Constructed Wetlands

What are constructed wetlands?

Constructed wetlands are man-made systems designed to mimic the treatment processes and ecosystem services offered by natural wetlands. The use of constructed wetlands has increased in popularity in the agricultural industry as a means to treat agricultural wastewater and capture runoff before entering nearby waterways.

What ecosystem services do wetlands provide?

- Water conservation and management
- Wastewater treatment
- Nutrient and greenhouse gas (GHG) cycling
- Biodiversity enhancement
- Carbon (C) sequestration

Threats to wetland health

- Change in precipitation patterns
- Drought stress
- Animal/livestock disturbance
- Changes to land management
- Agricultural conversion

What role do wetlands play in GHG emissions and C sequestration?

Wetlands often have an abundance of plants that remove carbon dioxide from the atmosphere through photosynthesis. During fall die-back, plants and organisms decompose releasing C which has the potential to then be stored in wetland sediment. Wetlands are also catch basins for sediments, which overtime can lead to C accumulation. Furthermore, wetlands can be both a source and a sink for GHGs. Proper management of these systems is essential for maximizing their C sequestration and GHG mitigation potential.

Quantifying GHGs and C

- The static chamber methodology is a common way to measure GHGs. It involves placing a tightly sealed chamber top on a collar either in the soil, or floating on the water surface. Gas samples are then collected at various time intervals from the chamber using a needle and a syringe, and then placed in glass vials for analysis.
- GHGs can also be measured using portable analyzers such as the Gasmet GT5000 Terra analyzer. This analyzer collects gas samples from a chamber over a shorter period of time. During this time, it records the GHG data on a tablet, which can be retrieved immediately following sampling.
- Soil C is measured by extracting soil cores at various depths.

Catalogue no. : A72-156/2023E-PDF
ISBN: 978-0-660-47703-9
AAFC no. : 13154E

Constructed Wetlands *(cont'd)*

Current Research

Greenhouse gases, water, soil, and biodiversity sampling are being conducted at on-farm constructed wetlands in Nova Scotia and Manitoba to evaluate how land use changes and climate change impact the ecosystem services provided by wetlands. This research also focuses on climate, hydrological characteristics, greenhouse gas emissions, C sequestering capabilities, and if wetlands could be a potential C credit.





What is being measured?

- Landscape metrics (previous use of land, current management practices, etc.).
- Soil data (microbial biomass of C and N, organic C, etc.)
- Water data (dissolved oxygen, pH, biological oxygen demand, nitrogen, phosphorus, etc.)
- GHG emissions (nitrous oxide, methane, and carbon dioxide)
- Biodiversity within and around the wetland (acoustic monitoring, malaise traps, cup traps, etc.)




Significance of Research

Results from this research will be used to develop improved management practices regarding GHG mitigation and soil C storage, contribute to GHG inventories on a regional and national scale, and help with the development of new agri-environmental indicators surrounding biodiversity through the AAFC Sustainability Metrics Program. This research will also evaluate the effectiveness of wetlands as a clean technology for treating wastewater and sequestering C, bringing attention to the importance of proper wetland management and the ecosystem services they provide.

For more information please contact:
Dr. Erin Smith, erin.smith2@agr.gc.ca, (902) 305-3371