



Water Management

Presentation to Agriculture Working Group July 12, 2016

**Ontario Ministry of Agriculture, Food and Rural Affairs
Environmental Management Branch
Food Safety and Environmental Policy Branch**



Strategic Framework for Agriculture Contribution to Phosphorus Reduction Targets

Draft Future Vision: Healthy Lake Erie Ecosystem and an environmentally-sustainable agricultural sector that is resilient to climate change.

Draft Long-term Goals

Nutrient Management

Nutrients are managed to optimize yield while minimizing losses to waterways

Soil Management

Soil management practices build and sustain soil health and reduce the loss of nutrients

Water Management

Surface run-off and drainage is managed to reduce loss of phosphorus through water movement

Draft Objectives

Better understand the role of farm management practices in P transport

Agricultural input formulations consider impacts on the environment

Nutrients are applied at the right time and place to minimize loss to the environment

Nutrients are applied in the right amount according to crop needs for nutrient use efficiency

Practices for prudent use of nutrients are widely utilized

Better understand the role of soil health in P transport

Soil health is sustained and enhanced to keep farmland productive and improve water infiltration

Soil erosion from tillage and water is minimized

Soil fertility is optimized for nutrient use efficiency

Understand the movement of phosphorus in water from ag land and sources

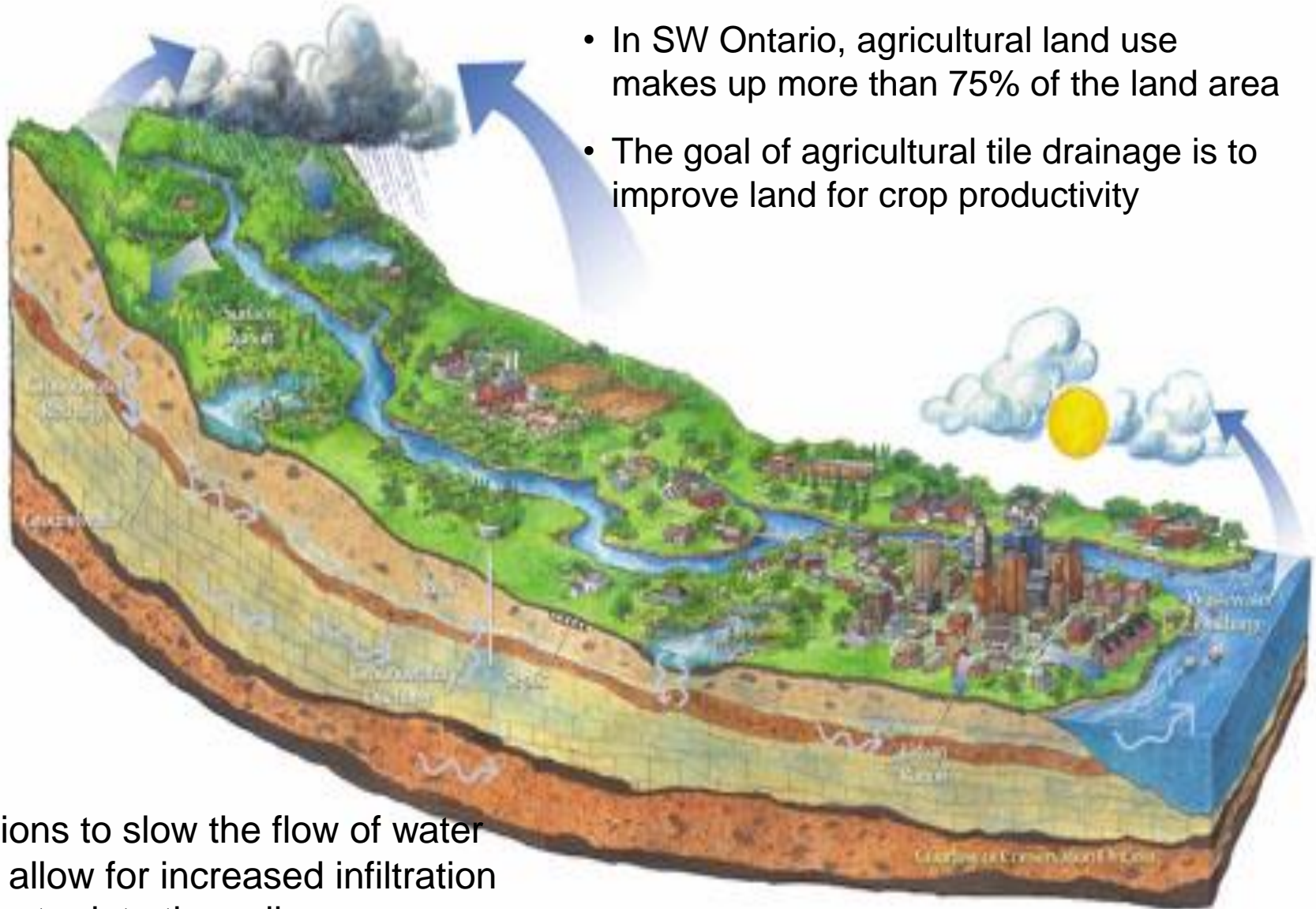
Better understand the role of drainage structures in P transport

