

Agricultural Systems, Land Use Practices and Water in Quebec



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by

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Introduction

Environmental awareness has increased substantially over the last 50 years in Quebec and elsewhere in the world, and water quality issues have been at the forefront. It has long been recognized that agricultural production generates negative externalities through its environmental impacts, which can have adverse effects on human health, on aquatic fauna and on the recreational potential of rivers and lakes. If water quality degradation is caused by farmers using specific inputs such as herbicides and insecticides or through agricultural production, then the targeting principle, cherished by Economists, prescribes taxing those polluting inputs or agricultural production itself. Taxing agriculture is difficult politically in the “developed world”, but reduced subsidies and regulations can be used to induce input substitutions and limit the generation of these “bad” outputs that accompany the production of “good” outputs, such as crops and livestock production.

The Quebec provincial government has relied on environmental regulations, changes to its agricultural policies to instill cross-compliance/eco-conditionality, and has invested in agri-environmental clubs and programs encouraging the adoption of Best Management Practices (BMPS) to address water quality concerns. This research note discusses past policy interventions and the challenges that lie ahead. Before addressing specific water quality issues and the regulatory and policy changes made to address those issues, we begin by describing the evolution of agriculture in Quebec to provide a picture of past and current environmental pressures on water quality.

Agriculture in Quebec: From the 1970s to now

Livestock

The 1970s were characterized by the implementation of supply management programs across the country. In Quebec, the expected limited growth in dairy, egg, chicken and turkey production prompted many farmers to switch to hog production and other commodities. The election of the *Parti Québécois* in 1976 triggered another major shift in agricultural policy. The provincial government was keen to boost agricultural production and implemented several new programs, including revenue and crop insurance programs, subsidized credit and loan guarantees, and a zoning law to protect Quebec’s agricultural land endowment. These provincial programs and regulations, as well as supply management programs, proved resilient to major modifications by subsequent governments and are still in place 40 years later.

The provincial revenue insurance programs, better known as ASRA (*Programme d’assurance stabilisation des revenus agricoles*), targeted a subset of commodities with

growth potential. The goal of ASRA was to diversify and expand Quebec’s agriculture. For example, the Quebec hog industry expanded considerably over the period 1970 to 1991, increasing by 140%, compared to a 40% growth rate for the Canadian hog industry as a whole (Coffin et al., 1992). While this growth began before the hog ASRA program was implemented, it expanded even more thereafter. As in most other agricultural sectors, domestic support could not stop the number of farms to start decreasing over time while their average size increased. This trend was particularly strong during the 1990s for the Quebec hog industry, but subsided in the 2000s, as indicated in Table 1. The average number of hogs per farm in Quebec is still quite large, especially compared to Ontario. Production has been stable, partly due to the ASRA program, but also because of a marketing contract, which commits all Quebec hogs to be slaughtered in Quebec. This has contributed to the development of a strong pork processing industry in Quebec which became highly integrated and concentrated.¹ As a result, Quebec’s processing capacity requires a large and steady supply of hogs which was facilitated by changes in the hog marketing system in 2009. More recently, pressure to boost provincial hog production has been partly alleviated through more interprovincial hog purchases (Larue, Pouliot and Jeddy, 2016). Overall, this growth in hog production has important implications for water quality in Quebec.

Table 1. Number of hog farms and average herd size in Quebec and Ontario

	Number of hog farms			Average herd size		
	2006	2011	2016	2006	2011	2016
QC	2,454	1,953	1,945	1,734	2,098	2,316
ON	4,070	2,556	2,760	971	1,208	1,280

Census of Agriculture, 2006, 2011 and 2016

<https://www150.statcan.gc.ca/t1/tb11/en/cv.action?pid=3210042601#timeframe>

¹ The largest processing firm, Olymel, is owned by *Coopérative Fédérée*. It was created in 1991 by a merger between Olympia and Turcotte and Turmel. Olymel bought a large slaughtering plant in Red Deer (Alberta) in 2001 and merged with Groupe Brochu in 2005, which was at the time the 2nd largest pork processor in Quebec. Olymel bought Big Sky farms, the largest hog producer in Saskatchewan, in 2013. In 2015, Olymel created a partnership with two rivals, Atrahan and Lucyporc.

