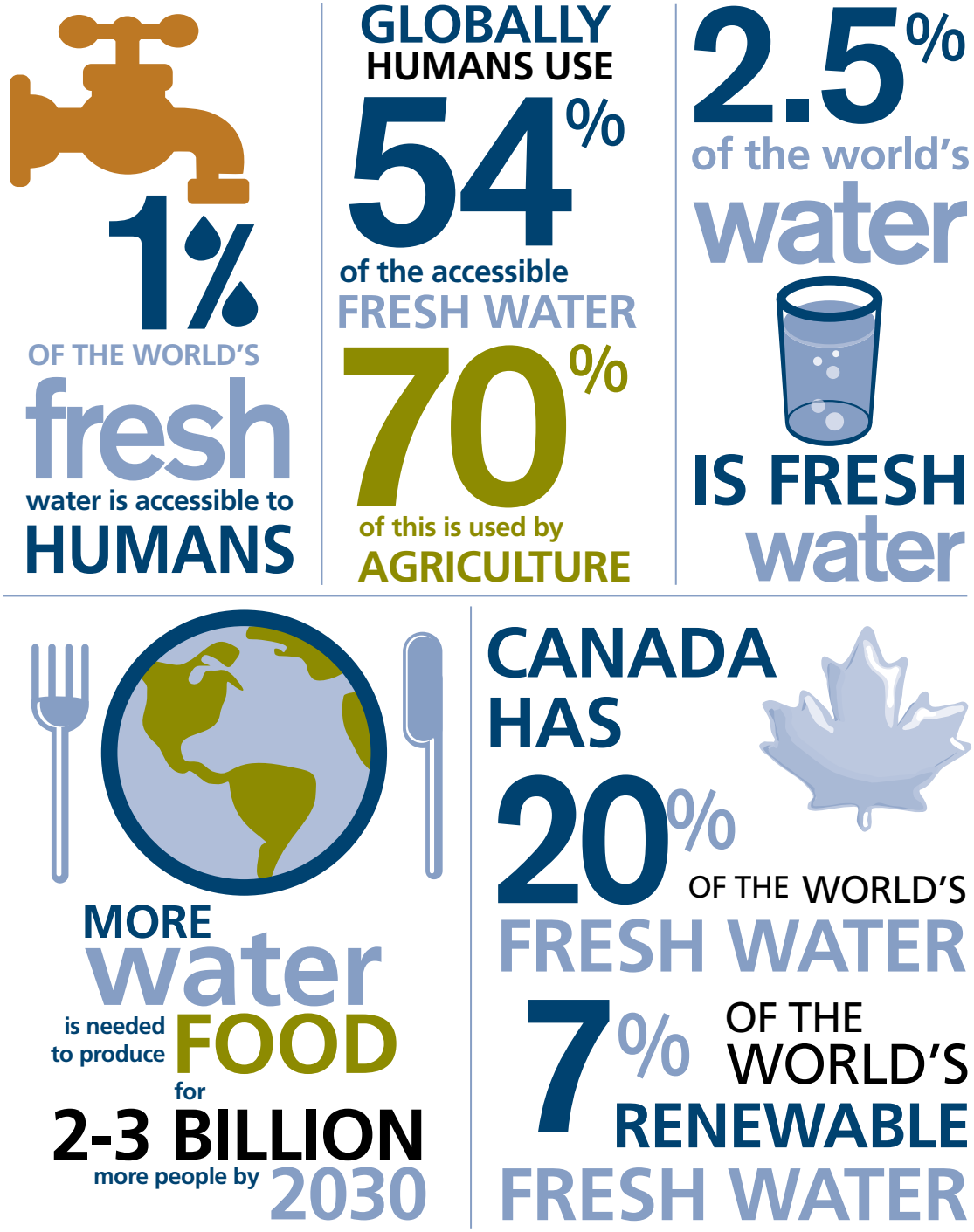
ASK THE EXPERTS – Dr. Chandra Madramootoo

Canada's water resources could help address global food security concerns.

See page 25

Figure 2:

FAST FACTS ON WATER & AGRICULTURE



Source: See note 3 on page 29.[3]

- Water and water rights are being traded and investment in water stocks is growing.
- Overseas investors from water-stressed nations are purchasing large tracts of arable land with access to fresh water.
- New water infrastructure is being built – China's South-North Water Transfer Project will be the world's largest and is projected to divert more than 40 billion square metres of water annually by 2050.[4]
- Water is more regulated. For example, several U.S. states facing drought and dwindling groundwater reserves have placed restrictions on gathering rainwater.[5]

Agriculture in the water-food-energy nexus

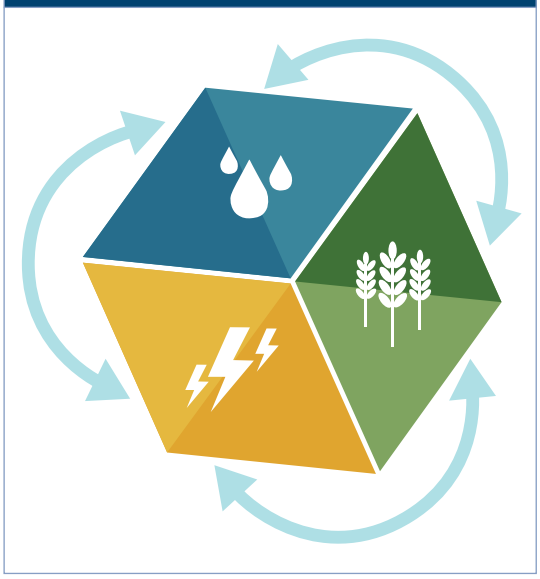
As both a water steward and one of the biggest consumers of water, agriculture has a complex and critical relationship with water.

While agriculture withdraws significantly less water than some other users in Canada, Environment Canada reports that agriculture is one of the largest net consumers of water, consuming 71 per cent of the water it withdraws and returning only 29 per cent to the source. All other users consume roughly 10 per cent of the water they withdraw.[6]

While efficiency gains and conservation in your operation can lead to water savings, there are limits to how much water can be returned to the source by some agribusinesses. For example, much of the water used in primary production is actually embedded in the products themselves as virtual water (see page 18 for more information on virtual water).

Agriculture is at the heart of the water-food-energy nexus (see Figure 3). The links between food and water are self-evident – water grows crops, hydrates livestock and processes food. Less evident are the connections between water and energy. For example, a large amount of energy is used to pump, heat and transport water through municipal and rural water systems.

Figure 3: The water-food-energy nexus



To view SAB Miller's four minute YouTube animation showing the water-food-energy nexus, go to http://www.youtube.com/watch?v=uCAO8yga5NM

Small- and large-scale agriculture operations are improving water quality and availability. Worldwide, the agriculture industry is minimizing its impact on water resources and the environment by implementing solutions that range from on-farm wastewater treatment and irrigation efficiencies to using air pressure instead of water to manufacture food.

