



The GRAND

GRAND RIVER
CONSERVATION
AUTHORITY
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Distribution 210,000 copies

A Plan for the Grand

A new water management study will address important issues in the Grand River watershed and provide strategies for addressing them over the next 25 years.

See page 3



floodcontrol



waterquality



watersupplies

Illustration by Lara Vujanic

Along
the
Grand

Restoration

Stream restoration can be an important tool to improve the health of the Grand River watershed.

Pages 6-7

Reforestation

Getting to the goal of 30 per cent forest cover will take time and dedication.

Pages 8-9

Conservation

Water prices are rising and consumption is dropping, making our municipal water systems better.

Pages 10-11

THE GRAND RIVER

A Canadian
Heritage River



The GRCA

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A Message

FROM THE CHAIRMAN



The Grand River Conservation Authority is only as strong as its partnerships.

When it was founded in 1934, the watershed agency that eventually became the GRCA was a partnership of the municipalities of the watershed.

Over the years, more partners came on board. The provincial and federal governments played important roles in the early days of the authority, helping to finance critical pieces of infrastructure such as Shand and Conestogo dams.

The partnership between the GRCA and the provincial government led to the development of rules restricting development in the floodplain – an important step toward reducing flood damage – and toward building the network of conservation areas that is second to none in the province.

Over the years, the GRCA has reached out beyond government to develop new strategic relationships. We have close ties with researchers at the three universities in the watershed. We've formed bonds with community-based groups such as the Friends of Mill Creek, highlighted in a story on Page 7.

There's a reason for all these partnerships. The Grand River watershed is far too big, the challenges far too complex for any one agency to master.

The population of the Grand River watershed is rapidly advancing toward one million people spread across an incredibly diverse landscape of growing cities, picturesque towns and thriving farming regions.

It would be folly to think all of those people have exactly the same vision of the natural wonders of the Grand River watershed and how they should be protected and nurtured. Local knowledge can be a powerful addition to any decision-making process.

Our newest partnership is the one that will be working over the next couple of years to develop the new Water Management Plan.

The plan will look at three important issues – flooding, water quality and water supplies – and outline an action plan for addressing those issues in an era of climate change, urban growth and intensive agriculture.

The municipality where you live appoints one or more representatives to the GRCA board to oversee the budget and activities of the conservation authority.

Townships of Amaranth, East Garafraxa,
East Luther Grand Valley, Melancthon,
Southgate: Tom Nevills

Townships of Wellington North and
Mapleton: Pat Salter

Township of Centre Wellington:
Shawn Watters

Town of Erin, Townships of
Guelph/Eramosa and Puslinch: Brad
Whitcombe

WHO SPEAKS FOR YOU?

City of Guelph: Vicki Beard,
Mike Salisbury

Regional Municipality of Waterloo:
(Cambridge, Kitchener, Waterloo, North
Dumfries, Wellesley, Wilmot and Woolwich) –
Jane Brewer, Kim Denouden, Jean Haalboom,
Ross Kelterborn, Claudette Millar, Jane
Mitchell (GRCA 1st vice-chair), Wayne Roth,
Jake Smola, Bill Strauss, Lynne Woolstencroft

The last time there was a comprehensive review of these issues was more than a quarter-century ago, when the 1982 Water Management Plan was released.

This time we're also taking the long view, looking at what might happen in the next 25 years.

That's why it's critical that the plan be developed by a partnership of all of those with a stake in the outcome: the GRCA, the province, the federal government, First Nations, environmental agencies, farm organizations, business people, academics, community groups, residents and others.

No one person, no one agency, has all of the knowledge necessary to develop the plan. More significantly, the plan will have to reflect the many perspectives of the many different regions of the watershed.

And, in the final analysis, the plan will only be successful if those responsible for implementing are behind it 100 per cent. The best way to ensure that happens is to make sure they're at the table right from the beginning.

More than 75 years of experience has demonstrated that a concerted effort by many people can restore the Grand River and its rich natural heritage. The greatest guarantee of success is that they first agree on what needs to be done and then work together to do it.

