



The Fractured Water Cycle: The Problem - The Solutions

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The Greater Lakes Project



Great Lakes
Protection Fund

The Problem

In urban areas, we have fractured water systems that disrupt natural water flows.

The Natural Water Cycle



Credit Valley
Conservation

40% Evapotranspiration

10% Runoff

50% Deep & Shallow
Infiltration

Natural Ground Cover

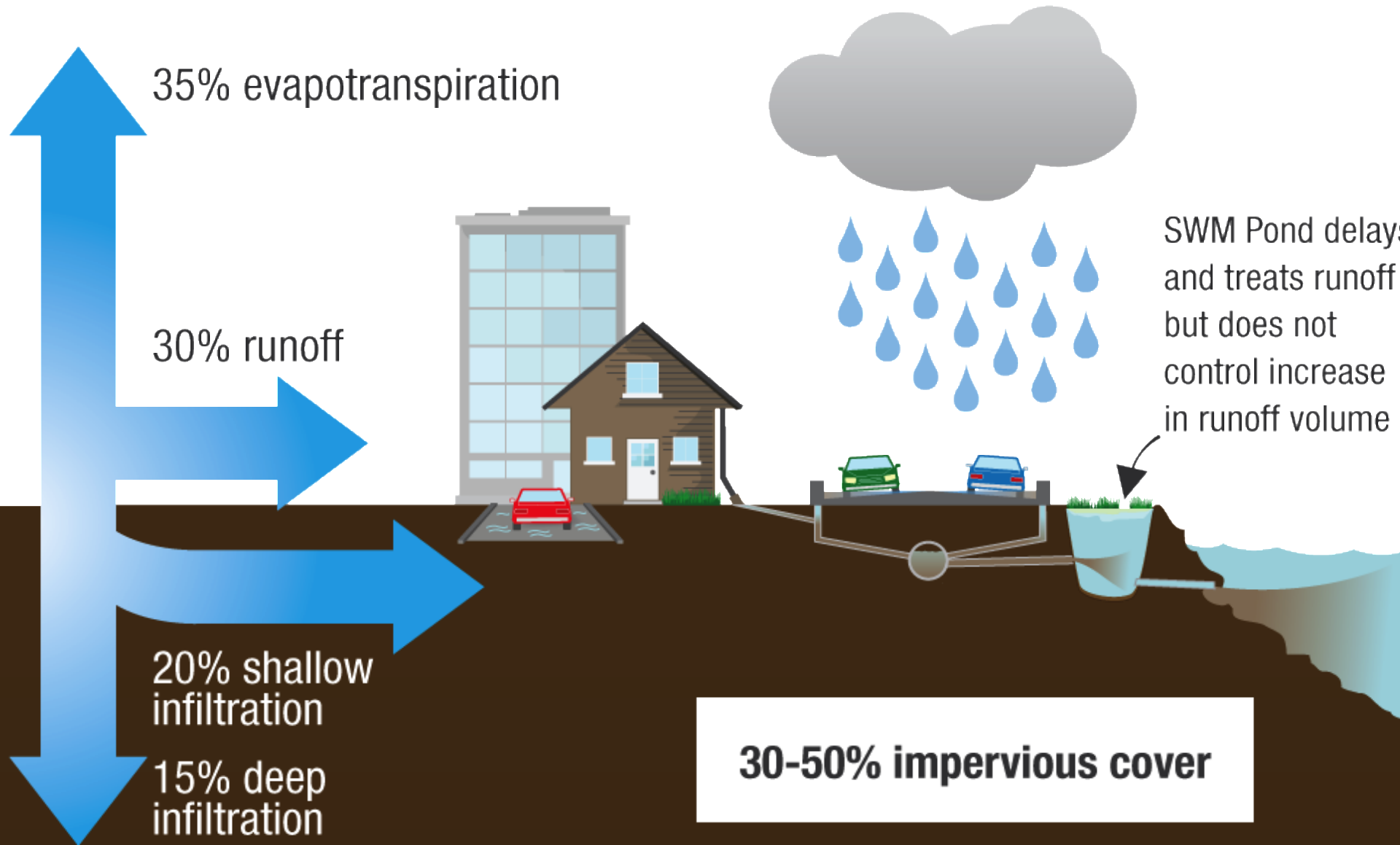


Urban Hydrology

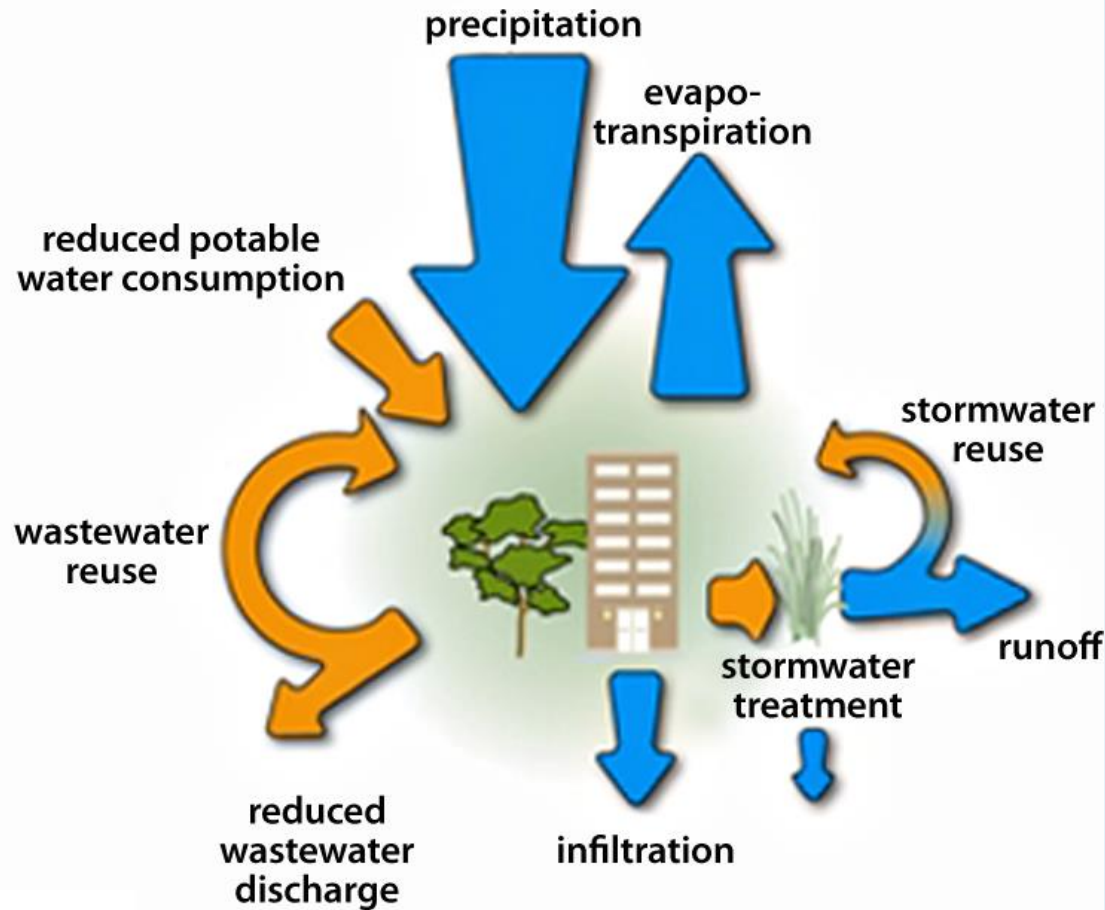


Credit Valley
Conservation

Typical development: Stormwater management using End of Pipe SWM Pond



Reconnecting the Water Cycle



Key:



