

WEBS GIS Tool

Website:
<http://www.agr.gc.ca/eng/?id=1285354752471>

Category	Practice- and outcome-based	
Objective	To evaluate the economic costs, water quantity and quality benefits and cost effectiveness of agricultural BMPs across a watershed. The tool, which was designed to be user-friendly for farmers, watershed managers and other conservation practitioners also allows to identify and target key areas with the highest potential impacts.	
General description of the tool	Geographical applicability	Only applied to a case study (Gully Creek, ON) but "has the potential to be transferred to other watersheds" and "should be expanded to include more BMPs for use in other watershed across Canada"
	Functionalities	Hotspots identification, alternative scenarios testing, provide a footprint value/metrics
	Target audience	Farmers, watershed managers, conservation extension managers and agencies
	Developers	University of Guelph, Canadian Water Network, Agriculture and Agri-Food Canada, Ontario Ministry of Agriculture, Food and Rural Affairs - latest update: 2015
	Format	Open source tool (online version to be developed)
	Cost (tool and data)	Free - however a data sharing agreement may need to be set up for some data related to water quantity and quality flow that are collected by watershed agencies
Past or current users	At the pilot stage for one watershed	

Commodities covered

All commodities

BMPs covered

Reduced tillage practices
 Fertilizer application - source

Application rate based on testing and book values

Application method - conventionally tilled land

Timing of application for plant needs

Cover crops
 Fertilizer application - rate
 Fertilizer application - timing
 Fertilizer application - placement
 Run-off control

Catch basin management
 Restoration of wetlands*
 Use of buffer zones for field crops*

Setback distance for manure application in proximity to water bodies*
 Siting - distance to nearest surface water body*
 Manage livestock access to water bodies and riparian areas (e.g. provide off-site watering)*

**could potentially be modelled in future versions*

Indicators covered

Water use
 Water quality

Data inputs

Data requirements	Primary data required	Default values
Environmental conditions	- Geospatial data (i.e. DEM, landuse, soil, stream network, watershed and field boundary, location of climate and hydrologic station) - Climate data	Datasets for geospatial data (digital elevation model, landuse, soil, stream network, field and watershed boundary, and location of monitoring stations), and climate data
Crop management	- BMP and agricultural management data	Datasets for agricultural management data
Carbon sequestration/storage	n/a	n/a
Livestock	- BMP and agricultural management data	n/a
Energy use	n/a	n/a
Primary processing	n/a	n/a
Water	- Flow and water quality data	Datasets for flow and water quality data
Transport	n/a	n/a
Others	- Related agricultural economic data	0

Scope Farm level Supply chain

Ease of use for the data collector
 Easy for the user - most data to be entered by the user are qualitative and related to agricultural practices. Other data inputs such as geographical information and climate data are already embedded in the tool and the user can simply select its location. Users can conduct model simulations and display results through drop-down menus and check boxes.

Modelling methods

- Consistency of the model with the goal and scope of the tool** Consistent - the tool helps users understand the impacts of their practices on water quality and quantity and the associated economic cost and cost effectiveness ratios. Users can also make projections with alternative scenarios while the tool can also provide a set of optimal BMPs to maximize environmental benefits.
- Transparency and quality of documentation** Guidance document: Yes - a step-by-step summary is provided in a factsheet and a user manual will be provided
Methodology document: The methodology is detailed in published papers
- Conformity of the methodology with the current state-of-the-art agronomic and environment sciences** Consistent - the tool is "based on a farm economic model for quantifying the costs of BMPs, the Soil and Water Assessment Tool (SWAT) for estimating water quantity and quality benefits of BMPs, and the integrated economic-hydrologic model for examining cost effectiveness of BMPs." The tool was also presented during workshops during which stakeholders and decision makers from government, conservation authorities, NGOs, farmer associations and universities could provide feedback.
- Methodology** "The interface is developed based on a farm economic model for quantifying the costs of BMPs, the Soil and Water Assessment Tool (SWAT) for estimating water quantity and quality benefits of BMPs, and the integrated economic-hydrologic model for examining cost effectiveness of BMPs. The interface is a decision support system (DSS) for conducting watershed evaluation of agricultural BMPs by conservation practitioners and farmers."
- Dataset sources used for modelling**
 - Climate and flow data: Environment Canada
 - Soil data and land management data: Ontario Ministry of Agriculture and Food
 - Topography: Ontario Ministry of Natural Resources
 - Water quality data: Ausable Bayfield Conservation Authority

Outputs / Results

- Results** Detailed summary of results in tables Detailed summary of results in graphs
- Analysis** Summary of main hotspots Comparison with alternative scenarios Summary of optimal set of BMPs according to specific targets and costs

Limits of the tool/model

The tool was fully developed for a specific study watershed in Ontario for now. Not all BMPs related to water quality and quantity that could be relevant to other watersheds across Canada are covered at the moment.