Moraines are the backbone of Grand

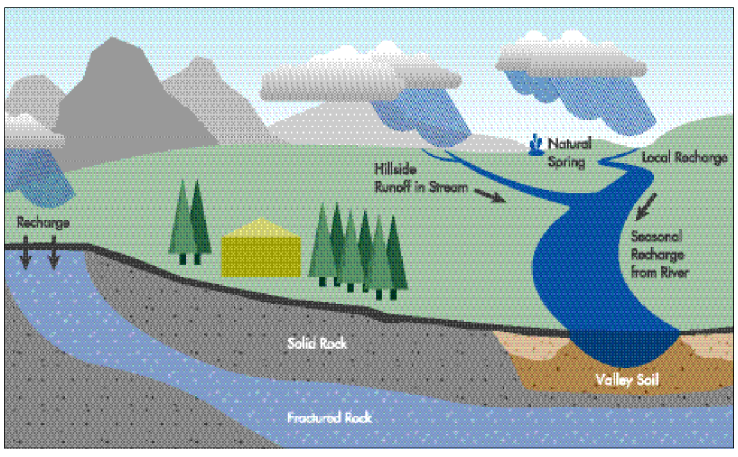
Take a close look at the landscape of the Grand River watershed and you'll be taking a look back thousands of years in time.

The rivers, valleys and hills that define this part of the province are remnants of an ice age that lasted tens of thousand of years, when ice two kilometres thick covered Southern Ontario.

When the Wisconsin Glacier retreated 10,000 years ago, it helped shaped the land we know today.

The rushing meltwaters carved out the Grand River valley and pooled in lowlands which helped to create the Great Lakes. The ice pushed forward and retreated in cycles that lasted centuries. In their wake they left behind great hills of sand, gravel and soil that we call moraines.

The Grand River watershed has three major moraine systems that are proof of the power of the ancient ice and water: the Waterloo Moraine, the Galt-Paris Moraine and the Orangeville Moraine.



Natural filter

Moraines play a critical role in the water system. Water that enters the ground in a moraine area is filtered and cooled as it moves through the sand and gravel of the moraine to recharge aquifers. Some of that water makes its way to the surface again in springs, which feed streams and rivers. Moraines are also a rich source of groundwater for private and municipal wells.

(Graphic from Pollution Probe, adapted from Oregon State University)

The Waterloo and Galt-Paris moraines play a major role in providing fresh water to the Grand River cities and are also most affected by the growth of those cities:

- The Waterloo Moraine covers much of Kitchener, Waterloo, Wilmot and parts of Wellesley and North Dumfries. It has an area of 400 square kilometres. In some places, the overburden – the sand, gravel and soil deposits left behind by the glacier – are 120 metres thick.
- The Galt and Paris Moraines run parallel to each other along the east side of the watershed through Wellington County, Waterloo Region and Brant County. The two moraines form a belt more than 70 kilometres long and six to eight kilometres wide, with overburden deposits as thick as 30 metres.

Key areas

The moraines are much more than just souvenirs of an ancient age. They are the backbone of the watershed and are critical to the health of the Grand River environment and, significantly, its cities, towns and farms. It is no great stretch to say that, after the river itself, these moraines were the key to the development of the watershed as one of the richest regions in Canada.

Moraines have been described as natural "rain barrels."

Wells drilled into the moraines provide clean drinking water to hundreds of thousands of rural and urban residents. The moraines are also the source of much of the water that fills streams and rivers in the central part of the watershed. That means they are an indirect source of drinking water to those communities that draw some or all of their drinking water directly from the Grand River system.

When rain falls or snow melts on the porous ground of a moraine, it soaks down into the ground, where it is naturally filtered and cooled.

This "recharges" the aquifers, which are underground beds or layers of earth, gravel, or porous stone that yields water.

Some of the water recharges aquifers in the overburden area, while some of the water makes its way lower into the ground, where

The river runs through it

Thousands of years ago, the Grand River carved a path through the Galt-Paris Moraine. Today, groundwater from the moraine seeps into the river, helping to raise water quality between Cambridge and Brantford. GRCA *photo by David Schultz*

Reservoirs

Continued from Page 7

munities that draw their drinking water from the river.

When a wastewater treatment plant is built, enlarged or expanded, an essential part of the planning process is calculating the assimilative capacity of the receiving stream.

The GRCA has a computer model of the watershed that it uses to take a larger look at the issue. Called the Grand River Simulation Model, it was first developed 25 years ago and has been constantly improved since then.

The model is built on data from all of the wastewater plants, information about pollution from other sources and records for river flows, temperatures and dissolved oxygen. Dissolved oxygen and temperatures are monitored continuously at seven water quality monitoring stations in the watershed. (Real-time data from the stations is available in the River Data section of the GRCA website.)

The model calculates the effects of the effluent coming from all of the waste treatment plants, plus other sources of pollution. It can predict the outcome of a variety of scenarios and conditions, providing a dynamic model of the river and its capacity to handle pollutants.

Municipalities planning a wastewater plant improvement or expansion can use the model to calculate the probable impact on the river. For example, the Region of Waterloo, which is conducting a study of its system of wastewater plants, can use the model to analyze a variety of scenarios. That helps the region decide which set of improvements will have the greatest impact on water quality at the most reasonable cost.

The water provided by the GRCA's reservoirs is a critical part of the analysis.

The GRCA operates seven reservoirs, with the four largest – Luther Lake, Belwood Lake, Guelph Lake and Conestogo Lake – playing a big role in keeping the water flowing in the Grand, Conestogo and Speed rivers.

Water from melting snow and spring rain is stored in the reservoirs. It is released gradually throughout the summer to maintain minimum flows at target locations.

There are flow targets at Doon for the outlet of the Kitchener wastewater treatment plant; at Guelph for the outlet of the Guelph plant; and at Brantford for the intake of the city's drinking water treatment plant.

The reservoirs are, in essence, an extension of the municipal treatment plants, since the water they put in the river helps the treatment plants meet the targets set by the province.

The GRCA has said to the provincial government that just as it shares in the cost of wastewater treatment plants, it should also share in the operating and maintenance costs of the reservoirs because they are vital to the proper operation of the municipal wastewater treatment plants.