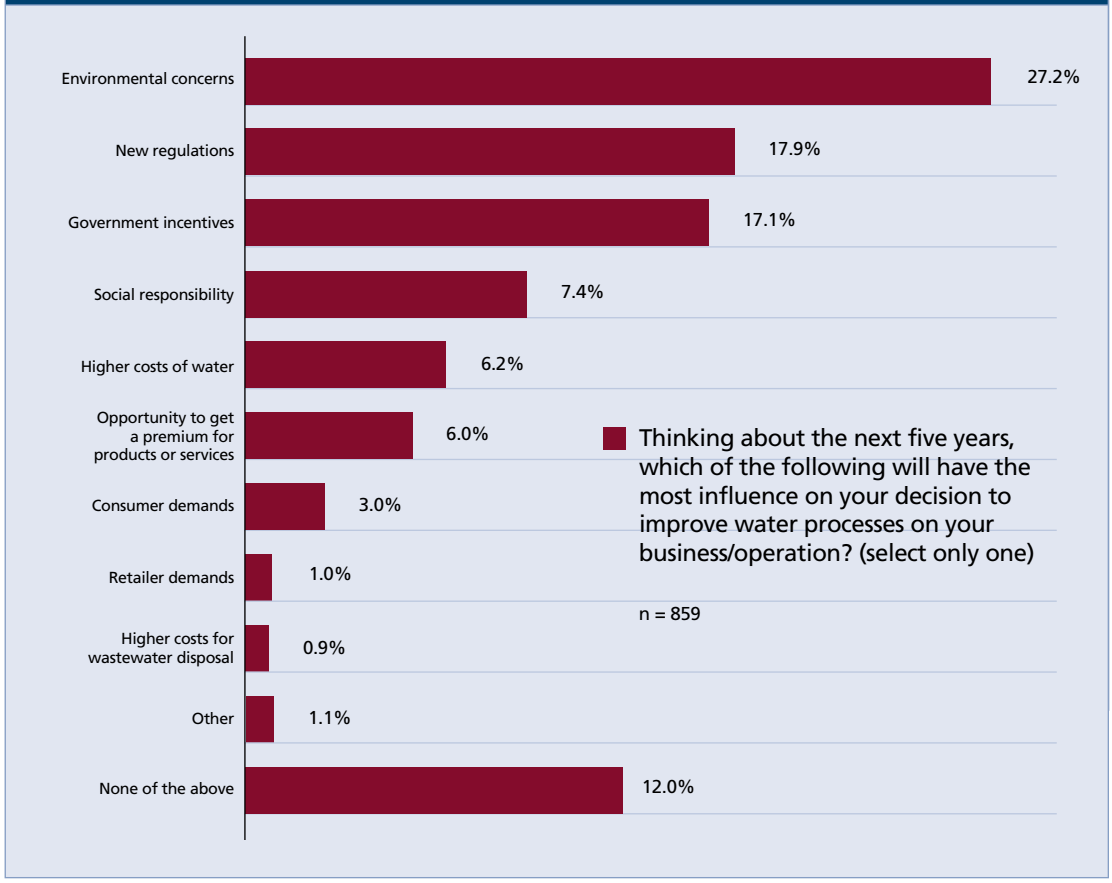
A 2012 survey of the FCC Vision Panel, a 9,000-member research advisory group, asked respondents to choose the most influential factor driving their decisions to improve water-related processes over the next five years (see Figure 4). See www.fccvision.ca/water for the full results.

ASK THE EXPERTS – P. Kim Sturgess

The water-food-energy nexus creates opportunities for Canadian agriculture.

See page 24

Figure 4 : Factors driving decisions about future water processes



Source: Water survey, FCC Vision Panel results, 2012

In Canada, agribusinesses across many sectors are changing their water practices or thinking about changing them. For example, in recent years, many greenhouse operators invested in innovative infrastructure and recirculation technologies to drastically improve water usage. Today, these operators must address further challenges resulting from new environmental regulations to reduce the nutrients, pesticides and pathogens in wastewater.

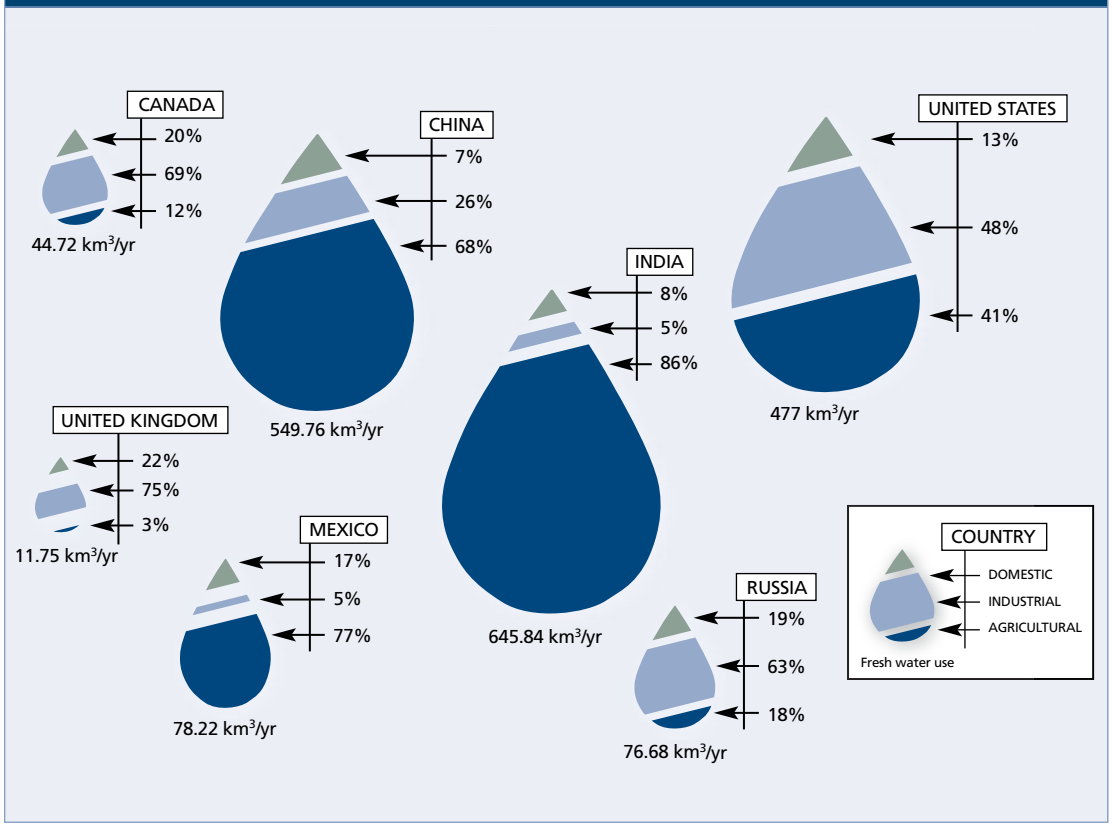
What can you learn from Canadian water users in your own sector and beyond to anticipate opportunities and risks?

