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THE CANADIAN AGRI-FOOD POLICY INSTITUTE

Water – The big global challenge
"Re-positioning our advantages for the future"

Perspectives 2016: Seizing Opportunities
Drummondville, QC

April 5, 2016

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"We need to feed 9 billion people by 2050"

What word is missing in this often-quoted statement?

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“We need to sustainably feed 9 billion people by 2050”

So, what does this mean for Canada?

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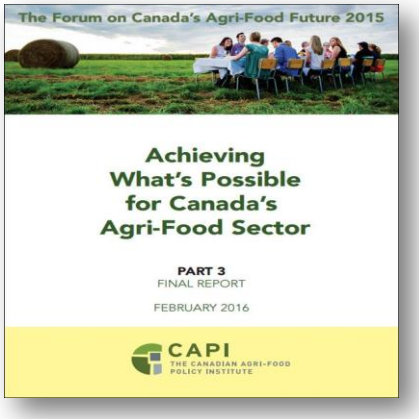
Canada’s opportunity

- **Growing the agri-food sector, improving farm income while enhancing eco-systems and nutritional quality of food**



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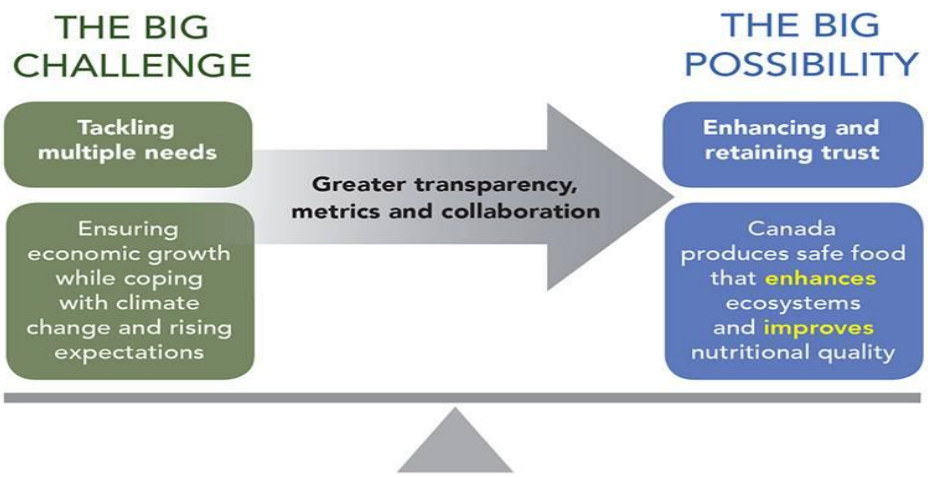
Canada's opportunity



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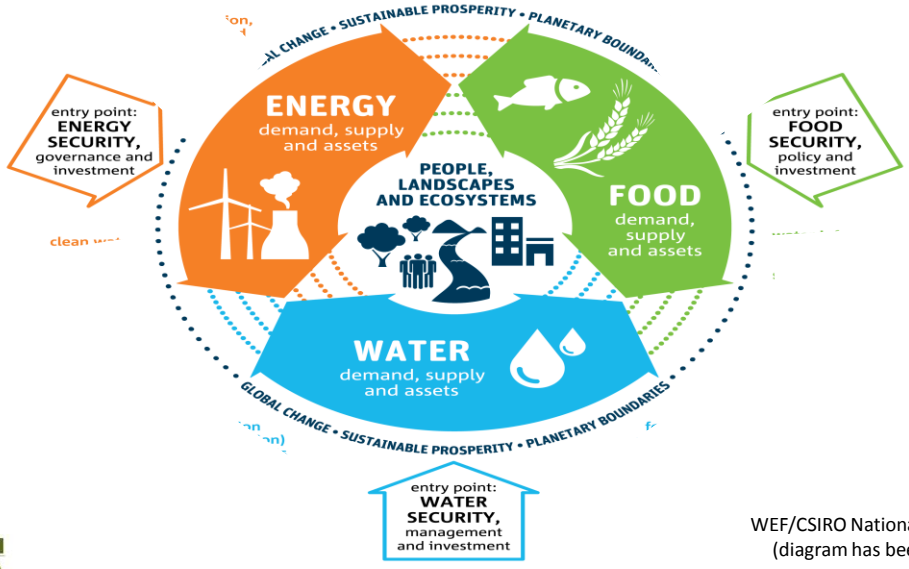
Achieving What's Possible for Canada's Agri-Food Sector 5

Water-energy-food nexus



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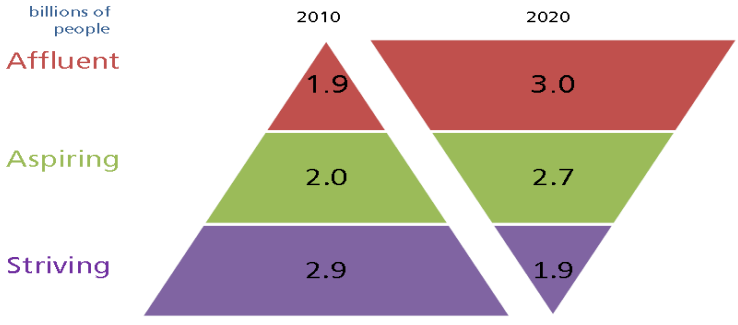
WEF/CSIRO National Outlook 2015
(diagram has been modified)

Consumer demographic trends are overwhelmingly favourable



More than 1bn new consumers able to buy our products by 2020

Source: Unilever estimates Globegro, updated upon LSM 2.0 baseline studies.

