VERMONT FOOD SYSTEM PLAN ISSUE BRIEF

farm to plate
STRENGTHENING VERMONT'S FOOD SYSTEM

VERMONT
AGENCY OF AGRICULTURE, FOOD & MARKETS
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ISSUE:
Water Quality

What's At Stake?

Our challenge is to find a path forward in Vermont agriculture that allows for food production while protecting water quality. Agriculture dominates Vermont's working landscape in many parts of the state and is also important to the state's economy, both directly and indirectly. Similarly, our natural resources, including clean water, are why many people live in Vermont or come to visit, fueling the tax base and the tourism economy. At the present moment, agriculture is experiencing an explosion of momentum around the concept of "soil health," a steep escalation in concerns and investments in water quality, and an intensification of the confounding effects of climate change. We will need to use common sense, the power of community, respect, sound science, and creativity to successfully navigate the dynamic intersection of these tightly interwoven factors.

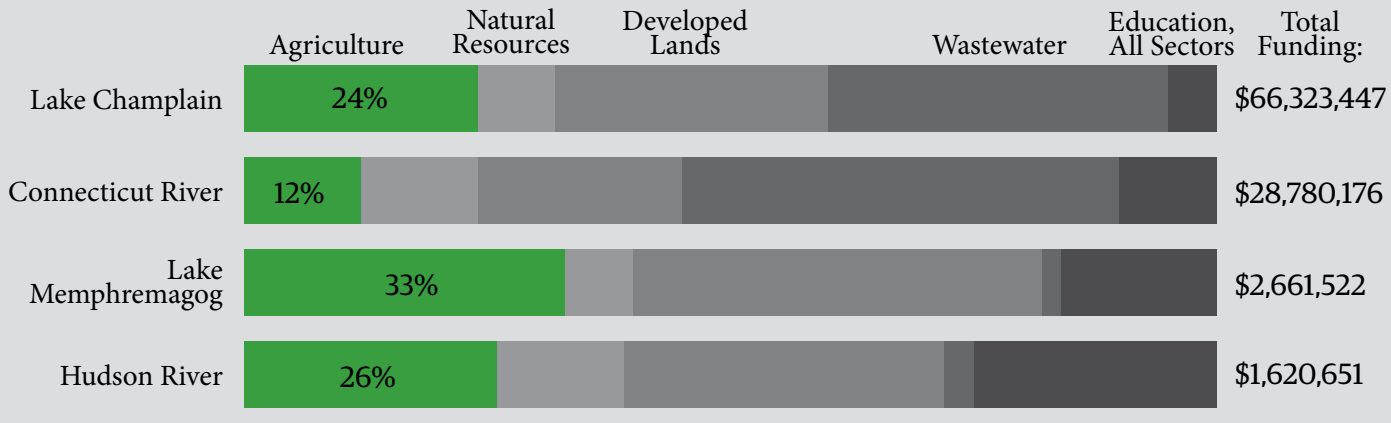
Current Conditions

The 2016 issuance of a federal Total Maximum Daily Load (TMDL) to limit phosphorus (P) loading to Lake Champlain drew much public attention to the connections between agriculture and water quality in Vermont. Harmful algal blooms in the lake, which are partially attributable to P in the water, have increased in severity since 2016. While there are many sources of P runoff across the landscape (including urban areas, roads, and wastewater treatment plants), models estimate that approximately 41% of the P entering Lake Champlain comes from agricultural lands. State legislation, such as 6 V.S.A. § 4803, has increased regulation and oversight on the agricultural sector.

At the same time, significant state and federal resources for improved farm management and infrastructure have been allocated to the agricultural sector. In general, farmers have stepped up to the challenge, and have significantly increased implementation levels of Best Management Practices (BMPs). BMPs include structural improvements (e.g., manure storage) and field-based changes related to increasing soil health and minimizing risk of nutrient and soil losses (e.g., cover crops and manure injection). There is clear momentum in the farming community toward improved management, and farmers are now becoming very interested in potential systems that would compensate them for various "ecosystem services" they provide to the state (e.g., carbon sequestration).

Simultaneously, further improvements to water quality may be hindered due to economic turmoil on many farms, combined with an aging farmer population that has a hesitation to invest in infrastructure upgrades. Probably even more impactful is climate change, which has brought more frequent heavy storms, increasing the potential for erosion and nutrient loss from fields. Despite these challenges, farmers, educators, researchers, and other service providers continue to make progress toward environmental goals and economic viability by working collaboratively across multiple agencies and organizations.

State Funding Awarded for Clean Water Projects in State Fiscal Year 2016-2018, by Major Basin and Sector



Soil Management

Current Conditions

There is growing knowledge and appreciation in the farming community of ideas and practices that improve soil health. The concept of soil health is a holistic way of viewing the soil that acknowledges the complex interconnectedness of its various biological, physical, and chemical characteristics, and how important these are to environmentally sustainable agricultural systems. In addition to potentially improving yields by increasing the resilience of crop and pasture systems, building soil health can increase infiltration of rainfall on farmland, potentially decreasing runoff, nutrient loss, and erosion. Management practices that enhance soil health are being promoted by many groups for use on all types of farms (i.e., dairy, livestock, grain, fruit, vegetables, etc.). Some of the more commonly recognized soil health BMPs include cover crops, reduced tillage (including no-till), perennial crops, strategies to increase organic matter, rotational grazing, and crop rotation.

Bottlenecks & Gaps

- Investments in management changes to improve soil health need to be economically sustainable for farmers.
- There is a lack of clear data on the variety of linkages between soil health-related management practices and water quality conditions at the watershed scale.
- Actual soil health data from Vermont farms is sparse due to lack of measurement and monitoring.
- Measuring soil health remains expensive.
- Additional research and program flexibility is necessary for figuring out how to build soil health on a variety of farm types while minimizing risk to yields.