Crops

Quebec corn production also grew very quickly during the 1970s and 1980s as new varieties were developed and a growing livestock industry required more corn as feed (Figure 1). The number of hectares in corn that were insured under ASRA jumped in 1981-82 from 8,436 ha to 104,057 the following year, and hit 300,000+ ha in 1992-93.² The largest coverage was achieved in 2007-08 with 443,939 ha insured. The high corn prices observed in the mid to late 2000s, made the corn ASRA program less necessary and so it was terminated in 2016.

The surge in soybean acreage was a relatively more recent phenomenon (Figure 1). ASRA coverage for soybeans began in 1989-90 and ended in 2016. The ASRA-covered soybean hectares increased rapidly, as they had for corn, reaching a peak in 2014-15 at 302,985 ha. ASRA coverage for other crops, such as oats and barley, began in 1980-81 and these ASRA programs are still in operation. Growth in the production of corn and soybeans can be explained by favorable market prices and technological advances. The average yields for corn and soybeans in Quebec increased by roughly 20% in the last 15 years, while those for oats and barley stagnated.³ Hectares planted with genetically modified (GM) corn accounted for 88% of all corn hectares in 2018. For soybeans, GM hectares made up not quite 71% of the total. The popularity of GM crops has steadily been on the rise and GM corn and soybean hectares made up 83% and 59% of their respective total hectares by 2012. West et al. (2014) surveyed Quebec farmers and found that GM crops were particularly enticing because they entail a significant economy of time. A quick glance at yield statistics also suggests that GM crops provided a yield advantage.

² The statistics about the ASRA programs come from the website of the Financière Agricole du Québec <https://www.fadq.qc.ca/statistiques/assurance-stabilisation/historique-par-produit-dassurance/>.

³ The statistics come from the website of Institut de la Statistique du Québec <http://www.stat.gouv.qc.ca/statistiques/agriculture/grandes-cultures/index.html>.