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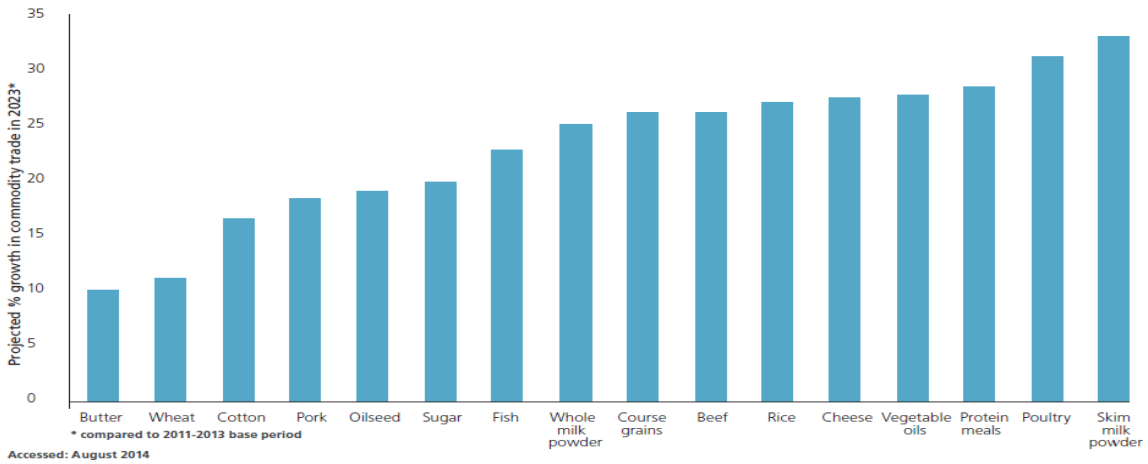
Food demand

Figure 16: More export opportunities in protein-rich foods on the horizon

Source: OECD – FAO Agricultural Outlook



* compared to 2011-2013 base period

Accessed: August 2014

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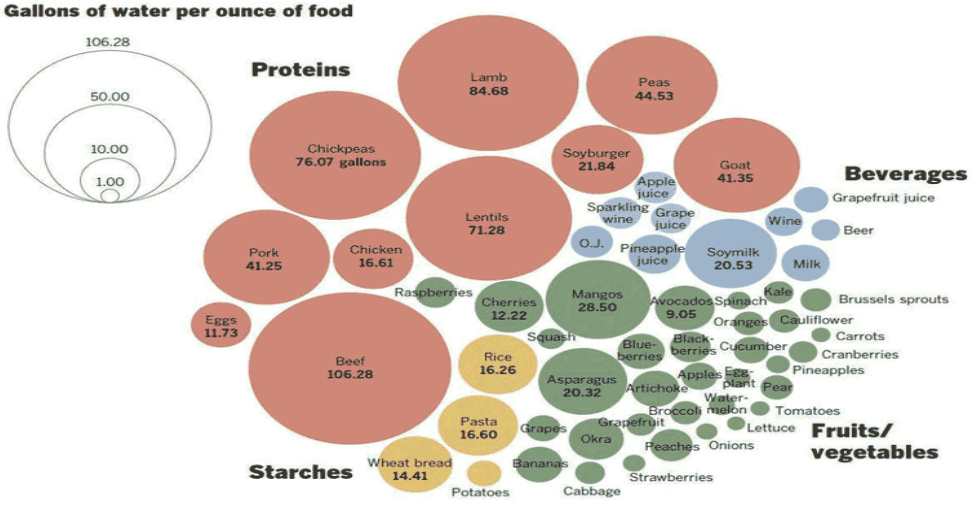
The water footprint of foods
Means Canada will have a growing protein advantage



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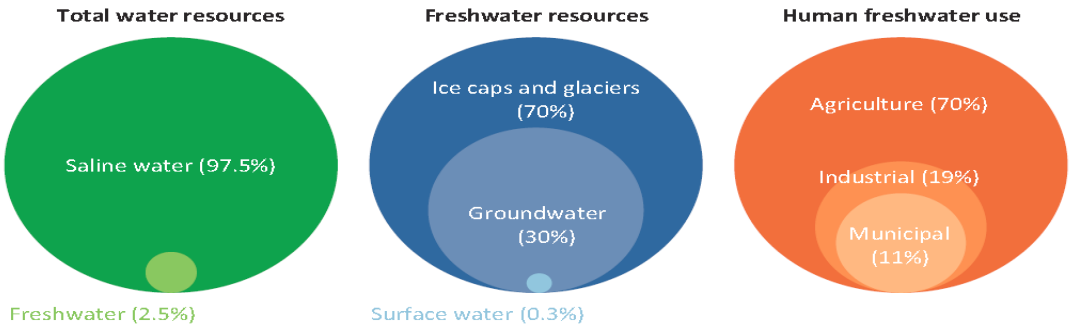
Source: The Los Angeles Times

Figure 17.1 ▻ World water resources and human freshwater use



Sources: Shiklomanov (1993); UN FAO Aquastat database.

, 2012

We can feed 7.4 billion people as we have increased the use of non renewable water by over 50% in the last 50 years, most of this from ground water which now accounts for 50% of freshwater withdrawals. In many parts of the world this is beginning to run out.