Considering Canada's opportunities and risks

Canada is a minor water user compared to China, India and the United States (see Figure 5). It is also water-rich and will be one of only a few countries able to produce more food than it consumes, exporting to countries affected by water and food shortages.

Eau Canada author Karen Bakker warns that the myth of limitless abundance is a risk for Canada because its rich stores of fresh water cannot be replenished once they are used.[7]

Figure 5 : Water use by sector



Source: National Land and Water Resources Audit; Ministry of Water Resources, China: FAQ Aquastat Yearbook; US Geological Survey (via circleofblue.org)

Fortunately, Canada is also rich in technical knowledge and has globally respected health and environmental standards. According to Dr. Chandra Madramootoo, professor at McGill University, "We need to harness our enormous national and provincial resources and capabilities, including water resources and expertise, in a much more integrated and strategic manner. Our agri-food sector can then become a more competitive and significant contributor to world food security."[8]

See Figure 6 for an overview of water stressors and the various solutions already being implemented in Canada. What opportunities and risks could your business address today to prepare for an uncertain water future?

Did you know?

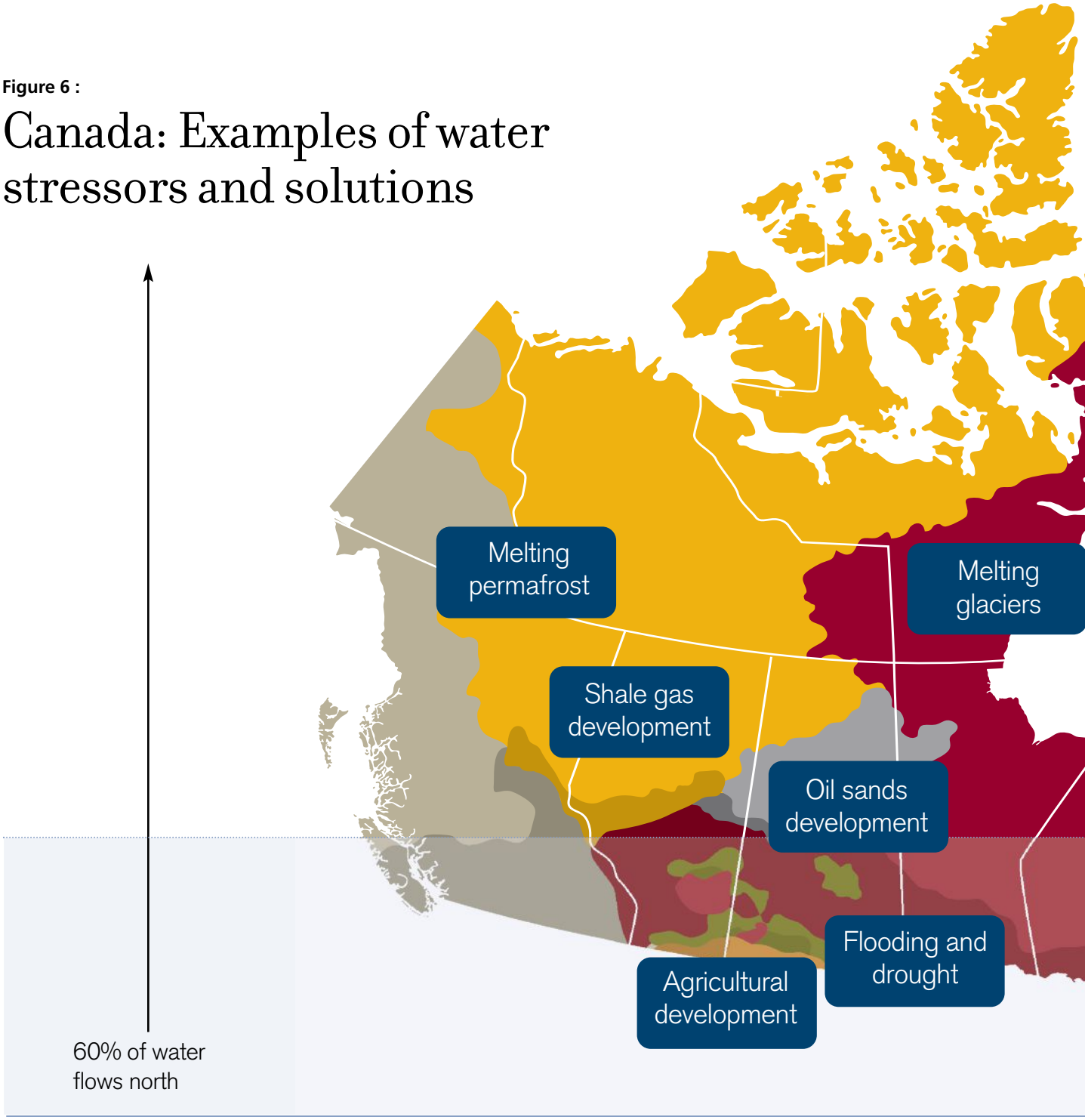
In 2011, the Conference Board of Canada ranked Canada 15th out of 16 peer countries for water conservation and 6th out of 17 countries for water quality.[9]

ASK THE EXPERTS – Brent Paterson

The impacts of climate change on Canada's water resources present both opportunities and risks.