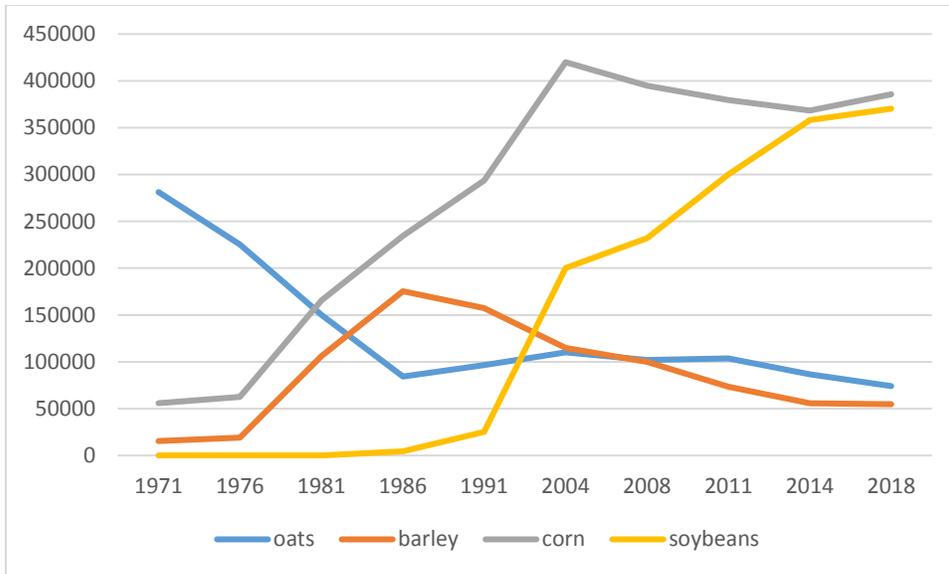


Figure 1. Hectares planted by crops for the province of Quebec

Figure 2 provides a more recent portrait of Quebec’s agriculture. Total receipts in 2017 amounted to \$8.8 billion, with milk being the dominant commodity produced, followed by pork. Dairy policies have been keeping the average size of dairy farms artificially low, through market caps on quota sales (Larue, Singbo and Pouliot, 2017). However, any changes to Canada’s dairy policy could induce a major increase in herd size, to levels more comparable to the United States and even Europe and Asia. The industry would undoubtedly become more competitive, but such increases would also lead to additional water quality concerns related to phosphorous and nitrous oxide run-off from manure.

Droughts in California have helped boost the sales of Quebec's horticultural products in recent years. The number of fruit farms in Quebec increased between 2006 and 2016 from 1,273 to 1,495, and both hectares under cultivation and exports also rose more recently.⁴ Fruit and vegetable production, however, entails more pesticide use. While relatively strong growth in these sectors contributes to the diversification of Quebec’s agriculture, it also raises many water quality issues, arising from pesticide contamination.

⁴ The number of fruit farms in Canada has fallen according to AAFC’s 2017 Statistical Overview of the Canadian Fruit Industry. Quebec ranks first for hectares of fruits and is second to British Columbia for fruit export value.

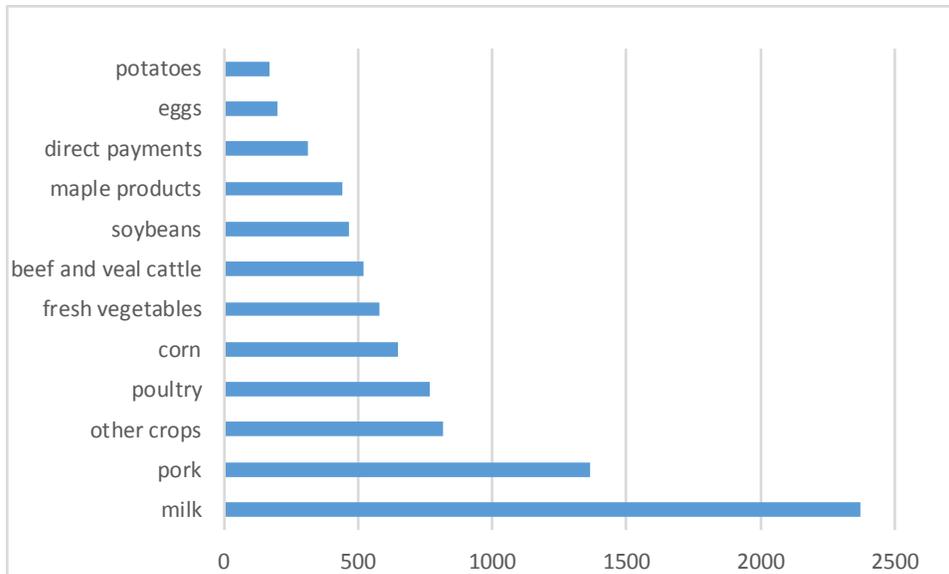


Figure 2: Quebec's 2017 agricultural receipts in million \$.