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Hydrology: When wells run dry, Richard Taylor, *Nature* **516**, 179–180 (11 December 2014)

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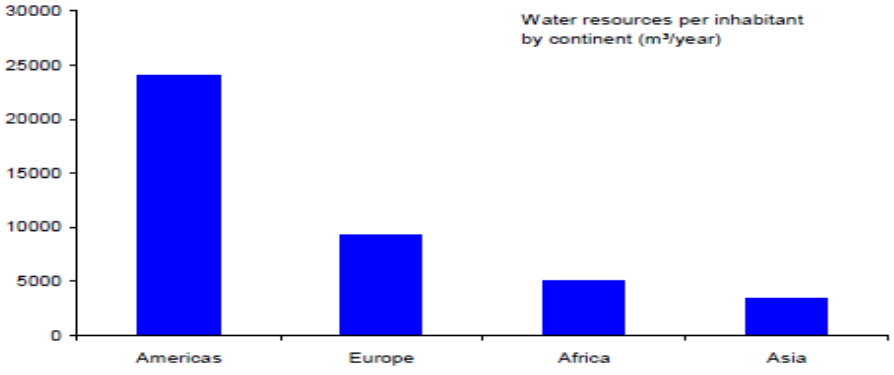
Agriculture uses 70% of freshwater withdrawals

Figure 5: World water resources by region



Source: FAO

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Risks we face

Global Risk 2015
World Economic Forum

Figure 1: The Global Risks Landscape 2015

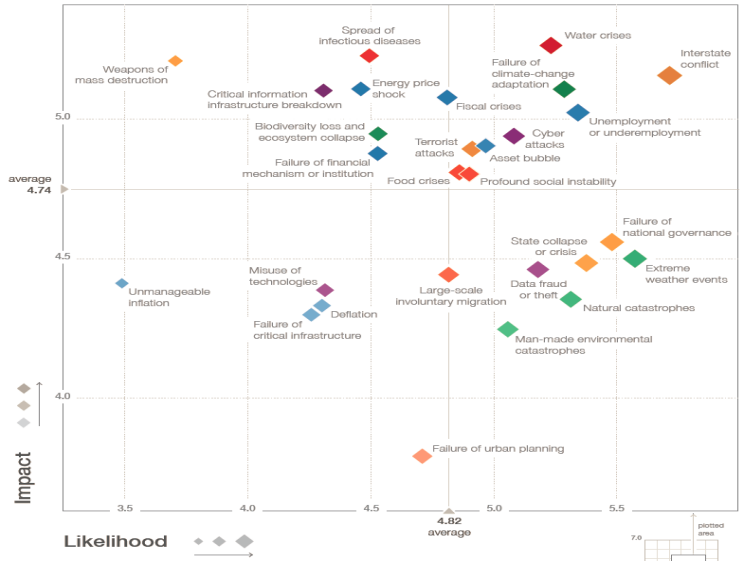

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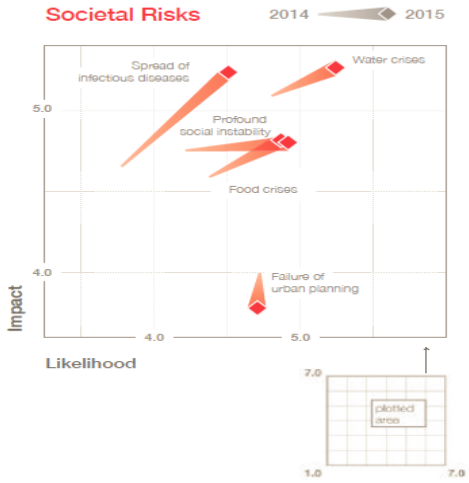
Figure 1.2: The Changing Global Risks Landscape 2014-2015, Societal Risks



Source: Global Risks Perception Surveys 2013 and 2014, World Economic Forum.
Note: See endnote 25

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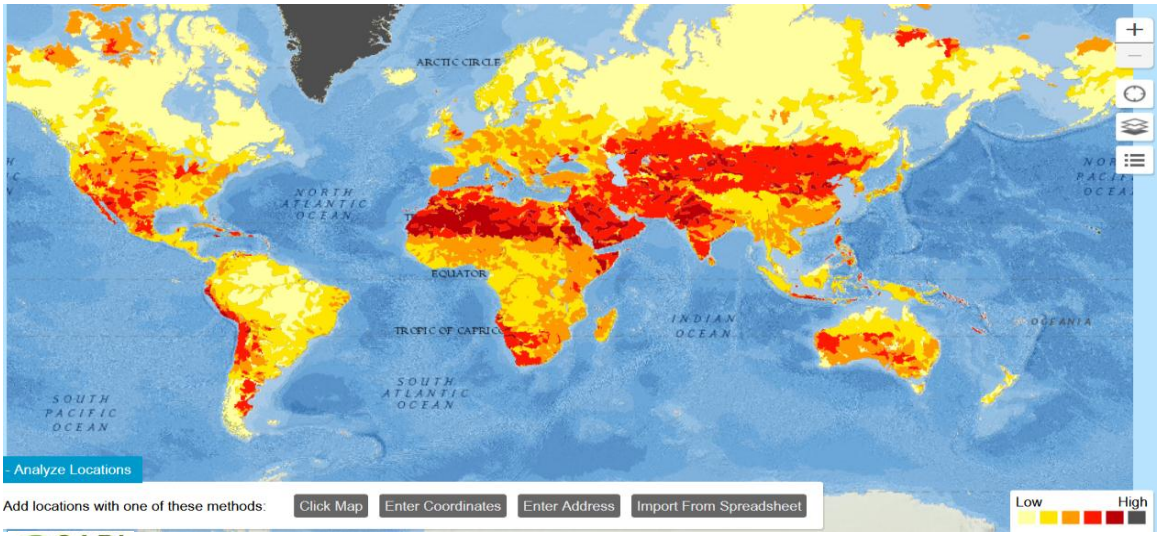
Overall water risk