Drainage/Green infrastructure is used on vulnerable lands to slow the flow of water and:

- Increase resilience to manage large storm events
- Improve run-off water quality

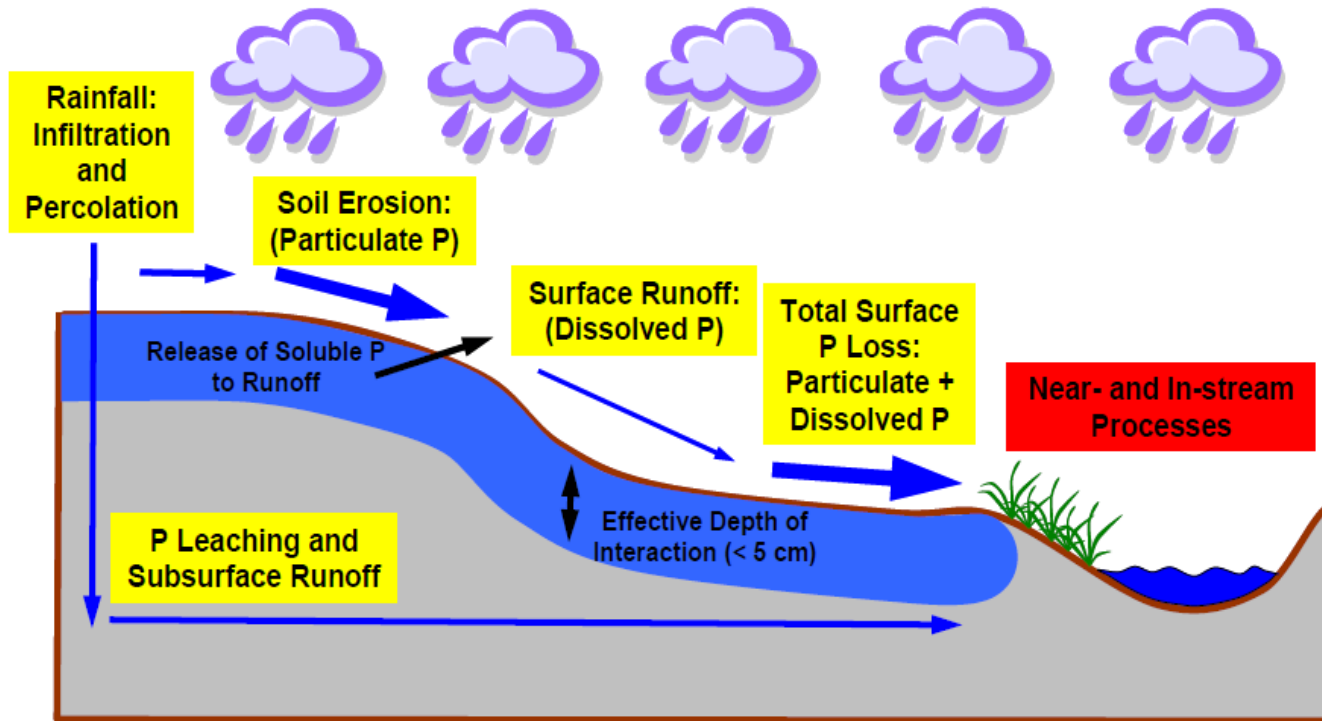
Drainage and Runoff

- In SW Ontario, agricultural land use makes up more than 75% of the land area
- The goal of agricultural tile drainage is to improve land for crop productivity



Actions to slow the flow of water will allow for increased infiltration of water into the soil.