Opportunities

- Vermont has excellent farmer-led organizations (i.e., farmer coalitions) for harnessing the power of peer-to-peer education around soil health practices.
- We have numerous success stories of improving soil health from a variety of farm types and sizes that can be promoted.
- Soil health practices can also provide climate change mitigation (carbon sequestration) and potential community resiliency benefits to surrounding communities.
- Young and beginning farmers have tremendous energy around soil health, which is an opportunity to advance this topic and its related practices.

Management of Manure and Phosphorus

Current Conditions

In some cases, business decisions and management practices based on farm economics have resulted in concentrations of P on farms in excess of what is appropriate for the land base. All farms must now follow state water quality regulations — Required Agricultural Practices (RAPs) — and a nutrient management plan. These regulations direct farmers to manage manure (the primary source of P on farms), in ways that will minimize P runoff. Some newer strategies to improve nutrient utilization and limit runoff — like manure injection — are being used across the state. However, more tools for better distribution and management of manure to minimize overloading of P on cropland are needed.

Bottlenecks & Gaps

- Long winters, extended wet conditions, and more extreme events as a result of climate change remain challenges for managing manure and preventing nutrient runoff.
- The infrastructure cost and time necessary for manure injection can be prohibitive for some farms. Not all farms have liquid manure or land suitable for injection.
- A surplus of P exists in Vermont due to current and historical importation of grain, yet some fields still need P for optimum crop production.
- When manure applications are reduced, or eliminated, due to high soil P and/or high risk of runoff, nitrogen (N) is still necessary for crop production. Purchasing needed N in the form of commercial fertilizer is difficult to justify economically, and nearly impossible on organic farms.
- No viable manure transfer program exists for distribution of manure away from high P soils to where P is needed.

Opportunities

- Manure, and its ability to maintain and increase soil organic matter, is a valuable resource and a key component of increasing soil health and growing crops.
- Newer technologies being trialed may further improve how manure nutrients are managed. These include manure P removal systems, grassland manure injectors, precision application advancements, and solutions being investigated through the Vermont Phosphorus Innovation Challenge.
- The nutrient management planning system offers a framework for the improvement of existing tools and implementation of new tools for improved P management and risk assessment. This could include incentives or market-based approaches to reward farmers for achieving lowered P losses from farms.

Tile Drainage

Current Conditions

Tile drainage is the placement of perforated pipes in agricultural fields beneath the roots of crops in order to lower the water table and more quickly drain excess water after rainfall. It has been shown to dramatically increase crop yields and allow farmers to enter fields with equipment without damaging soil during wet periods. The rate of tile drainage installation has increased in the past several years, along with concerns about its role as a pathway for P runoff from a field. All types of farms (i.e., large, small, dairy, vegetable, livestock) are investing in tile due to its significant production benefits in the face of climate change and increasing rainfall. Farmers indicate that tile drainage is allowing them to be more successful with soil health BMP implementation. Policy makers and researchers are struggling to keep pace and understand the full impact of this complicated situation.

Bottlenecks & Gaps

- Climate change is increasing the demand for tile drainage on farms, but water quality effects are not well understood.
- There is not enough information on tile drainage and its potential impact on water quality in Vermont.
- How tile drainage affects the overall magnitude of P loss from a tiled field vs. an untiled field due to decreased surface runoff is poorly understood.
- We lack information on how to best manage manure in tile-drained fields to minimize potential P runoff.

Opportunities

- There is interest by farmers to be involved in tile drainage research to increase understanding and find ways to reduce P runoff using practical approaches.
- Advancements in tile-outlet treatment systems for high-risk fields are being made in Vermont and elsewhere.
- There is a need to provide additional technical assistance to farmers to install tile in ways that minimize environmental impact.

Summary

The agricultural sector is energetic about increasing soil health and its benefits for water quality in Vermont, however, management changes must be economically justifiable for the farmer and supported by data demonstrating benefits. Improvements in soil health are achievable on many farms, but can potentially be overwhelmed by mismanagement of manure. Manure, high in organic matter, is a resource for soil health improvement and new technologies are emerging to allow for better utilization but manure distribution remains a challenge. Tile drainage is an important tool for farmers given climate change, and is allowing for increased adoption of soil health BMPs, but more information is needed around manure management in tiled fields.

Recommendations

- Dedicate funds to support Vermont Natural Resources Conservation Districts and farmer watershed organizations with the specific objective of allowing them to reach other farmers and do farmer-to-farmer education about improved soil and manure management. We know this to be one of the most effective means of influencing change, so we should facilitate it as much as possible. Cost: $100,000 per year, per organization; total cost $300,000 per year.
- Dedicate $5 million to research that monitors field-scale water quality performance of practices post-installation, and will inform a Payment for Ecosystem Services program that provides incentives to farmers for reducing P losses.
- Dedicate $1 million to measuring and continuously monitoring soil health across the state of Vermont, building a statewide database, benchmarking specific soil types, and correlating changes with specific BMP implementation.
- Fully fund the Vermont Agency of Agriculture, Food and Markets Farm Agronomic Practices Program and the Capital Equipment Assistance Program to financially assist farmers with improving soil health and lower the economic hurdle of changing management during these challenging economic conditions.
- Continue to fund the Vermont Phosphorus Innovation Challenge to launch current projects and pilot the most promising technologies.

Farm to Plate is Vermont's food system plan being implemented statewide to increase economic development and jobs in the farm and food sector and improve access to healthy local food for all Vermonters.

The Vermont Agency of Agriculture, Food & Markets (VAAFM) facilitates, supports, and encourages the growth and viability of agriculture in Vermont while protecting the working landscape, human health, animal health, plant health, consumers, and the environment.

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