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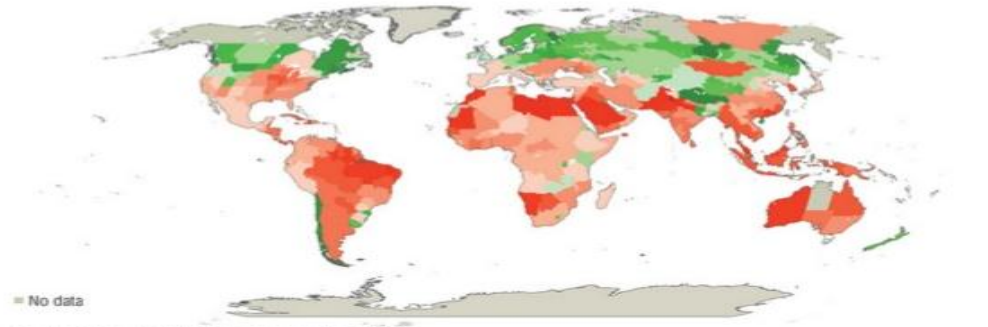
Aqueduct water resource analysis

Increasing challenge from climate change

IFPRI 40 YEARS

Impact of climate change on mean crop yield



Needed: 14% ▲ in crop yield per decade

Happening: 20% ▼ in global cereal yields by 2050

Shenggen Fan, May 2015

Source: WRI 2013, IPCC 2014, World Bank 2013

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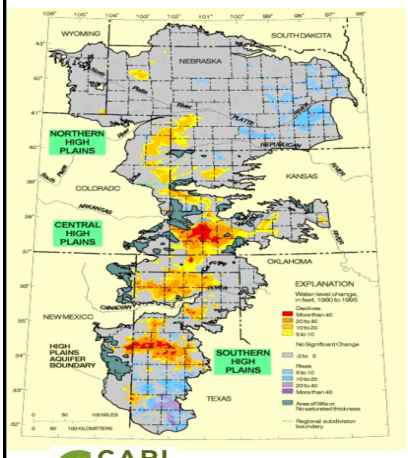
Groundwater withdrawal reduced Kansas' wealth approximately $110 million per year –just one of 8 states drawing from the Ogallala aquifer



> Current Issue > vol. 113 no. 9 > Eli P. Fenichel, 2382–2387, doi: 10.1073/pnas.1513779113

CrossMark

Measuring the value of groundwater and other forms of natural capital

Eli P. Fenichel[a,1], Joshua K. Abbott[b], Jude Bayham[a,c], Whitney Boone[a], Erin M. K. Haacker[d], and Lisa Pfeiffer[e]

Author Affiliations

Edited by Stephen Polasky, University of Minnesota, St. Paul, MN, and approved December 31, 2015 (received for review July 13, 2015)

Abstract | Full Text | Authors & Info | Figures | SI | Metrics | Related Content | PDF | PDF + SI

Significance

Economists have long argued, with recent acceptance from the science and policy community, that natural resources are capital assets. Pricing of natural capital has remained elusive, with the result that its value is often ignored, and expenditures on conservation are treated as costs rather than investments. This neglect stems from a lack of a valuation framework to enable apples to apples comparisons with traditional forms of capital. We develop such an approach and demonstrate it on Kansas' groundwater stock. Between 1996 and 2005, groundwater withdrawal reduced Kansas' wealth approximately $110 million per year. Wealth lost through groundwater depletion in Kansas is large, but in a range where offsetting investments may be feasible.

Published online before print February 8, 2016, doi: 10.1073/pnas.1513779113

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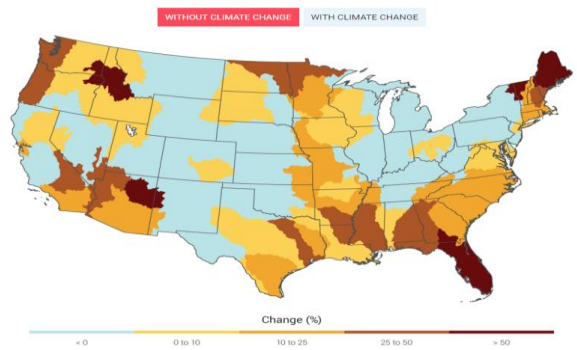
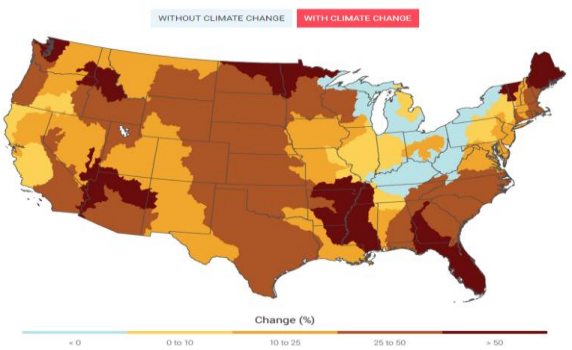
Projected Changes in Water Withdrawals
(With & Without Climate Change)

Food Production will change





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Groundwater depletion that will affect tens of millions of people