Understanding P Runoff



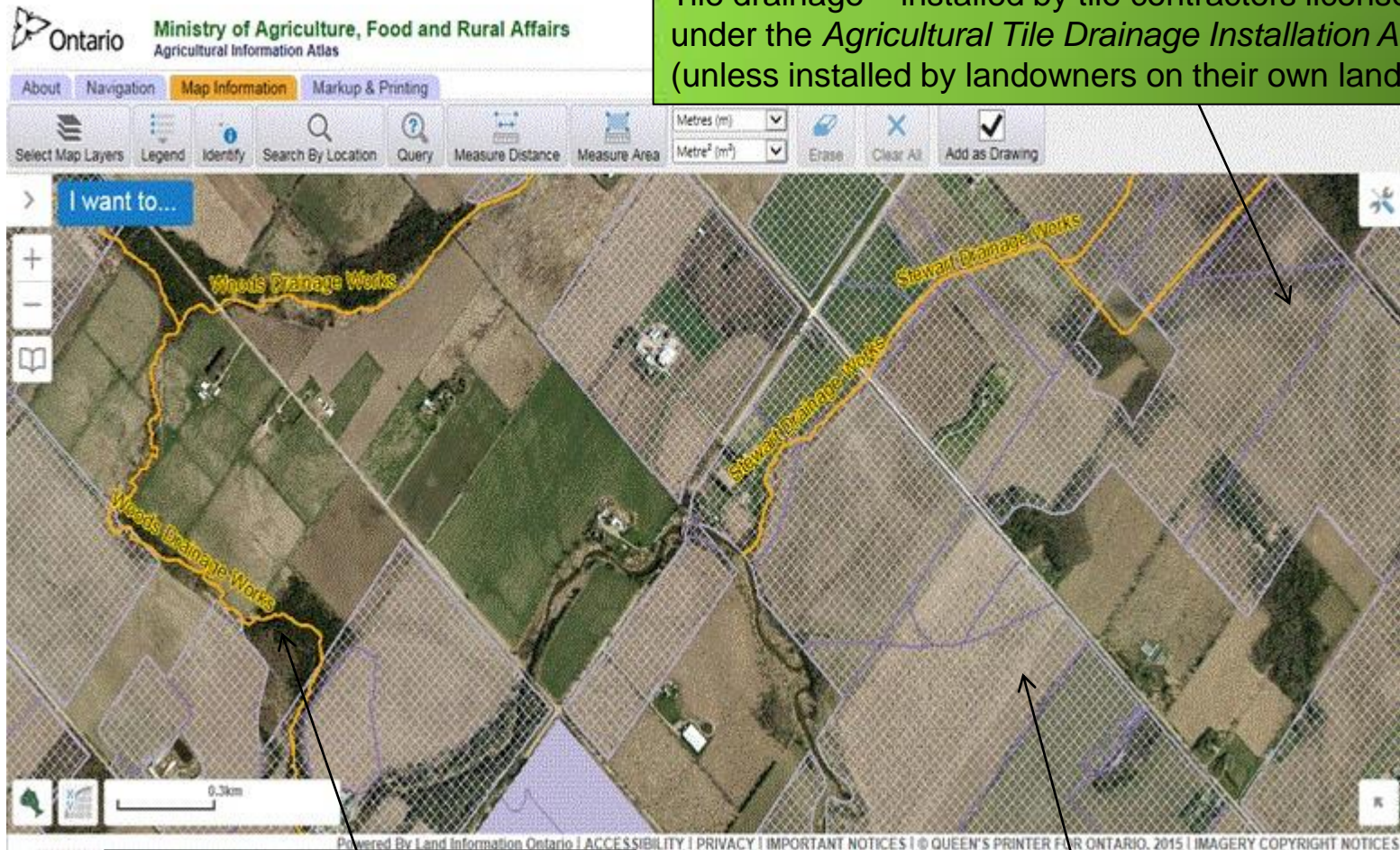
(Adapted from Wood 1998)

- Soil P is highest at surface
- P loss varies with soil type, topography and nutrient management

Erosion and runoff can increase with:

- slope
- low infiltration rates
- compacted or frozen soils
- low crop/residue cover
- intense rainfall / snowmelt