We're confident that the new water management plan will continue the progress of the past and carry us forward to meet the goals of making Grand River watershed – and its communities – healthy, vibrant and sustainable.



Alan Dale

Alan Dale
Chairman

Town of North Perth, Township of Perth
East: George Wicke

Regional Municipality of Halton: (Halton
Hills and Milton) – Barry Lee

City of Hamilton: Jeanette Jamieson

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East Zorra-Tavistock, Norwich) –
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City of Brantford: Robert Hillier,
Vic Prendergast (GRCA 2nd vice-chair)

County of Brant: Robert Chambers,
Brian Coleman

Haldimand and Norfolk counties:
Lorne Boyko, Craig Grice

A new plan for the Grand

From her house on the riverbank in Caledonia, Lorrie Minshall can see the value people place on the Grand River.

Anglers stand hip-deep in water downstream of the Caledonia Dam. Power boats pull excited tubers up the middle of the channel. Dinner cruise boats cruise quietly along the river.

Minshall, a water resources engineer with the Grand River Conservation Authority, knows it wasn't always that way. Not that many years ago, when people turned their noses up at the river – literally.

Now it plays an ever-bigger role in the lives of watershed residents from the headwaters near Dundalk to the mouth near Dunnville.

The Grand River and its tributaries have long been essential to urban and rural life – water for drinking, water for crops and industry, a place to put effluent from sewage treatment plants.

But it's taking on greater importance as people rediscover the river after generations of neglect. River-based tourism is a growth industry along much of the Grand. Municipal economic development offices tout the Grand, its riverside trails and natural areas as key components of their quality of life.

A new study will provide strategies for water quality, water supply and flooding issues

But as a long-time employee of the GRCA, Minshall knows the rebirth of the Grand River is no accident. Many of the improvements have taken place because of co-ordinated efforts to undo man-made damage. River improvement plans date back to the 1930s, with the most recent being the Grand River Basin Water Management Study, completed in 1982.

That four-year study focused on water quality, water supply and flooding issues and proposed more than 20 recommendations that have, for the most part, been implemented.

Now, says Minshall, it's time to take another look to see what

work will need to be done in the next 25 years to ensure that the Grand River system will continue to meet the needs of everyone – and everything – that depends on it.

She's the program director for a new Water Management Plan study that is just getting underway and is scheduled to be completed in about two years.

"If we keep our goals realistic then we can achieve a healthier river than we if we didn't have a

plan," she said in an interview.

The new study is looking at the same issues as the 1982 study – water quality, water supply and flood damage reduction – but there are some new wrinkles to take into account, notably urban growth and climate change. Like the earlier plan, it's a collaborative work involving municipalities, the GRCA, several provincial and federal ministries, First Nations, academics and other experts. There will also be a component of community involvement.

Build on existing knowledge

A lot of the information the planners will need already exists, notes Minshall. Municipalities are developing long-term strategies for water supplies and sewage treatment. These studies are being done against the backdrop of the province's Places To Grow strategy, which has identified the cities of the Grand River watershed as high-growth areas.

But there's one important question that can't be answered by all of these individual studies: Will they fit together?

For example, as municipalities upgrade their sewage treatment plants, they need to meet provincial regulations governing the quality of the treated effluent they put into the Grand and its tributaries.

"Is meeting the regulations good enough?" asks Minshall. Will the combined impact of the sewage effluent be beyond the river's quality to assimilate it, or will other actions be required?

Minshall believes "we've hit a wall in terms of affordable technology" to treat sewage to squeeze out more impurities. "The technology is out there but it hasn't been developed on a scale for practical, affordable application."

That's why the water management plan will look at other alternatives to improve river health, such as rehabilitating the Grand and its tributaries so they function more like they did 200 years ago: remove unneeded dams, plant riverbank



Lorrie Minshall

buffers of trees and shrubs and restore meandering stream channels.