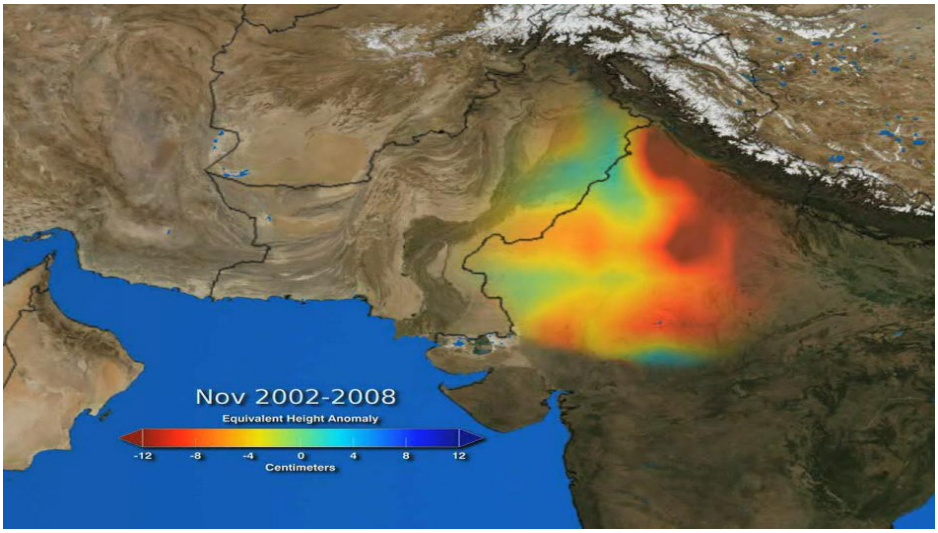
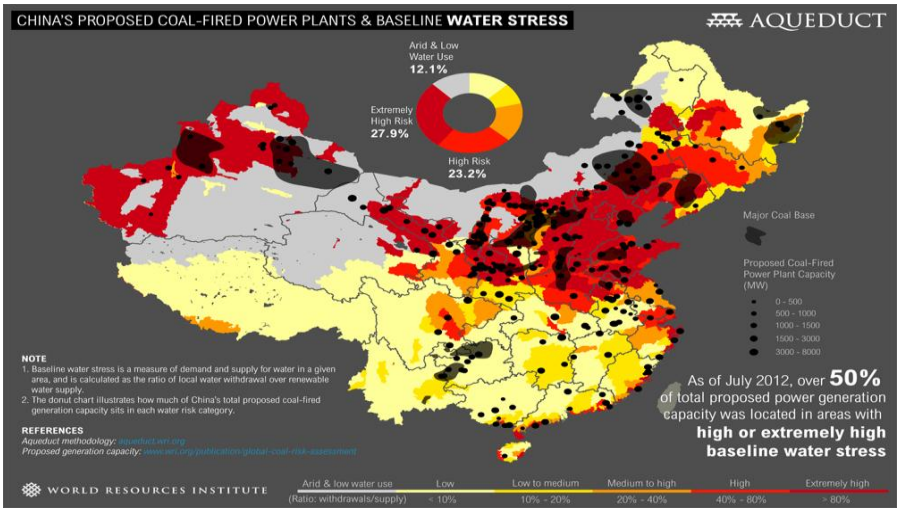


Image credit: NASA/Trent Schindler and Matt Rodell

China's coal fired power generation located in areas of water stress



Temporary solution -diverting water

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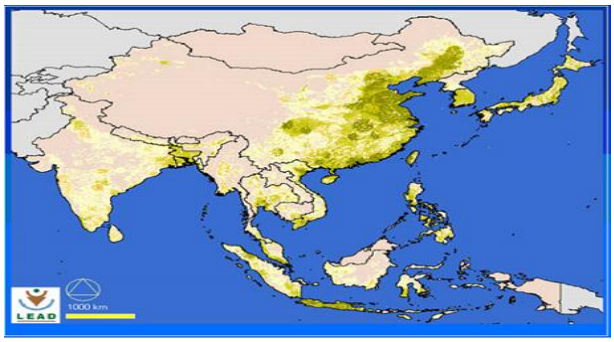
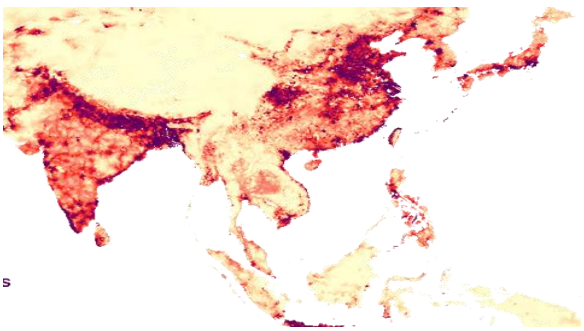
Human and poultry population densities



Poultry



Humans

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Source: FAO, WHO, Rimsa, Mexico City April 2005

Agricultural intensification: disease & pollution

Nitrate levels in the waters are soaring

Kim, T.-W., Lee, K., Najjar, R. G., Jeong, H.-D. & Jeong, H.-J. *Science* advance online publication

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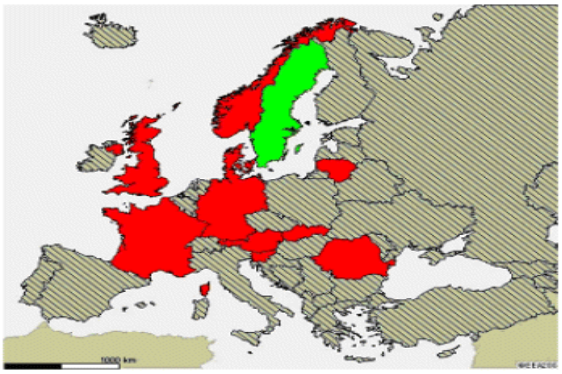
The issues are not unique to China