Responsibilities



Tile drainage – installed by tile contractors licensed under the *Agricultural Tile Drainage Installation Act* (unless installed by landowners on their own land)

Municipal drains – managed by municipality through drainage superintendents (created through petition by landowners under the *Drainage Act*)

Natural watercourse and private drainage ditches – common law & regulated by agencies (e.g. CAs, MNRF)

Legislative Framework

Legislation	Description
<i>Drainage Act</i>	<p>Sets out the process for the construction, maintenance, repair or improvement of drainage works on agricultural land including municipal engineers' reports, cost assessments for each property, appeals of decisions and grants</p> <p>Agricultural Drainage Infrastructure Program (ADIP): Provides grants to municipalities for costs associated with drainage works (i.e. construction, maintenance and 50% of drainage superintendents' costs). Provides training of municipal staff (drainage superintendents, councillors, clerks, treasurers)</p>
<i>Tile Drainage Act</i>	<p>Provides for the transfer of funds to municipalities to finance loans to agricultural landowners for the installation and maintenance of tile drainage</p> <p>Tile Loan Program: Sale of municipal debentures provides funding for 10 year open loans at fixed rates of interest to agricultural landowners for tile drainage system installation or maintenance</p>
<i>Agricultural Tile Drainage Installation Act</i>	<p>Requires the licensing of each contractor, drainage machine and operator in the business of installing agricultural drainage systems</p> <p>Training of contractors in proper design and installation. Ancillary training in design and construction of erosion works</p>

Education and Incentives

Education and awareness:

- Best Management Practices – Guides on “Buffer Strips”, “Phosphorus Primer”, “BMP for Phosphorus”, “Cropland Drainage”, and “Controlling Soil Erosion on the Farm”
- Environmental Farm Plan – Increases awareness by providing an assessment of an individual farm’s environmental needs

Incentives:

- Agriculture Drainage Infrastructure Program – For properties assessed at the Farm Property Class tax rate, the province provides a grant to the municipality to cover a portion of the assessment against a property for construction, maintenance and repair of drainage systems under the *Drainage Act*
- Tile Loan Program – Provides fixed interest fully repayable loans for the installation or maintenance of private tile drainage systems on agricultural land
- Great Lakes Agriculture Stewardship Initiative (GLASI) – Cost-share funding to improve soil health, reduce runoff and improve pollinator habitat, modify equipment to address risks related to manure application and pollinator health, and adoption of BMPs (including erosion control structures, cover crops and buffer strips)
- Conservation Land Tax Incentive Program (MNRF) – Provincially significant conservation lands identified by MNRF are eligible for property tax relief in exchange for protecting the natural heritage values of their property (e.g.. wetland, protected escarpment, endangered species habitat)

Benefits of Managing Runoff

Managing runoff is good for the watershed:

- Reduces erosion and allows for particulate settlement
- Reduces loadings (including P)
- Helps mitigate adverse affects of large storm events

Managing runoff can help profitability

- Better use of nutrients
- Better control of subsurface water
- Maintains and improves soil health
- Potential crop yield improvements
- Reduces maintenance on municipal drainage systems

Managing runoff is part of a multi-pronged strategy for reducing phosphorus load.

How To Manage Run-off

There are numerous techniques and technologies used to control and to treat runoff that would reduce sediment loading resulting in a reduction of P in waterways

Each could be considered part of a drainage system, whether part of tile drainage, municipal drainage or surface runoff

Main mechanisms:

- Reducing in-channel remobilization and stream bank erosion:
 - e.g. vegetative buffers, fencing of waterways
- Retaining, redirecting water or treating water:
 - e.g. sediment basins, water inlet/outlet improvements, constructed wetlands, treatment sandwiches

Other Jurisdictions

- **Quebec** regulatory requirements targeted to reduce non-point source nutrients and cyanobacteria blooms (i.e. reg. requirement for a 3m buffer along streams and 1m strip along drainage ditches with cost-share funding for implementation)
- **Leamington** has amended its policy and procedure to require the establishment and maintenance of 10 feet (3m) grass buffer strips on both sides of municipal drains
- **Huron-Kinloss** passed a by-law to adopt a Municipal Drain Environmental Improvement Initiatives Policy which applies to all landowners in a watershed undergoing municipal drainage work – it encourages landowners to consider incorporating environmental structures and informs of the applicability of 1/3 grant for incorporation
- **Minnesota** is implementing a Buffer Initiative (Nov 2018) requiring vegetation buffers of up to 50 feet along public waters (including public water wetlands) and 16.5 feet along drainage ditches - Provides slowing/filtering of P, N and sediment