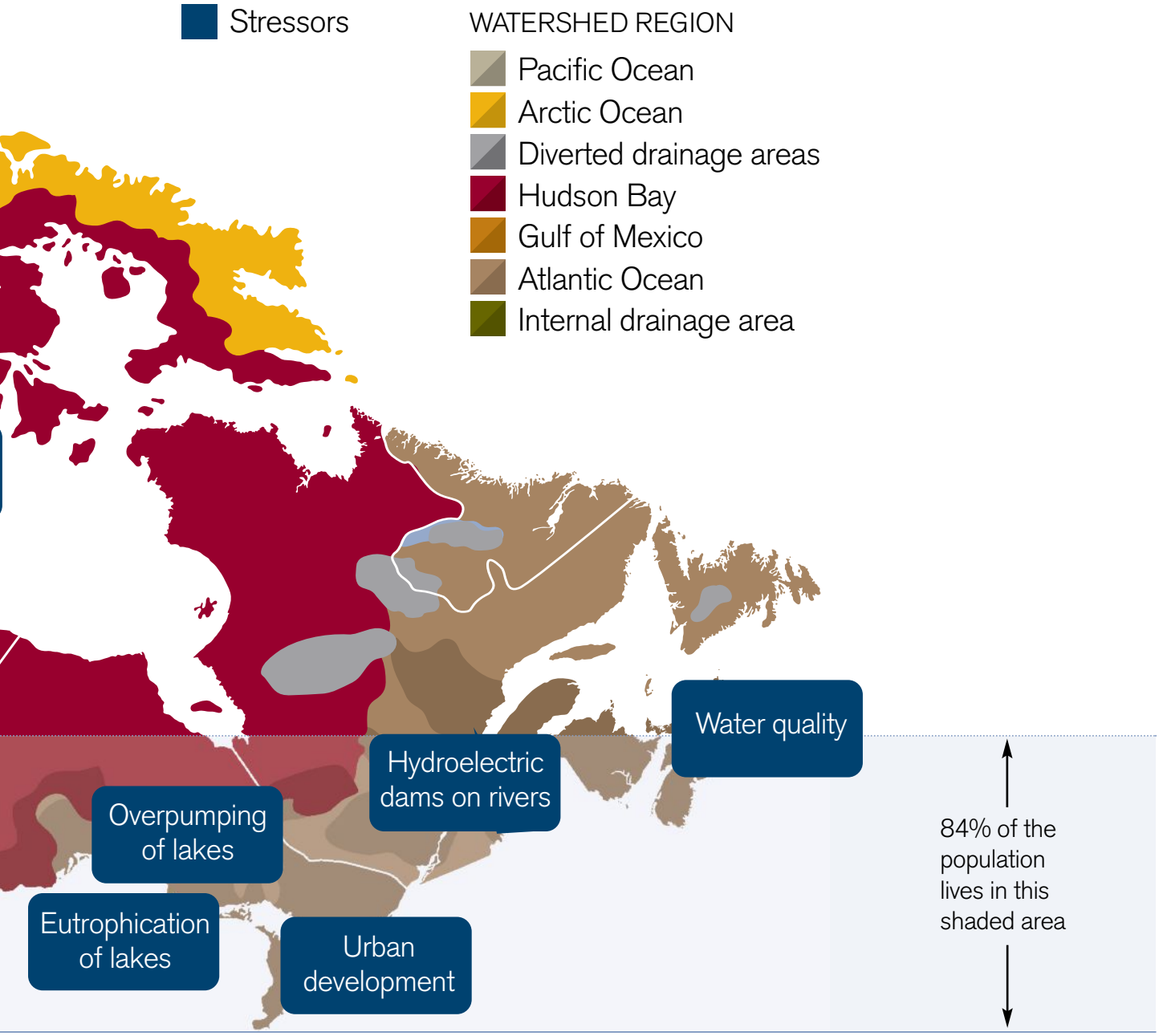
Figure 6 :

Canada: Examples of water stressors and solutions



	WEST	PRAIRIES
What are Canadians saying about Canada's water future?	"A time for governance reform." "What is so valuable about a national water strategy?"	"From flooding to the water-energy nexus." "How to avoid the hydro-climatic time bomb."
Some regional solutions	BC Water Sustainability Action Plan BC Living Water Smart AB Water for Life Strategy	SK Safe Drinking Water Strategy MB Water Strategy

Source: POLIS Project on Ecological Governance and Adaptation to Climate Change Team, Simon Fraser University, 2012; Council of the Federation Water Stewardship Council, Canada's Water InfoStream website, 2012.



CENTRAL

"Conservation on the rise – Ontario's renewal."

"Water and the political game."

ON Clean Water Act
QC Water Policy

ATLANTIC

"Sea level rise and dynamic First Nations involvement."

NS Drinking Water Strategy
PEI Watershed Planning Initiative
NL Water Resources Portal
NB Surface Water Protection Program

NORTH

N/A

Yukon Water Board
NWT Water Stewardship Program

Solutions for a more secure water future

Monitoring water trends at home and abroad can help you make more strategic decisions. Learn how Canadian agribusinesses and industries are:

- improving water productivity
- accounting for water
- thinking differently about water

Improving water productivity

Countries and companies around the globe are tackling water productivity improvements.

Did you know?

IBM uses sophisticated sensoring, smart meters and analytics to provide more reliable, in-time water data.[10]

Profound Technology Inc., from Olds, Alta., uses its patented Biostel technology to treat bacterially contaminated water wells in rural Alberta. There are plans to expand the technology, which is registered with the Canadian Food Inspection Agency and Health Canada, to the Canadian food and beverage industry at the farm and plant levels.

In the United States, reclaimed water use is increasing by roughly 15 per cent annually in response to more stringent regulations and economic incentives. SBI Energy's 2012 report forecasts that the global water recycling and reuse sector will increase nearly 91 per cent in market value between 2009 and 2015. Reusing water can benefit your bottom line and the environment. For example, it can preserve or restore wetlands and reduce water treatment and wastewater costs. How can growth in the reclaimed water industry benefit Canada, your industry or your business in the future?[11]

An August 2012 Government of Canada news release states that Canadian wastewater management is a top issue for the food and beverage industry, and that water treatment costs have doubled for this sector every six years. A 2012 report by Global Water Intelligence offers distilleries, breweries, dairy manufacturers and the sugar industry suggestions for water efficiencies and opportunities to gain value from wastewater. These industries face the challenge of having highly loaded wastewater streams.[12]

The Food and Agriculture Organization of the United Nations suggests cumulative investment of almost $1 trillion in irrigation technology will be needed to meet the food demands of growing world populations over the next 40 years. A United Nations report shows that, globally, irrigated crops yielded roughly 2.7 times more than rain-fed crops, and the amount of arable land modified for irrigation increased from 170 million hectares in 1970 to 305 million hectares in 2008.[13]

Some farmers in South Carolina and New Zealand use variable rate irrigation technologies. Israel, a world leader in irrigation efficiency, wastes only a tenth of its water through the widespread use of drip-feed and micro-feed irrigation systems. By considering lessons at home and abroad, you can develop ideas on how to consume less water on your operation.[14]

Did you know?

PepsiCo's web-based i-crop™ system uses water and soil moisture data to help farmers get "more crop per drop."[15]

Water technologies, such as RealTech Inc.'s M3000 online monitoring system, are being used by food and beverage companies to help monitor water quality and provide more efficient use of water.

Photo courtesy of RealTech Inc.

Making it work – RealTech Inc. Ontario

Ontario-based RealTech Inc.'s portable and online water quality monitors detect organic compounds to improve water reusability in industrial processes. Although Dan Shaver, Vice-President of Sales, worked mainly with municipal water clients in the past, he sees the food and beverage industry paying more attention to water due to increased regulatory pressure and projected cost savings. "A water quality monitoring plan helps companies meet water regulations and save money by minimizing product loss and reducing operating costs through improving water quality or decreasing water consumption. In the end, for most companies it comes down to cutting expenses."

www.realtech.ca

Did you know?

Water experts are adapting water management tools to account for climate change by focusing on bias adjustment, scenarios and case studies to better incorporate climate change uncertainties into modelling.