Results of EU survey of the danger of groundwater pollution by pesticides



Red: danger of pesticide pollution in GW reported by countries

Green: no danger of pesticide pollution in GW reported by countries

A number of the EU countries did not report results

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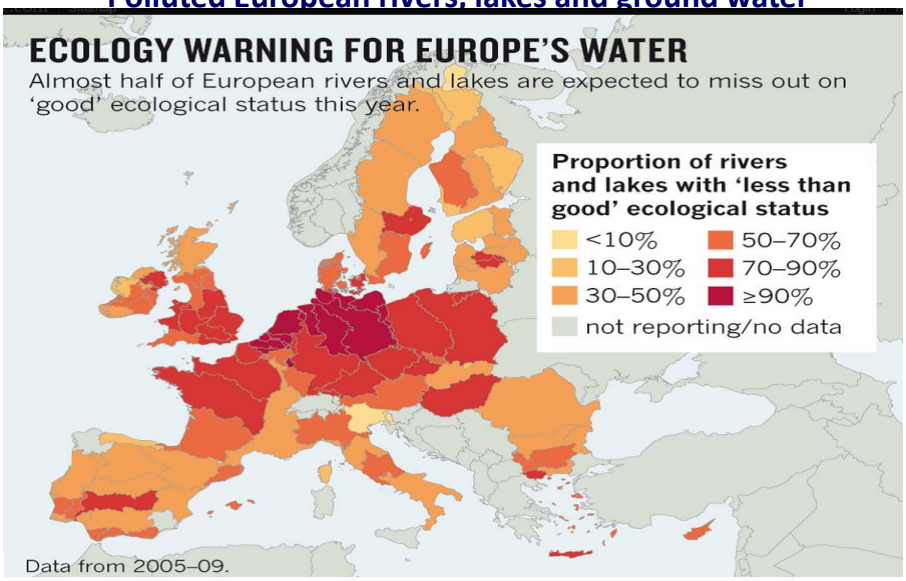
Polluted European rivers, lakes and ground water



Nature March 5 2015

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March 2016 Chile

Massive algae bloom kills 23 million salmon

- Warmer ocean waters and nitrate-rich runoff from livestock blamed.
- Increased use of antibiotics to treat bacteria infection in remaining salmon have closed some U.S. markets.
- Economic losses from Chile's bloom – over $800 million
- about equal to the value of Canada's entire farmed salmon industry

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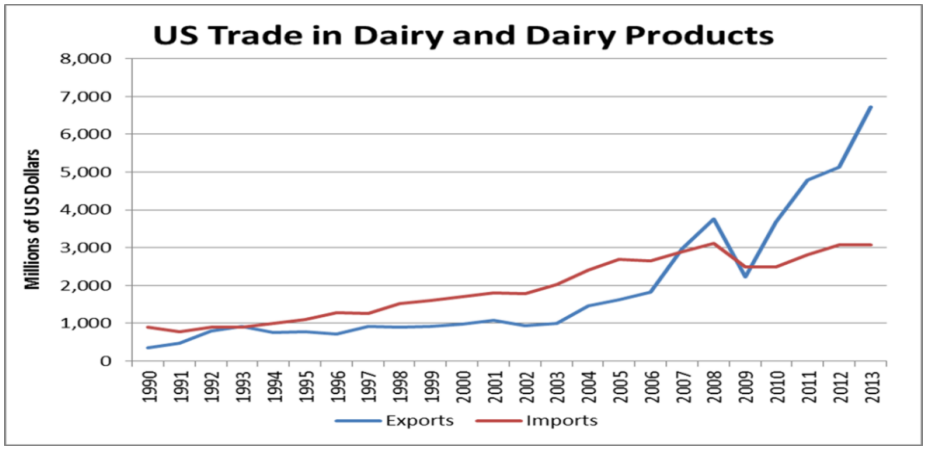
With no monetary value on water
California became the leading U.S. dairy state



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Source: USDA/GATS

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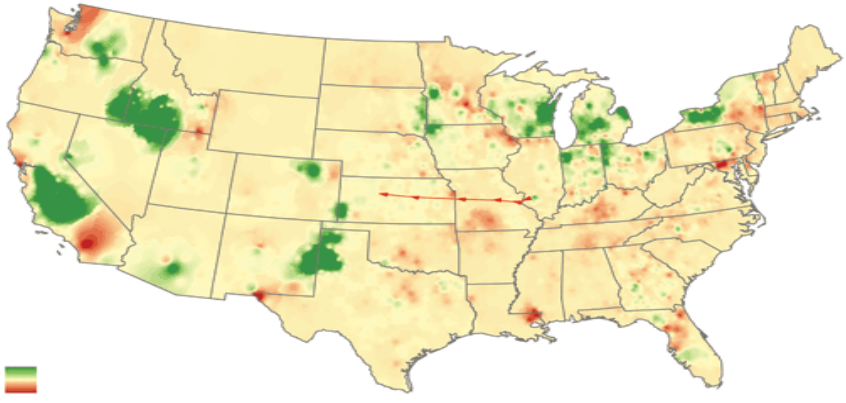
What happens when consumers/citizens become aware of the issue?

Areas of growth and decline of milk production

Rust indicate less milk in 2011 than 2001. Green areas mean more. Buff color designates a neutral milk region.