Water Quality Issues

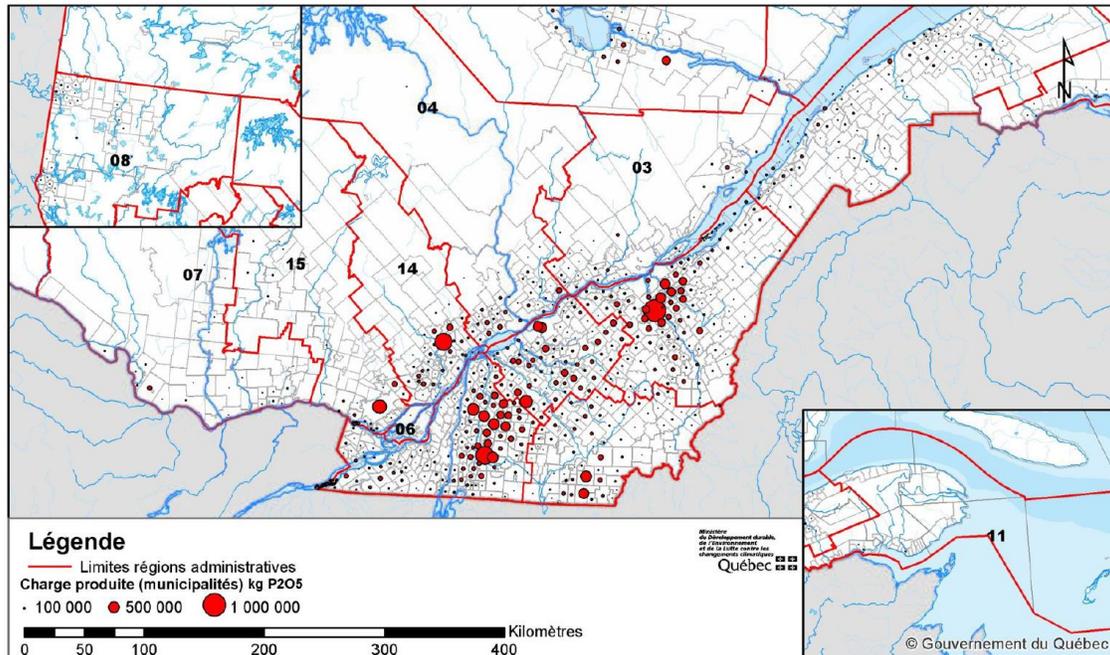
In Quebec, the main regulations related to soil and water protection are the *Règlements sur les Exploitations Agricoles* (REA). The first REA was implemented in 2002 and its main objective was to reduce non-point source pollution resulting from agriculture. Three provincial ministries are directly involved in rural water quality issues, including the *Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec* (MAPAQ), the *Ministère du Développement Durable, de l'Environnement et de la Lutte contre les Changements Climatiques* (MDDELCC) and the *Ministère des Affaires Municipales et de l'Habitation* (MAMH).

The amount of phosphorus injected into soils through manure management has been worrisome for quite some time. Both farm and non-farm rural households have also been impacted by fecal coliform in water (Larue et al., 2017). Tighter environmental regulations have been adopted since the mid-2000s and revisions to the hog ASRA program were made in both 2009 and 2018. The total number of hogs province-wide, that can be covered by ASRA, has been capped and the principle of eco-conditionality (or cross-compliance) links the receipt of program benefits to good environmental stewardship. Pesticide regulations have also recently attracted much attention, resulting in increased pressure on the industry.

Phosphorus and coliforms

The rapid development of Quebec's hog-pork industry in the 1970s, 1980s and 1990s created major environmental concerns for water quality. Hog production is concentrated in a few administrative regions in Quebec, with Montérégie and Chaudière-Appalaches accounting for about two-thirds of all provincial production. Figure 3 below illustrates the quantities of phosphorus (p2o5) produced from manure in various municipalities.

Figure 3: Distribution of manure phosphorus production in Quebec, 2013



Quebec's environment ministry, MDDELCC, began raising red flags in the 1980s about phosphorus and nitrogen-saturated soils. However, it was not successful in curbing the growth of the sector, which was boosted in the late 1990s by the provincial government's desire to increase agricultural exports.⁵ Growth was limited in the dairy industry, due to supply management, but the size of the dairy industry is such that it still accounted for 40% of all the phosphorus derived from manure in 2013.⁶ Regions where livestock production is very intensive tend to have phosphorus saturated soils. Sooner or later, the environmental toll could no longer be ignored: this occurred in 2002 when a province-wide moratorium on on-farm hog expansion was imposed. A commission was mandated to survey the situation and issued several recommendations. The moratorium was lifted in 2005, when benefits from participation in government programs began to be tied to environmental regulations. The number of programs with eco-conditionality ties increased between 2005 and 2010. After 2005, Quebec hog producers were required to produce a

⁵ In 1998, Premier Lucien Bouchard called for the doubling of Quebec's agricultural exports and the creation of 15000 new jobs. This became known as the St-Hyacinthe objectives.