Accounting for water

Given agriculture's pivotal role in the water-food-energy nexus, your industry and region is likely using or considering water governance, management and allocation methods. Understanding these and other ways to account for water can help you to better prepare for coming changes. Consider best practices at home and abroad to help navigate your operation through an uncertain water future.

Commonly, water users throughout the world pay less for water than the cost to provide it to them and, in some developed countries, irrigation pricing does not reflect real market value for water. Canada's per capita water use is one of the world's highest, yet its water prices are some of the lowest. Environment Canada suggests irrigation water charges in Canada only recover 10 per cent of the actual costs of the service, leaving inadequate funds to upgrade or maintain water infrastructure.[16]

FCC Chief Agriculture Economist Jean-Philippe Gervais says rising water prices in some countries will affect global markets. "In a highly globalized world, increases in water costs in one part of the world will change the face and nature of competition. With experts predicting as much as a 40 per cent gap between water supply and future demand, higher prices will result. Businesses will then face incentives to increase water productivity, slow future consumption and help fill the anticipated gap."

Did you know?

Lake Winnipeg suffers from the worst algae problem of any freshwater lake in the world, in part due to an excess of phosphorus and nitrogen. The wetland on the lake's south end also suffers from an abundance of hybrid cattails that stifle plant growth and reduce its ability to remove excess nutrients from the water. The Netley-Libau Nutrient-Bioenergy Project received global recognition at the United Nations Conference on Sustainable Development (Rio+20) for its efforts to harvest the cattails and turn them into biomass fuel pellets, which would improve plant diversity and growth in the marsh and provide biofuel for local residents and industry.[17]

Making it work – Hortau Inc. Quebec

Irrigation scheduling technology using climate and soil data in combination with web and GPS technology, can improve irrigation efficiency. Quebec-based Hortau Inc. uses patented soil tension sensors to help its agriculture clients precisely manage their irrigation using available groundwater in a narrow comfort zone for their crops. The data is automatically uploaded from the field to Hortau's cloud computing application for real-time accessibility from anywhere, using smartphones or web-enabled tablets.

Hortau President Jocelyn Boudreau explains the benefits of using water, energy and fertilizer more efficiently. "Our technology is helping growers simplify the irrigation management process through relevant high precision data. The result is a reduction in water and energy usage while optimizing inputs like fertilizers and pesticides. It's a true win-win situation for farming operations and the environment."

www.hortau.com

Did you know?

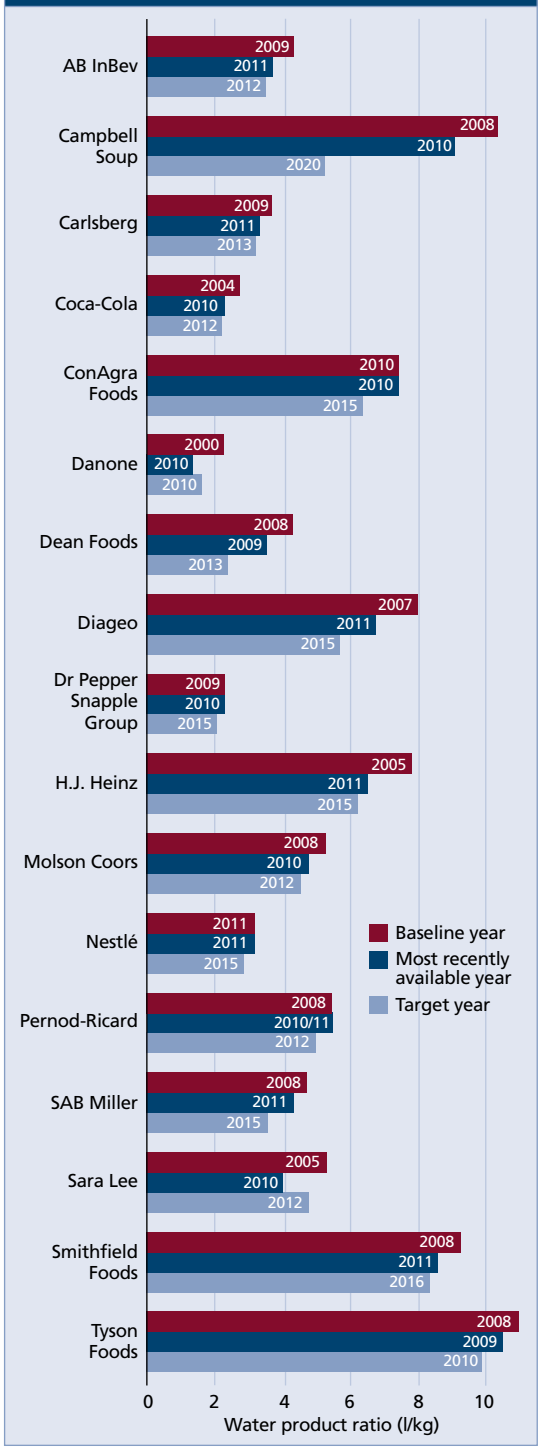
Environmental, carbon and water finance workshops are offered through the University of Toronto's Centre for Environment, including one that asks, "How Blue is Your Bottom Line?" To learn more about the workshops, visit the University of Toronto website: www.learn.environment.utoronto.ca/home/environmental-carbon-and-water-finance.aspx

Accounting for water goes beyond water pricing. A triple bottom line approach considers the needs of people, the planet and profitability – and corporations increasingly integrate water into their bottom line through sustainability indexes or corporate strategies. Major global food and beverage companies have set ambitious water targets, driven by rising water prices, tightening regulations and increasing consumer demand (see Figure 7). How soon will retailers in your supply chains require you to measure your water footprint?