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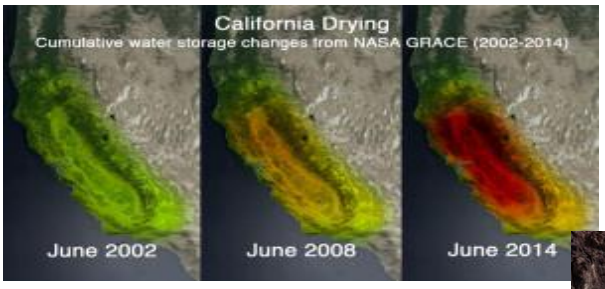
Unsustainable practices intensified the water crisis



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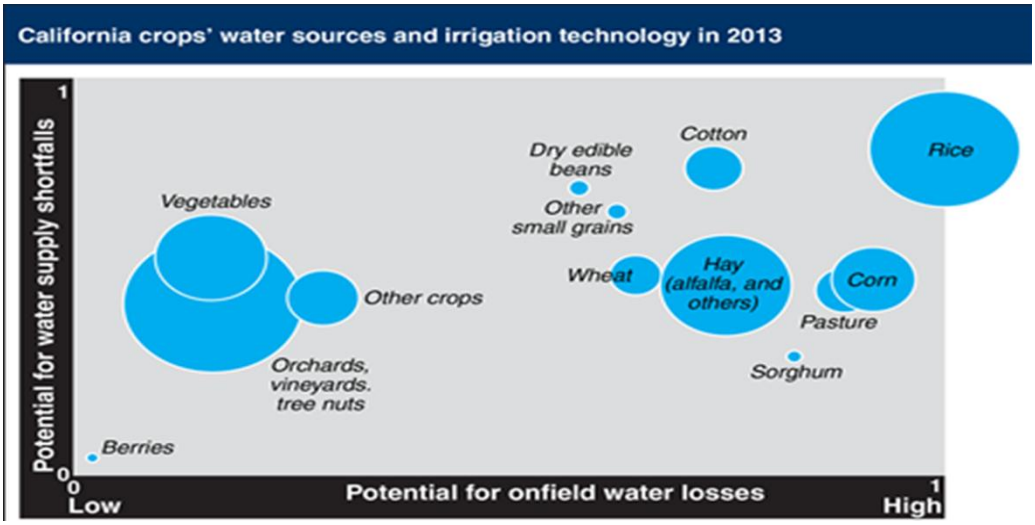
Unsustainable practices



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New pressure from consumer/citizens who have lost trust

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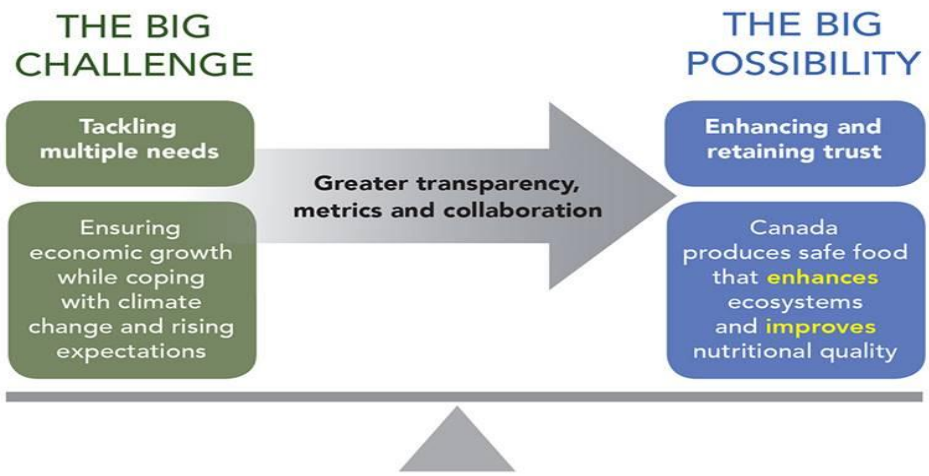
Canada's opportunity



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Trust means maintaining our ecosystems for generations to come

Lake Winnipeg Algae bloom forced a multiple year ban on new hog barns in Manitoba

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Lake Erie blue green algae

Ontario now committed to agriculture mitigation but still serious agricultural pollution coming from the U.S.

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NASA's Aqua satellite - September 26, 2013.

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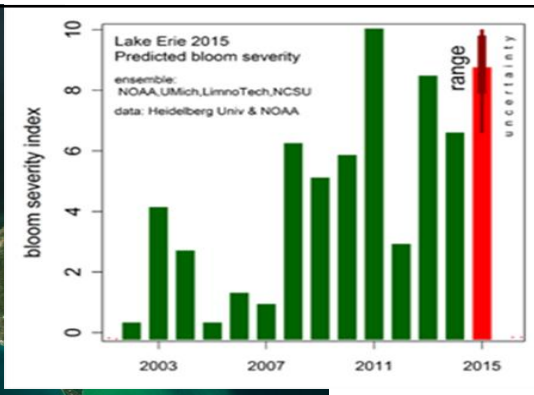

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Brome Lake, Memphremagog and Lac Saint-Charles - Cyanobacteria

LE DEVOIR

Le Devoir
Perspectives, samedi 6 février 2016, p. B3

Québec - Le "monstrueux" problème de l'eau potable

As for agricultural pollutants ….Mr. Morneau emphasizes they are very *"harmful". "That's why 300 municipalities have signed a petition to strengthen regulation on drinking water collection."*

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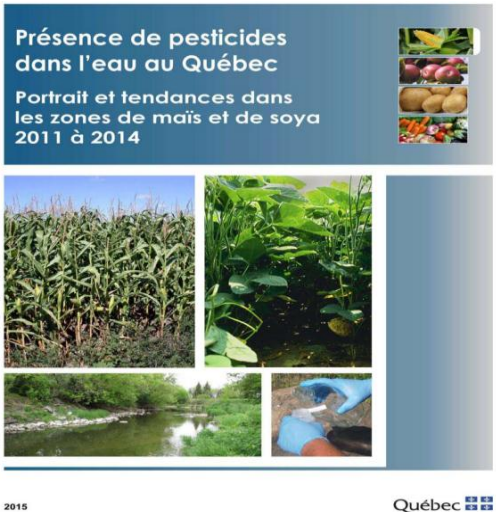
La présence de pesticides dans l'eau au Québec

La présence d'herbicides dans les cours d'eau des secteurs agricoles en culture de maïs et de soya est une problématique connue depuis plusieurs années….