⁶ This statistics was taken from *Bilan Phosphore: Portrait des Années 2011-2013*.

phosphorus report which must be validated by an agronomist. The report must certify that the farm has enough land and/or contractual arrangements to safely dispose of the manure it generates. Data from *Financière Agricole du Québec* (FADQ) shows that compliance has been good; 2013 was the worst year, with 17 farmers being fined a total of \$349,448 (FADQ, 2015). The Appendix, which gives the chronology of measures and events impacting Quebec's water quality, shows that the stiff penalties imposed between 2011 and 2013 were made less stringent, beginning in 2014. The goal was to severely penalize first-time offenders without forcing them out of the industry.

Another moratorium was imposed starting in 2004, in response to the deterioration of several Quebec watersheds. This moratorium was on acreage under cultivation, and it remains binding in various municipalities to this day. Its purpose was to limit the quantity of manure that could be injected into the soil in municipalities that were dealing with excess phosphorus. Conditions for case-by-case lifting of the moratorium were described in a 2017 law on environmental quality. These conditions appear to be a major point of contention between MAPAQ and MDDELCC.

Patoine and D'Auteuil-Potvin (2015) analyzed water samples from 51 testing stations in several watersheds in rural areas in Quebec and found that the concentrations of fecal coliform often exceeded the safety thresholds for recreational activities and for water treatment stations. The frequency with which concentrations exceed the threshold tends to be higher in the summer months. For 17 watersheds with longer time-series data, a decline in the concentration of fecal coliforms was observed in only 6 of these. The average concentration of fecal coliform varies considerably across watersheds. Those with high livestock density have higher concentrations. In Larue et al. (2017), non-farm rural residents appeared to value water quality improvements from reductions in coliform more highly than from reductions in phosphorus, possibly reflecting the dominance of health concerns over environmental concerns. In particular, since the Walkerton contamination incident in 2000, unease over the quality of municipal water supply has remained very high. Quebec's *Ministère des Affaires municipales et de l'Habitation* has developed programs to help rural municipalities cope with water treatment challenges. However, it is also hoped that adoption of best-management practices (BMP) by farmers will further reduce the risk of bacterial contaminations.

Hog production has stabilized in recent years, with roughly 6.7 million head covered by ASRA, down from 7.8 million head in 2008. While the last complete agro-environmental portrait of Quebec farms dates back to 2007,⁷ there are signs of progress. For 2016-2017, 10,000 farms received financial support to adopt BMPs. A survey of these farms reported that 56% incorporate manure in the soil within 24 hours after spreading. This is consistent with the 45% adoption rate for this BMP reported in Ghazalian, Larue and West (2009) for

⁷ See for example the article in the farm paper *La Terre de Chez Nous* about the need to provide an updated portrait <https://www.laterre.ca/actualites/environnement/environnement-de-portrait-global-de-situation>.

the Chaudière watershed. It remains to be seen whether current efforts to promote BMPs will be sufficient or whether additional measures will be needed.

Antibiotics

Since 30-90% of antibiotics are excreted through urine and faeces, any antibiotics used in livestock production can end up in wastewater (Sabri et al., 2018). Bacteria in the intestines of livestock can become resistant to antibiotic treatments and become “superbacteria” that could spread through processing plants, and during meat handling in the home by consumers. Accordingly, antibiotic resistance poses tremendous risk to the health of humans and livestock. For the last 30 years in Quebec, the use of antibiotics in livestock production has required a prescription from a veterinarian. However, until December 2018, livestock producers in other provinces did not need a veterinary prescription to purchase antibiotics.⁸ In February 2019, new Quebec regulations entered into force to completely stop the use of category I antibiotics for preventative purposes in livestock production and to drastically limit the use of such antibiotics for curative purposes.⁹