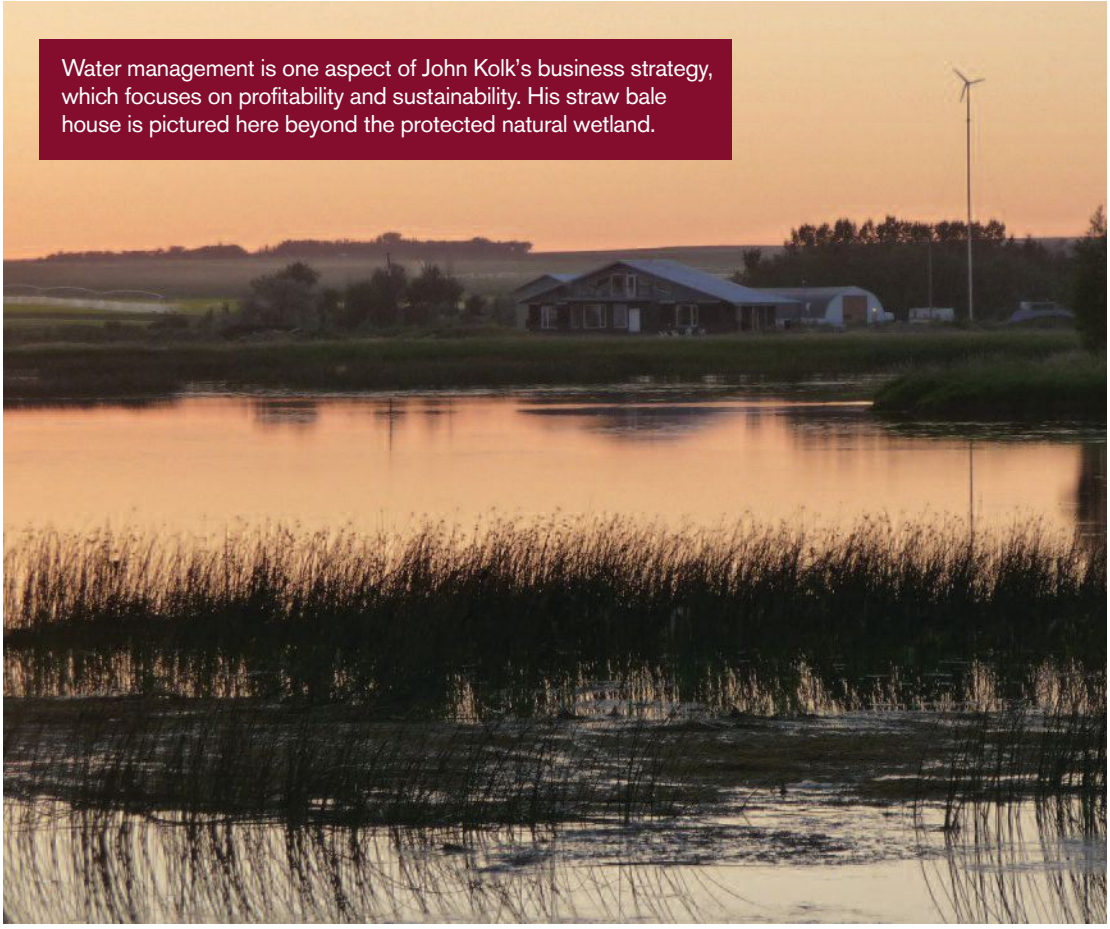
Water footprints are a measure of direct and indirect water use, accounting for rainwater consumed (green water footprint), pollution and water quality (grey water footprint), and surface or groundwater consumed through evaporation or being embedded in the product (blue water footprint). In 2011, the Water Footprint Network established a Global Water Footprint Standard for water definitions and calculation methods, which garnered international support from governments, corporations, partners and researchers.[18]

Some regions facing water pressures, such as the Okanagan and southern Alberta, have water pricing systems that reward low-volume customers. Environment Canada's 2011 Municipal Water Pricing Report showed a strong correlation between lower per capita water use and charging per volume of water instead of a flat rate. The report showed that, in 2006, average residential water use per capita was 60 per cent higher for customers with flat rates than customers with volumetric rates.[19]

Figure 7: Major food and beverage companies are reducing water:product ratio targets



Source: Global Water Intelligence, Feeding a growing water business, Volume 13, Issue 4, April 2012



Water management is one aspect of John Kolk's business strategy, which focuses on profitability and sustainability. His straw bale house is pictured here beyond the protected natural wetland.

Photo courtesy of Kolk Farms Conrich Ltd.

Making it work – Kolk Farms Conrich Ltd. Picture Butte, Alta.

When it comes to water on his irrigated and dryland grain and oilseed, feedlot and cow/calf operation in Picture Butte, Alta., John Kolk manages water to meet today's needs and prepare for the future. Kolk's focus on water ranges from constructing a wetland to process grey water to implementing variable-rate irrigation to grow crops. "Water can be the biggest hindrance to plant growth in our region. Since you run your operation and make decisions on your limiting factor first, water conservation, costs and application techniques are where we spend our money first."

Kolk believes in the adage: "If you don't measure it, you won't manage it." He says that lower costs to measure water would make it easy, affordable and top-of-mind for farmers to regularly use technology to monitor optimum water intake for animals or soil moisture, and sees affordable sensors, cloud computing and digital applications on the horizon. "Farmers adapt quickly when they see the payback. The dashboard approach to managing water more effectively is just around the corner. Agriculture is so exciting right now!"

Finland-based Raisio is the world's first food company to include an H_2O label on its product packaging. The label shows a product's water consumption from production to end product.[20]

Some companies aim to be water neutral by reducing their water footprint to offset the negative impacts of water use. In Water Neutral: Reducing and Offsetting the Impacts of Water Footprints, Professor Arjen Hoekstra writes, "The water-neutral concept offers a great opportunity to translate water footprint impacts into action to mitigate those impacts within both communities and businesses."[21] How many of your competitors are already monitoring their water footprint?

Gervais suggests that as water becomes scarce, it will become more expensive. Businesses located in water-rich regions will have an edge and businesses throughout the world will be challenged to account for water in their bottom line. "Different water allocation methods and emerging technologies will bring new risks and opportunities for businesses. Businesses with a water management strategy will have a competitive edge."

Thinking differently about water

Thinking differently about water usage and management can provide business owners with options in an uncertain water future. What new technologies or approaches could you consider today to build greater water security for your business? What game-changing innovations will displace your current water technologies or processes? How will you manage water differently on your operation in the future?

When asked in 2012 about the water-related processes Canada should implement in the next five years, FCC's Vision Panel ranked the following top three solutions:

- provide incentives for good water practices (20 per cent)
- protect wetlands, groundwater and surface water resources (19 per cent)
- restrict the export of water or water-intensive products (14 per cent)

See www.fccvision.ca/water for the full FCC Vision Panel results for water-related concerns.

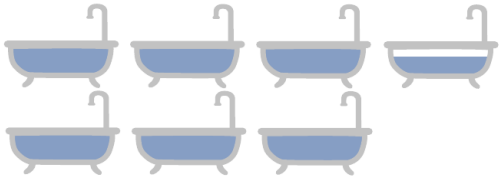
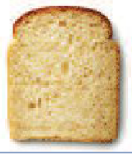
Think about . . . virtual water

Virtual water is the economic measure of the water used in growing and manufacturing products. Another way to think about virtual water is as water embedded in products (see Figure 8).

Understanding virtual water can help inform decisions about what to produce and where to produce it. Water-rich and water-smart countries will have an advantage in an uncertain water future as their goods will be more in demand by countries with water shortages. The virtual water content of foods may actually vary depending upon the country or region in which each is produced, due to differences in climate, technology and production processes.[22]

Some analysts suggest virtual water exports are a risk rather than an opportunity for Canada. They believe that exporting water-intensive products without considering the effect on Canada's water reserves perpetuates the myth of limitless abundance and can put Canada at risk by not accounting for water loss or environmental impact.