There are similar questions about water supply, said Minshall. Municipalities are developing long range water supply strategies. Water is also needed for agriculture and, of course, there has to be enough water to support a diverse ecosystem.

Is there enough water?

Are groundwater and surface water resources sufficient to meet future needs? How easily can new supplies be developed? What if climate change brings longer, more severe droughts?

Climate change also raises questions about flood control efforts, explains Minshall.

The existing networks of reservoirs and dikes were built to standards based on historical rainfall and temperature patterns.

"The fact is that we're seeing more extreme weather in recent years," said Minshall. "We can't plan just for what we've seen in the past."

Warmer weather could mean rivers and streams will be warmer, which could have an impact on water quality and biodiversity, said Minshall.

Though the questions are complex, the partners are determined to find the answers, she said.

"Municipalities are more interested in taking a watershed approach to issues," she said. They're more willing to look beyond their own borders to find solutions to environmental issues.

The provincial government is looking for innovative ways to pay for infrastructure costs for urban growth and to ensure it takes place within a sound environmental framework.

The federal government is now looking to improving rivers such as Grand as a way to meet its commitment to improve the health of the Great Lakes.

"We've got almost all the pieces of the puzzle," said Minshall. "Now it's time to pull it all together."

Water management plan facts

Issues: The Grand River Water Management Plan Update will address three key topics:

- A sustainable water supply for communities and ecosystems
- A reduction in flood damage potential
- Improvements to water quality to maintain river health, and to reduce the river's impacts on Lake Erie

Goal: To develop an action plan that the partners agree to implement.

Timeline: The study is in its initial

stages now and is planned to be completed in about two years, although it may recommend more research that will go beyond the end of the study.

Partners: A steering committee has been set up with members from the GRCA, municipalities, First Nations, provincial ministries and federal departments. Project teams will be made up of representatives from those agencies along with academics and key stakeholder groups (e.g. agriculture, industry, environmental organizations).



The Grand River Water Management Plan will examine three primary topics: flood control, water quality and water supplies. The articles on these two pages provide an overview of the issues.

Flood control

Flooding is a long-standing problem in the Grand River watershed and it will never go away.

The changes that have been made to the land – cutting down forests, draining wetlands, paving large swaths of land, tile draining rural areas – guarantee that flooding will continue.

It is, though, possible to manage the problem to reduce the chances of human injury and property damage.

The first tool is the GRCA reservoir network. The seven reservoirs, such as Belwood Lake (Shand Dam), Conestogo Lake and Guelph Lake store water from the spring melt or summer thunderstorms, reducing the amount flowing downstream. Many times they have reduced flood peaks by 50 per cent or more.

Dikes can reduce damages on a local basis. Dikes protect large parts of Kitchener (Bridgeport), Cambridge (Galt) and

Brantford. River flows high enough to cause floods in the past now go practically unnoticed.

However, a recommendation to build dikes in New Hamburg and Dunnville was not implemented.

Controls on development in flood-prone areas reduce the potential for damages and loss of life.

But even with all of these measures in place, there are still times when it's simply not possible to contain flood waters. Over the years, the GRCA has developed a robust flood forecasting and warning system. When the GRCA issues a warning, municipalities warn residents and take other action to protect lives and limit damage.

The past

Among the steps taken to reduce flood damages following the 1982 Basin Study were:

- Tighter controls on development in the floodplain that are included in municipal zoning bylaws and official plans.
- Construction of new or expanded dikes in Brantford, Cambridge and other communities in the 1980s and 1990s at a total cost of about \$45 million
- Changes in the operation of GRCA reservoirs to provide more flood storage capacity at certain times of the year.

The future

The flood damage reduction program has proven its mettle over the years. However, the prospect of climate change introduces some new concerns.

The precise impact of climate change is unknown, but preliminary research has pointed to changes in precipitation patterns that could lead to more and bigger storms, more dry periods and heavier snowfall in the northern part of the watershed.

At the same time, new technology holds the promise of new and more accurate flood forecasting methods which could provide property owners and emergency services with better information to respond to floods.