- Increase landowners' awareness of opportunities to address drainage and P-reduction objectives
- Increase the capacity of people designing and constructing drainage works
- Provide opportunities in vulnerable areas for landowners and municipalities to work together on local area solutions (targeting specific problem areas)
- Offer innovative incentives (e.g. water control structures)
- Expand work eligible under current programming to address P issues (i.e. Tile Loan Program, GF3)

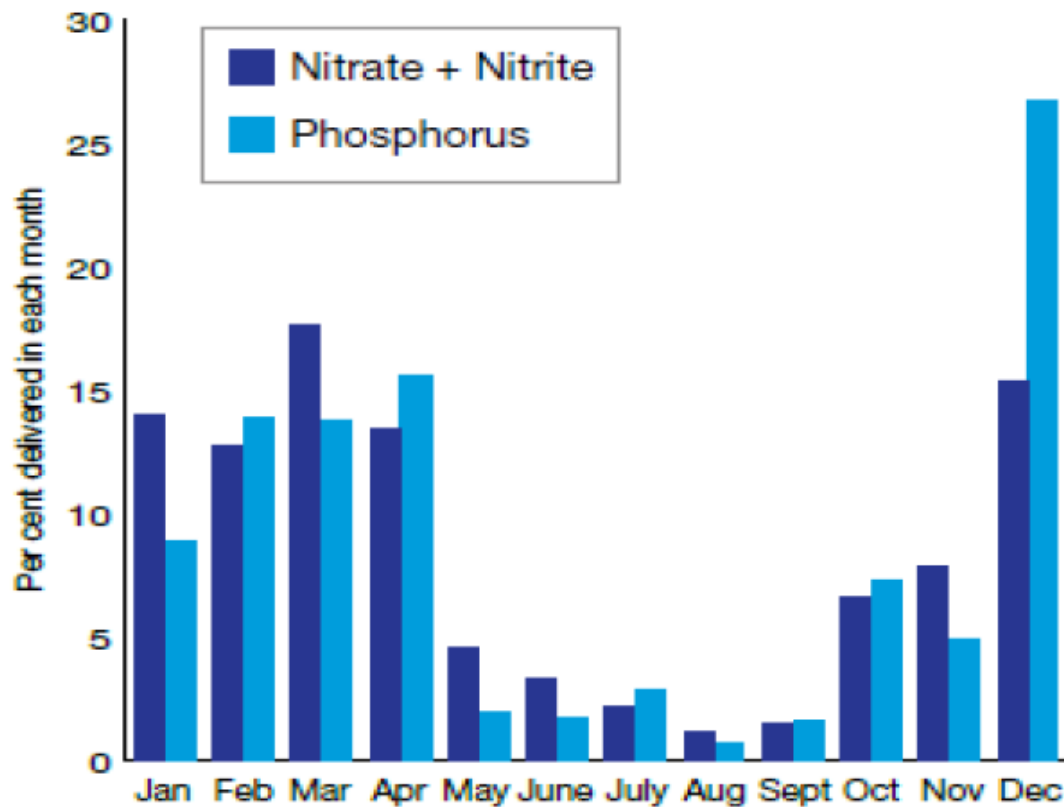
Drainage Act concepts and non-point source management

- Like phosphorus, water issues are non-point source issues—many small contributions across the watershed result in a significant problem
- The *Drainage Act* has provided a framework for groups of landowners to address a common problem
- A number of concepts embedded in the *Drainage Act* might be useful in addressing the phosphorus loading issue:
 - Everyone in a watershed contributes to the issue in a large or small way, the cost of addressing the issue should be shared among all
 - Some contribute more to the problem and so should pay more
 - Some may benefit more than others and so should pay more
 - A solution requires design across the watershed, not ad hoc individual actions
 - The solution requires the sanction of a legitimate body because the solution is unlikely to meet universal agreement
 - The solution requires a plan for long-term maintenance

Role of drainage infrastructure in P reduction?

P loading occurs in the non-growing period, particularly in large storm events

Majority of nutrient export in non-growing season:



MOECC Water
Quality in Ontario
2012 Report