Figure 8: Virtual water in food

		Water needed to produce (litres)	
1 hamburger		2400	= 
1 glass of milk		200	= 
1 egg		135	= 
1 apple		70	= 
1 slice of bread		40	= 
1 potato		25	= 

Source: Food and Agriculture Organization of the United Nations, 2008, FAO Water Development and Management Unit, FAO virtual water poster (adapted), http://www.fao.org/nr/water/news/virtualPRINT.html.

A 2011 Council of Canadians report and several recent books on Canada's water future raise concerns about the need to preserve Canada's water heritage.[23]

Did you know?

The Virtual Water Project has worked with iTunes to develop an interactive iPhone app that allows users to learn more about the virtual water content of foods and beverages. See http://virtualwater.eu/ to learn about the virtual water app.

Canada is the third largest virtual water exporter and has the fifth largest water footprint. What does this mean to your business? There may be untapped potential in providing high-value, water-rich exports to water-stressed countries.

ASK THE EXPERTS – Robert Sandford

Virtual water exports can enter existing or new global markets.

Once the naturally occurring sugars are filtered from the sap to create maple syrup, the remaining 85 per cent is sugar-free maple water that Eau Matelo bottles and markets as De l'Aubier sap water.

Making it work – Eau Matelo Inc. Quebec

Quebec's Eau Matelo, winner in the best still or sparkling water category of the Water Innovation Awards 2012, has found a new way to add value to water left over from harvesting maple syrup. Every spring, pure sap is harvested from Quebec maple trees and filtered to concentrate the sugars into 15 per cent of the volume collected, before being boiled to produce maple syrup. Eau Matelo reclaims the remaining 85 per cent, typically discarded by maple farms, to create unique drinking water called De l'Aubier, which means "from the sapwood."

Co-founder Elodie Fleury says, "Sustainability and respect for our natural resources are important to Eau Matelo so we're turning maple sap waste into 'green' blue gold." This premium water product is sold in a designer glass bottle and targeted at fine dining customers and aficionados of natural foods and wines.

www.delaubier.ca

Think about . . . desalination

Countries and energy companies are exploring desalination – the process of removing salt from seawater – as a solution to address projected future shortfalls of fresh water. Despite the high energy intensity and cost of desalination, thousands of plants are operating or being constructed worldwide. Advances in thin film membranes for reverse osmosis and nanotechnology offer new opportunities for efficiency and cost savings.

According to a 2012 Global Water Intelligence report on industrial desalination and water reuse, the food and beverage industry is the largest industrial market for water technology companies by total expenditure, due largely to the pressure to improve water stewardship efforts. SBI Energy forecasts more than 320 per cent growth in the global desalination market between 2010 and 2020.[24]

Nick Hodge writes on the Green Chips Stocks website that desalination is the answer to the world's water issue. He says recent technology advances will help offset the 50 to 80 per cent of costs typically spent on energy during the desalination process. "As these costs continue to fall – and the costs of traditional energy and water continue to ascend – desalination will emerge as a game changer."[25]

Think about . . . integrated water resources management

According to the Global Water Partnership group, integrated water resources management (IWRM) "promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of ecosystems and the environment."[26]

Many decisions about water are made according to political boundaries or at the facility or farm level, rather than at the watershed level. IWRM encourages an integrated approach where stakeholders make decisions for mutual benefit. By 2011, 64 per cent of all countries had developed IWRM plans.[27]

IWRM is on the rise in Canada, covering diverse issues such as drought planning, farm income, fishery habitat protection and riparian health improvements. Through IWRM initiatives, agribusiness owners can influence their region's future water resources.

Making it work – Silver Hills Ranch British Columbia

Both in his off-farm work with the British Columbia Cattlemen's Association (BBCA) and running Silver Hills Ranch with family members, Lee Hesketh promotes integrated water resource management and a sustainable approach to ranching. In his work with the BBCA's Farmland – Riparian Interface Stewardship Program, Hesketh helps ranchers and regulators to more collaboratively manage water and meet regulations in a profitable, sustainable way.

In 2012, Silver Hills Ranch was named an environmental steward by the BBCA for using water and grazing management strategies to make its property more productive for its Black Baldie cattle and wildlife. The ranch uses off-stream watering for its herd and fencing to protect streams, and is certified as salmon safe.

As the costs of desalination technology decrease, expect more plants to be built in coastal areas worldwide in response to the need for more fresh water.

Final thoughts

Water matters to agriculture and agriculture matters to water. As a key player in the water-food-energy nexus, Canadian agriculture will have a leading role in building a more secure water future.

Asking questions today can help build a secure water future tomorrow:

- How can Canadian agribusinesses maximize water productivity?
- What game-changing technological advances will affect the supply-demand gap?
- What policy changes do you expect in the next five years?
- What infrastructure changes will you need to make to keep pace with changes from retailers who are measuring water footprints to meet consumer demands and new regulations?
- How can the agriculture industry continue to change Canada's reputation as a water-rich country with a myth of limitless abundance to a water-smart country contributing to global water security?

To help you find answers to these and many other questions, read pages 24 – 26 and learn what four Canadian water experts believe are the top risks and opportunities Canada should consider in the face of an uncertain water future.

Do you consider water a critical risk for your business or an untapped opportunity? Perhaps it is both.

Knowledge Insider

Tips, tools and strategies | **Water**

ASK THE EXPERTS

"What are the top risks and opportunities that Canadian agribusinesses should consider in an uncertain water future?"

Brent Paterson
Executive Director
Irrigation and Farm Water Division
Alberta Agriculture and Rural Development

Risks

1. Climate change – Less water in rivers and streams and less precipitation during the growing season in many agricultural areas, combined with higher temperatures, may create production challenges for producers.
2. Competition for water – In water-short areas, increased municipal, industrial and environmental demand for water may result in less water for agricultural production.
3. Water quality – Agriculture's impact on surface and groundwater resources may result in reduced support from an increasingly urban Canadian public and reduced sales to international markets.

Opportunities

1. Climate change – Rising temperatures and changes to the growing season will increase the diversity of crops that can be produced in many parts of Canada.
2. Increased economic return – By implementing effective water management, Canadian agriculture could benefit from the growing demand for food, rising food prices and ability of many developing countries to pay.
3. Water quality – World markets are increasingly choosing agricultural products that are safe and grown in an environmentally sustainable way – both strengths of Canada's system.

P. Kim Sturgess
CEO
Alberta WaterSmart

Risks

1. Groundwater degradation – Canada has a gap in understanding the state of its groundwater aquifers in terms of contamination, overall health, quantities and existing qualities.
2. Surface water use – Canada is viewed as having abundant surface water, yet there are regions, such as southern Alberta, where allocation and use are a challenge. Many sub-basins, like the Bow River basin, have to balance multiple stakeholder needs, including the environment.
3. Water-food-energy nexus – Water is integral to energy and food production. A surprising amount of energy is required to distribute

water in cities, creating the need for water and energy conservation to provide a balance for future population growth and related energy and food demands.