Pesticides

In Quebec, the use of pesticides is regulated by provincial laws on pesticides and by laws about environmental quality. Despite these regulations, several municipalities in Quebec still present high risk of pesticide contamination.¹⁰ The 2016 report by the *Commissaire au développement durable* urged tighter pesticide regulations based on reports documenting their presence in rivers and lakes.¹¹ In the Yamaska River, Giroux (2019, p.42) reports that 22 pesticides were detected in water samples. Herbicides like Atrazine and s-métolachlore were detected in 100% of the sample against 80% for glyphosate. Water quality thresholds for aquatic fauna were exceeded in 77.8% of the samples. Several herbicides, insecticides and fungicides were found in water samples in other rivers. Fortunately, only 7 of the 52 wells tested had traces of pesticides that were well below safety standards for human or livestock consumption. In its Vision for the Agri-food Sector, Policy Report, 2018-2025 (p. 70), MAPAQ conceded that in 2015, the amount of pesticides

⁸ See for more details at <https://ici.radio-canada.ca/nouvelles/special/2018/03/antibiotiques-animaux-elevage-resistance-bacteries-sante-canada-porc-poulet/> Beginning in 2018, Health Canada requires importers, manufacturers and compounders (pharmacists and veterinarians) to report their sales.

⁹ Chicken Farmers of Canada had required that its members stop using category 1 antibiotics for preventive purposes in 2014.

¹⁰ Areas treated by herbicides, insecticides and fungicides have been on the rise between 1961 and 2011 in Quebec and in other provinces. For comparisons, see <http://www.agr.gc.ca/eng/science-and-innovation/agricultural-practices/water/pesticides-indicator/?id=1462401144426>.

¹¹ See http://vgq.qc.ca/fr/fr_publications/fr_rapport-annuel/fr_2016-2017-CDD/fr_Rapport2016-2017-CDD.pdf.

purchased per hectare was 19% higher than in the 2006-08 reference-period. The magnitude of this increase was surprising in light of a 2004 moratorium that continues to limit pesticide use on acreage under cultivation in several municipalities. Also, this increase is surprising, given the efforts of agronomists working in agri-environmental clubs to promote reduced and localized pesticide applications with minimal drift. Tamini (2011) showed that such clubs have had a significant positive influence on BMP adoption. However, Ghazalian, Larue and West (2009) found that only 46% of farmers reported applying reduced herbicides, in low-wind conditions with low-pressure hoses and/or with a protective screen around the hoses, and maintained herbicide-free zones. Results from a recent survey also suggest that screening for weeds (and localized herbicide applications) have become more common practice.¹²

The popularity of GM corn and soybeans is most likely a factor contributing to the strong demand for pesticides in Quebec. Prior to 2018, pesticides were sold freely. Farmers with a permit could buy any authorized pesticide in any quantity they chose. Since 2018, the use of five different pesticide molecules requires a prescription from an agronomist, while the use of other molecules does not. For example, glyphosate is freely available, except when it is mixed with Atrazine. Since 2018, farmers must also document their use of pesticides belonging to specific classes (1 to 3a).¹³

Institutional Failures

Recent controversies in Quebec (at the Quebec Ministry of Agriculture (MAPAQ) and the Centre de recherche sur les grains (CEROM)) have brought attention both to the conflict of interest faced by many agronomists (especially those working for pesticide companies) and to the diminishing involvement of MAPAQ in the provision of extension services, leading to the greater reliance of farmers on the pesticide industry for agronomic advice.

First, in 2018, an agronomist working at MAPAQ was fired after leaking confidential information to the media denouncing the pesticide industry's influence on researchers working at CEROM, a Quebec research center, testing herbicides and insecticides. The resignation of 15 employees of CEROM, including 7 researchers, who were reportedly pressured by board members to change their interpretation and dissemination of research results, was also denounced in the media. While CEROM receives 90% of its funding from public sources (provincial and federal), its board of directors is dominated by interested parties, including registered lobbyists. The second controversy relates to the shelving of a report, prepared in 2016, by the *Institut de Recherche et Développement en*

¹² See the article <https://www.laterre.ca/actualites/environnement/environnement-de-portrait-global-de-situation>

¹³ Details about the information to be provided by farmers are available at: <https://www.mapaq.gouv.qc.ca/fr/Regions/chaudiereappalaches/journalvisionagricole/Pages/Registre-de-pesticides.aspx>.