Le S-métolachlore, l'atrazine, le glyphosate, l'imazéthapyr, le bentazone, le mésotrione et le dicamba sont détectés dans plus de 50 % des échantillons. En 2014, la fréquence globale de détection dans les quatre rivières était de 99 % dans le cas du S-métolachlore, de 98 % pour l'atrazine, de 91 % dans le cas l'imazéthapyr et de 88 % pour le glyphosate.

Mais plus de 20 autres herbicides ont aussi été détectés dans ces rivières.

-Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques



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- Blue Green Algae remains a problem in Quebec rivers and lakes but with restrictions on bringing new land into cultivation phosphorus pollution has stabilized and nitrite levels remain under scrutiny.

- Pesticides in rivers, lakes and aquifers are now a major focus.

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U.P.A. and Government have strategies to deal with the water challenge however clearly we need a plan where everyone works together.

Notre engagement

Au Québec

L'amélioration de la qualité de l'eau et de la mise en valeur de la biodiversité, un des quatre grands enjeux de la Stratégie agroenvironnementale de l'UPA (2010-2020).

Nos objectifs

- Favoriser la mise en œuvre de nouveaux projets de gestion de l'eau à l'échelle de bassins versants
- Implanter des mesures de protection de sol dans les zones sensibles à l'érosion.

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UPA L'Union des producteurs agricoles

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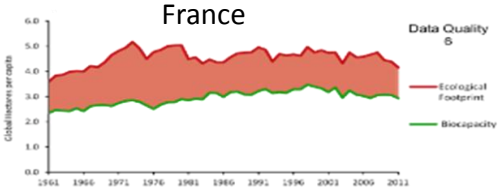
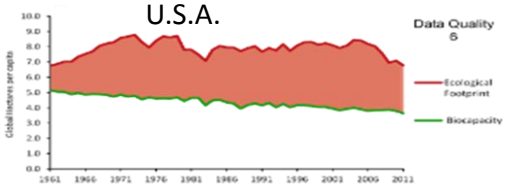
Global Footprint Network
Advancing the Science of Sustainability

Countries with significant biological deficits (using biological reserves well beyond biological capacity)

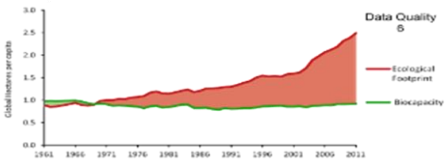
France



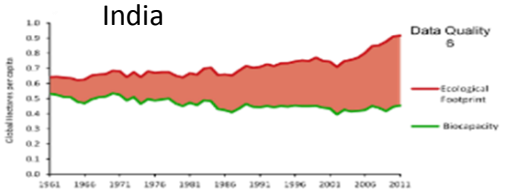
U.S.A.



China



India



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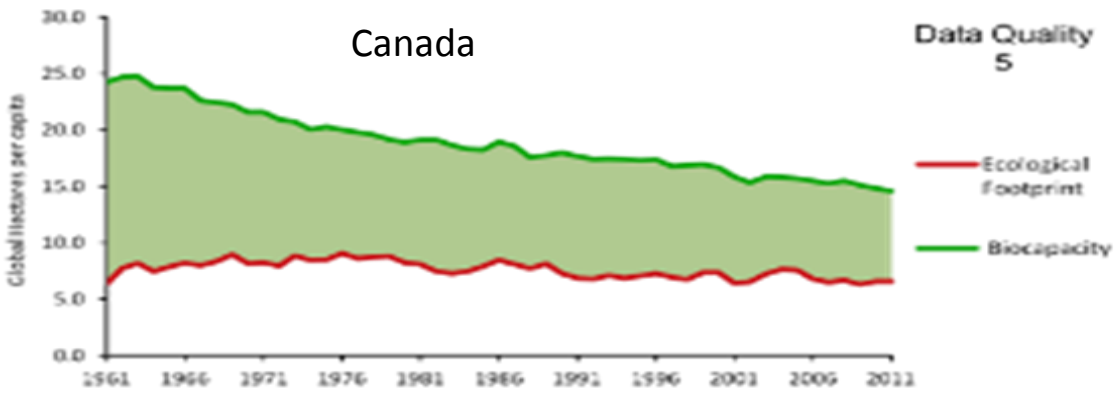
Global Footprint Network
Advancing the Science of Sustainability

Countries with surplus ecological reserves—not the ones relying on continued ecological deficit spending—will emerge as the robust and sustainable economies and societies of the future.



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What all this means

- Our ability to take advantage of the increasing opportunity for agriculture is directly connected to trust - social licence, brand/reputation health and environment)
- Importance of measuring/understanding those connections (data, mapping, etc)
- "Jeopardy index" – many countries/regions have depleted natural capital and now face the prospects of decline.

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What does this mean for Quebec?

"re-positioning our advantages for the future"

- **Advantages:** Natural advantages for Quebec/Canada: water, energy in abundance, certain benefits from climate change
- **Trust:** Be trusted by citizens everywhere that we can produce more good food while enhancing ecosystems
- **Value:** Multiple roles for agriculture: produce food, fiber, energy, carbon abatement and maintain clean potable water, vibrant ecosystems
- **Choice:** Our future: putting a value on natural capital (water, soil, air) or not – a priority to decide upon, act and protect

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Thank you

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