Opportunities

1. Groundwater potential – Canada can more effectively manage its massive groundwater aquifers through a better understanding of groundwater and more effective mapping.
2. Surface water management – Canadians can better manage water withdrawals by collaborating to improve on- and off-stream storage of fresh water from rivers.
3. Water-food-energy nexus – A better understanding of this nexus can help create balance and efficiencies through innovative technologies and approaches such as reusing or conserving water or sharing it between industries.

Dr. Chandra Madramootoo
Professor
McGill School of Environment

Risks

1. Climate change impacts – Agriculture will need to adapt or cope with a lack of available soil moisture from droughts or excess soil moisture from floods.
2. Water quality – Water quality issues can be precipitated by agriculture through livestock and crop production methods that pollute water. Conversely, agriculture can be affected by degraded water that can create food quality risks in growing fruit and vegetable crops.
3. Air quality – There's a risk of not managing soil and water systems to reduce emissions. For example, flooded soils in waterlogged conditions can release greenhouse gases.

Opportunities

1. Global food security – Water-rich Canada could export commodities and value-added foods to address global food security concerns, in particular for countries with a limited potential to produce food.
2. Higher value creation – By properly valuing our land and water today, rather than waiting for land and water values to rise, we would be forced to move to a model of higher value creation.
3. Niche markets – Water could be used to produce niche products such as pulses, which create higher returns and minimize environmental impacts.

ASK THE EXPERTS

Robert Sandford
Chair
UN Water for Life Decade

Risks

1. Policy risk – Agricultural policy in Canada is challenged to keep up with changes in the global water-food-energy nexus. Canada can do well economically if it takes advantage of its market position or its actual and potential water management capacity by doing good abroad.
2. Climate change risk – Canadian agriculture needs to address how climate change is affecting the way water moves through the hydrological cycle, which will affect production in many areas of the country.
3. Agriculture runoff risk – Agriculture needs to recognize and address the impact of agricultural runoff on national water quality.

Opportunities

1. Water management – A new world order is developing based on abundant water resources and the ability to manage them effectively. Canada could be at the top of that order if it gets its house in order with respect to water management.
2. Virtual water exports – The effects of growing populations and climate change will alter agricultural production patterns around the world, creating new markets and enhancing existing trade relationships based on virtual water exports.
3. Reward system – A huge opportunity exists in agricultural policy reform to reward farmers for maintaining critical ecosystem functions and producing food.

Knowledge Insider tools

What you'll find	Web address
WATER TRENDS – Global	
The World Water Council's website raises awareness and encourages action on critical water issues for the environmental sustainability of water.	www.worldwatercouncil.org
Circle of Blue is a non-profit information source about the global water crisis.	www.circleofblue.org
The Food and Agriculture Organization of the United Nations provides facts about how water is used in agriculture and ideas for best practices.	www.fao.org/nr/water
WATER TRENDS – Canada	
This website compares provincial and federal water policies across Canada.	www.waterpolicy.ca/compare-provinces
FLOW Canada is an independent group of water experts from across Canada encouraging government action to protect freshwater resources.	www.flowcanada.org
The Council of the Federation's Water Infostream page features a map of Canada with links to provincial water resources.	www.councilofthefederation.ca/infostream.html
WATER TRENDS – Agriculture	
Environment Canada provides environmental sustainability indicators such as water availability and soil and water quality for agriculture.	www.ec.gc.ca/indicateurs-indicators/
Agriculture and Agri-Food Canada provides interactive maps that show water erosion risk areas, potential for land drainage issues, agriculture use restrictions and a drought watch map.	www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1228838087110&lang=eng
WATER FOOTPRINT	
The Water Footprint Network is an international learning community focused on water metrics and conservation.	www.waterfootprint.org
The WaterSense label, sponsored by WaterWise Technologies and the United States Environmental Protection Agency, is included on products that save water.	http://www.waterwisetech.net/waterwise_epa_watersense.htm

What you'll find	Web address
WATER FOOTPRINT continued	
This Canada Water Week video provides an animated overview of the 2012 Canada water week theme – Discover Your Water Footprint!	www.youtube.com/watch?v=63D_b7uUkSU&feature=related
WATER SOLUTIONS	
IBM's Global Harvest Initiative includes a presentation on the water-food-energy nexus.	www.globalharvestinitiative.org/
The Carbon Disclosure Project now includes a water disclosure project.	https://www.cdproject.net/en-US/Programmes/Pages/cdp-water-disclosure.aspx
BASF, a global chemical company, is active in desalination.	www.desalination.ucla.edu/
WATER RISKS	
The Global Environmental Management Institute's water sustainability tool helps users identify water-related risks.	www.gemi.org/water/module2.htm
World Wildlife Federation's water risk filter helps companies and investors identify risks and suggests possible responses.	http://waterriskfilter.panda.org/

Notes

Endnotes

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3 FCC developed this infographic using information from common reference works and the following specialized sources:

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- Globe-Net: The Business of the Environment Online (www.globe-net.com)
- Statistics Canada (www.statcan.gc.ca)
- United Nations (unwater.org)

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8 Adapted with permission from Dr. Chandra Madramootoo, "Canada's Role in Global Food Security," (Toronto, *Canadian Food Summit*, Conference Board of Canada, Feburary 7, 2012), consulted on the Conference Board of Canada website, www.conferenceboard.ca/Libraries/CONF_PRES_PUBLIC/120018_presentation_madramootoo.sflb.

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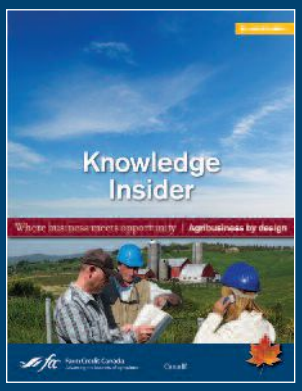

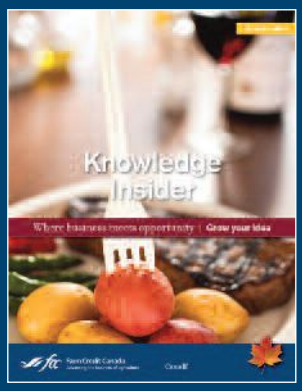

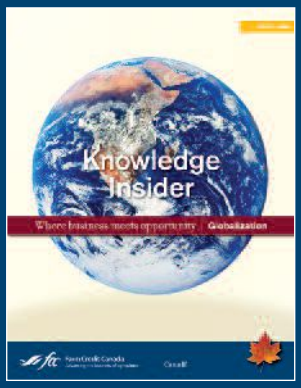

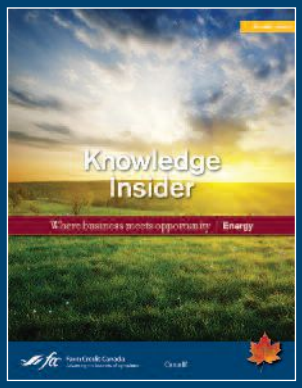

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