Agroenvironnement (IRDA) regarding strategies to reduce pesticide use. Since most of IRDA's research funds come from MAPAQ, the decision to ignore their suggestions on pesticide reduction strategies appears unfounded.

These two controversies have re-ignited concerns about the independence of MAPAQ vis-à-vis industry interests, including the grain growers and pesticide manufacturers. Back in 2008, the Commission on the future of Quebec's agriculture previously recommended that MAPAQ distance itself from the farmers' union (*Union des Producteurs Agricoles*), farm input suppliers and food processors, yet it still appears to be a problem.

Implications for Future Agri-environmental Policy and Regulations impacting water quality

In order to ensure that future agri-environmental policies and regulations to address water quality issues are effective, an up-to-date, province-wide environmental portrait is needed to clearly describe the extent of environmental problems associated with agriculture in Quebec and to identify precise targets for improvement. While there is some evidence available that suggests that many Quebec farmers have adopted BMPs and are concerned about water quality, it is important to be able to determine where BMPs are producing good results and where more must still be done to improve water quality. The abatement curve in Ghazalian, Larue and West (2010) suggests that some abatement can be done cheaply, but that incremental improvements become increasingly costly beyond a certain threshold. In their evaluation of farm performance, Tamini, Larue and West (2012) have shown that there is more heterogeneity in environmental efficiency than in technical efficiency.¹⁴ Since the results from these studies apply to a specific watershed, one should be cautious about making any inferences about the provincial level. Still, wider adoption of BMPs would help municipalities with degraded water quality. An alternative is to make optional practices mandatory through regulations. Cost-share programs, like the ones used in Quebec and in the United States, have been criticized on several grounds (e.g., Garnache et al., 2016). The specific measures needed to optimize water quality vary across farms, and there are significant differences between those and the investments required when cost-share programs are used to stimulate environmental practices.

Rural demographics are also changing with the continuous decline in the number of farms and the increase in the number of non-farm rural households. The relative importance of farmers in the rural population is declining and, while there remains a strong consensus in Quebec about using tax dollars to support farm income, there are greater differences in attitudes about who should pay for BMPs and water quality improvements. In Larue, West

¹⁴ Technical efficiency refers to the ability to produce more outputs with a given set of inputs or to produce the same outputs with fewer inputs. Environmental efficiency refers to the ability of farms to cut the production of bad outputs while producing the same amount of good outputs.

and Tamini (2017), estimates of the “willingness to burden” taxpayers versus farmers for environmental improvements varied considerably across non-farm rural residents. There was evidence of a polluter-payer philosophy, where many non-farm rural residents would prefer farmers pay for most or all of the costs of BMP-induced water quality improvements. Their study highlights how behavior is influenced by risk aversion and uncertainty around the ability of BMPs to deliver water quality improvements.¹⁵ This aspect of BMP adoption has been overlooked in the literature.

Government agencies do not always seem to work for the same constituents. Eco-conditionality has forced a connection between the ministries of Agriculture (MAPAQ) and the Environment (MDDELCC), but cooperation must improve.

Finally, public policy and regulations must be anchored in sound science and economics. This is why investment in research by provincial and federal governments should be boosted, specially around agricultural and environmental economic issues. Past budget cuts and changes in rules governing federal research on agro-environmental issues, including the termination of Agriculture and Agri-food Canada (AAFC’s) Watershed Evaluation of Beneficial Management Practices in 2013, have been detrimental to the impact of agriculture on water quality. Hopefully, more resources in the future will be focused on research that allows government and academic researchers from various disciplines (soil science, agricultural engineering, crop science, hydrology and agricultural economics) to work together to develop solutions to address water quality issues, both in Quebec and in the rest of Canada.