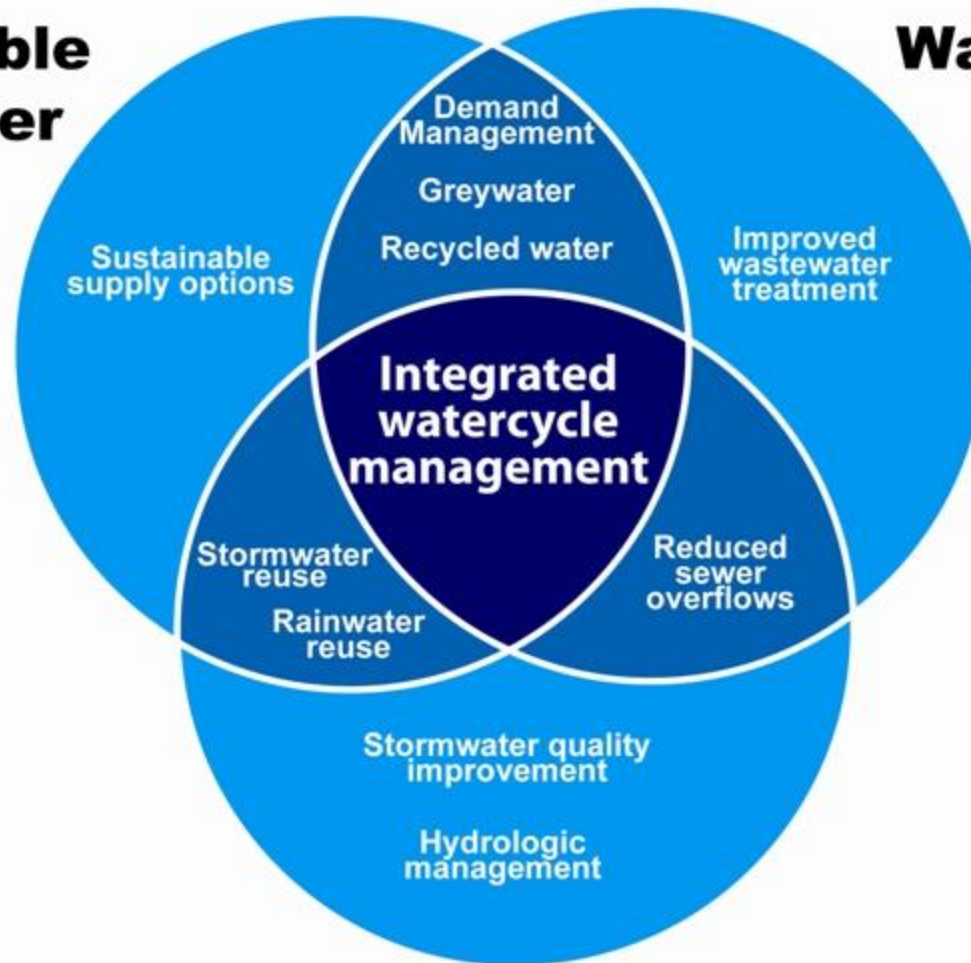
natural
state



altered
state

**Potable
Water**

Wastewater



Stormwater

Take Actions towards Integrated Water Management

- Set up strong source water protection programs on watershed basis
- Engage in water efficiency and conservation
- Set up waste water reuse systems
- Use drinking-water quality water only for uses that require that level of purity
- Reduce impervious surfaces so that water can infiltrate into the ground

Action (cont.)

- Treat green and grey infrastructure as one system
- Set up cistern and rainbarrel systems to capture stormwater for indoor and outdoor uses

AWE Water Conservation Tracking Tool:

*Planning and Evaluating
Cost-Beneficial
Water Conservation Programs*

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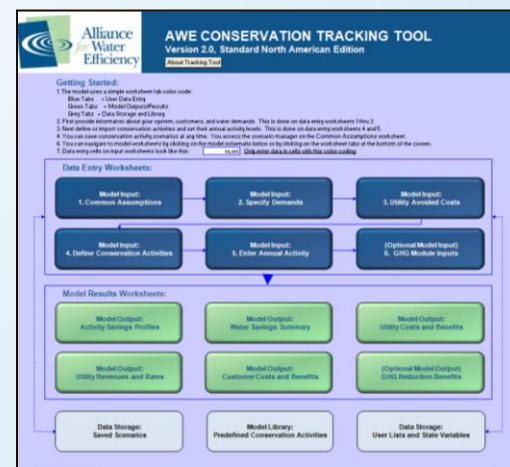
Components of Benefit-Cost Analysis

Inputs

- Demographic data
- Weather data
- Customer utility rates
- Water demand forecast
- Avoided utility costs
- Efficiency program information
- Energy data

Outputs

- Water savings
- Costs and benefits
- Impact to revenue and rates
- Greenhouse gas and energy reductions



What are Example Benefits Associated with Water Conservation Programs?

- Short-term
 - Water purchase costs (if supplied by wholesaler)
 - Variable water treatment costs
 - Energy costs related to pumping and treatment
 - Chemical costs
- Long-term
 - Avoid, Defer, and/or Downsize Expansion Projects

Guelph, ON Costs and Benefits

Activity Name	PV Cost (\$)	PV (\$) Benefit	NPV (\$)	B/C Ratio
Royal Flush Toilet Rebate, SF	\$ 1,676,300	\$ 12,068,155	\$ 10,391,855	7.20
Royal Flush Toilet Rebate, MF	\$ 525,400	\$ 2,534,944	\$ 2,009,544	4.82
Royal Flush Toilet Rebate, ICI	\$ 55,800	\$ 441,405	\$ 385,605	7.91
Smart Wash Washing Machine Rebate	\$ 1,333,250	\$ 4,806,374	\$ 3,473,124	3.61
Blue Built Home - Bronze	\$ 329,280	\$ 545,126	\$ 215,846	1.66
Blue Built Home - Silver	\$ 15,900	\$ 21,487	\$ 5,587	1.35
Greywater Reuse Systems	\$ 21,000	\$ 3,157	\$ (17,843)	0.15
ICI Audit and Capacity Buyback Program	\$ 967,395	\$ 12,323,719	\$ 11,356,324	12.74
Rainwater Harvesting System	\$ 50,000	\$ 7,264	\$ (42,736)	0.15
Healthy Landscape Visit	\$ 368,970	\$ 36,022	\$ (332,948)	0.10
Efficient Home Visit Surveys (GEL/NetZero City)	\$ 229,505	\$ 24,127	\$ (205,378)	0.11
Total	\$ 5,572,800	\$ 32,811,780	\$ 27,238,980	5.89

Oakland County, Michigan Costs and Benefits

Activity Name	<u>Commerce</u>	<u>Lyon</u>	<u>SW Oakland</u>
	B/C Ratio	B/C Ratio	B/C Ratio
Residential High-Efficiency Toilet Rebates	13.57	1.42	2.29
Residential High-Efficiency Clothes Washer Rebates	2.84	0.45	0.71
Residential Efficient Irrigation Nozzle Replacements	0.51	0.09	0.09
Residential Irrigation ET Controller Rebates	1.22	0.20	0.21
Residential Soil Moisture Sensor – Targets High Water Users	3.08	0.69	0.83
Large Landscape Surveys	4.27	0.74	0.77
Large Landscape Irrigation Controller Rebates	3.94	0.64	0.66
Total	7.22	0.75	0.97

2010 Total Water Consumption by Quarter (MG)