¹⁵ The study relied on stated-choice experiments to generate willingness to burden estimates. Non-linear utility functions allowing for either constant absolute risk aversion or constant relative risk aversion (with respect to wealth) were used. The former was more consistent with the data than the latter and risk aversion was shown to increase with the level of education.

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Appendix

List of Environmental Regulatory/Policy Changes Impacting Quebec Agriculture

- 1978 Law about the protection of farmland
- 1981 Regulation to prevent water quality degradation due to livestock farms
- 1986 Policy on a rational use of pesticides
- 1987 Moratorium on hog production in the Lanaudière region
- 1987 Law about the sale and use of pesticides
- 1988 Program about manure management
- 1989 Federal-Provincial committee on sustainable agriculture
- 1989 New federal ag-policy has environment as one of four pillars
- 1992 Phytosanitary policy to reduce pesticide use
- 1993 St-Lawrence Vision 2000: environmental issues in watersheds highlighted
- 1993 Federal-provincial cooperation to support the development of agri-environmental clubs
- 1994 Forum on sustainable agriculture
- 1995 Policy on sustainable development
- 1996 Identification of municipalities with surpluses of phosphorus and nitrogen
- 1997 Agro-environmental fertilization plans
- 1997 Strategy to minimize air pollution from manure management
- 1997 Support for the development of agri-environmental clubs
- 1997 Program to subsidize manure storage structures
- 1997 Agri-environmental plan for hog production
- 1999 Programme Prime-Vert to subsidize the adoption of beneficial agroenvironmental practices (BMPs)
- 2001 Law 184 on Eco-conditionality
- 2002 Regulating the Farm: Farm-by-farm approach to enforce environmental regulations (Règlement sur les exploitations agricoles)
- 2002 Beginning of a province-wide moratorium on on-farm hog production expansion

- 2002 Commission on sustainable development of hog production
- 2002 Water policy: watershed integrated management
- 2003 Report on sustainable development of hog production
- 2004 La Financière Agricole du Québec adopts an eco-conditionality plan
- 2004 Moratorium on areas under cultivation in certain municipalities
- 2005 End of the moratorium on on-farm hog production expansion
- 2008 Research initiative about underground water
- 2008 Riparian buffer maintenance introduced as eco-conditional measure
- 2008 Report on the future of Quebec agriculture. See chap.9 and recommendations 31-40.
- 2009 Water policy + funding for 40 watershed management groups
- 2009 The revenue insurance program ASRA is modified. Spending on all ASRA programs is capped, cap on the province-wide number of hogs covered and change in cost of production determination.
- 2011 Phosphorus report must be sent to MDDELCC before May 15 to get crop and revenue insurance coverage
- 2013 Limit of \$50000 loss per farm per program to cover administrative fees for a nonconform phosphorus report
- 2014 A first nonconform phosphorus report triggers penalty of 25% on revenue and crop insurance compensation with a maximum limit of \$50000 per program. Agri-Quebec deposits and contributions are also cut by 25%. A second nonconform report makes the farm ineligible for compensation payments, but ASRA and ASREC contributions must be paid by the farm.
- 2015 Quebec strategy about pesticides 2015-2018
- 2016 Corn, soybeans and potatoes are no longer covered by ASRA.
- 2016 Report by the commission on sustainable development. Chap. 3 is about the (lack of) control over pesticide use in Quebec.
- 2017 Update of the law about environmental quality (*loi sur la qualité de l'environnement*)
- 2018 Agri-Food Policy 2018-2025 (*politique bioalimentaire*) : promotion of best practices to improve water quality

- 2018 Modification of the code regulating pesticide management (*code de gestion des pesticides*). Documentation of pesticide sales and uses for pesticide classes 1-3a.
- 2019 New regulation on the use of antibiotics for preventive and curative purposes in livestock production
- 2019 Small and large hog farms pay the same ASRA contributions, but large farms must pay a franchise to receive ASRA payments.