As part of the basin study, several topics will be investigated:

- What are the best ways to adapt to climate change?
- What additional flood control works could be constructed in flood damage centres such as New Hamburg and Dunnville?
- How can existing flood forecasting and warning tools be improved? What new tools will be available in the future?



Flooding remains a problem in several communities including New Hamburg and Dunnville.

Water quality

What happens on the land is reflected in the water. That statement takes on a special significance when the topic is water quality.

The Grand River watershed is intensely developed with big, fast growing cities and some of Canada's best agricultural land. Between cities and farms, there are few parts of the watershed that are still in a natural state.

The impact of that intense land use has been reflected in the water quality of the Grand and its tributaries ever since the watershed was settled two centuries ago.

There have been significant improvements in water quality in the past 50 years that turned the river back into a place that people enjoy, rather than avoid. Sportfishing, canoeing, hiking on riverside trails and other river-based activities surged in the late 20th century.

Yet the pressures on the river continue. There are 29 municipal sewage treatment plants handling the waste of more than 700,000 people.

Some plants are approaching their capacity and technological limits. In some instances, expensive upgrades may be required; in others, the continual improvement in the management and operation of the plants is a way to produce higher quality effluent with the equipment already available.

On the farm, the use of manure storage tanks, fencing along creeks and streamside vegetation buffers is far from universal.

In the cities, stormwater management systems are relatively new features. In older areas, poor quality water runs off from streets and parking lots into streams and rivers.

Chemicals such as phosphorous and nitrates that are found in human and animal waste and in fertilizers can degrade water quality. Phosphorous can cause prolific plant and algae growth, which in turn leads to low dissolved oxygen levels.

Algae growth can also lead to taste and odour problems in drinking water.

Upstream erosion affects water quality for communities that use the Grand as a source of drinking water.

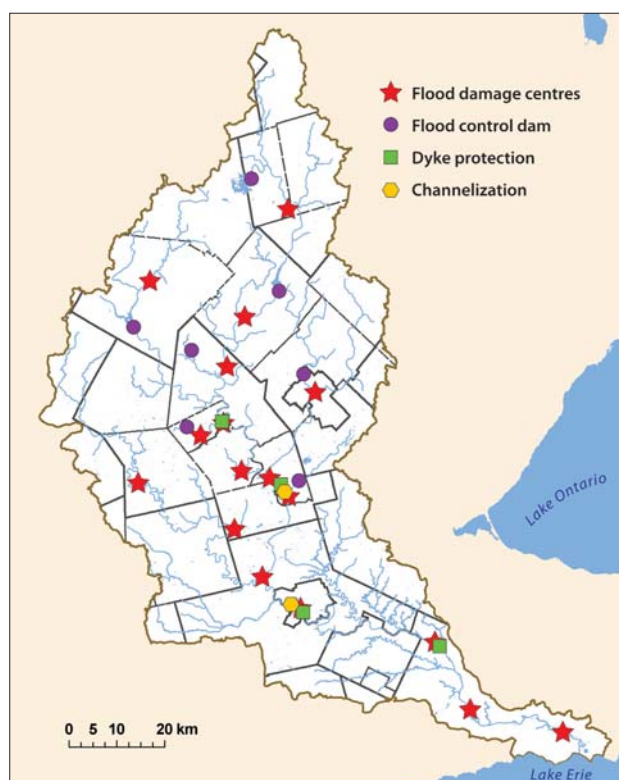
The problems of the Grand spill over into Lake Erie. The Grand has been identified as a leading source of nutrients to the eastern basin that result in low water quality in the lake, particularly the area closest to shore.

The past

As a result of the recommendations of the 1982 Basin Study, several steps were taken to improve water quality:

- The Guelph sewage treatment plant was upgraded several times which helped to significantly improve water quality in the Speed River. Improved operating procedures have been adopted in Guelph and Haldimand; other municipalities are now exploring adopting optimization procedures as well.

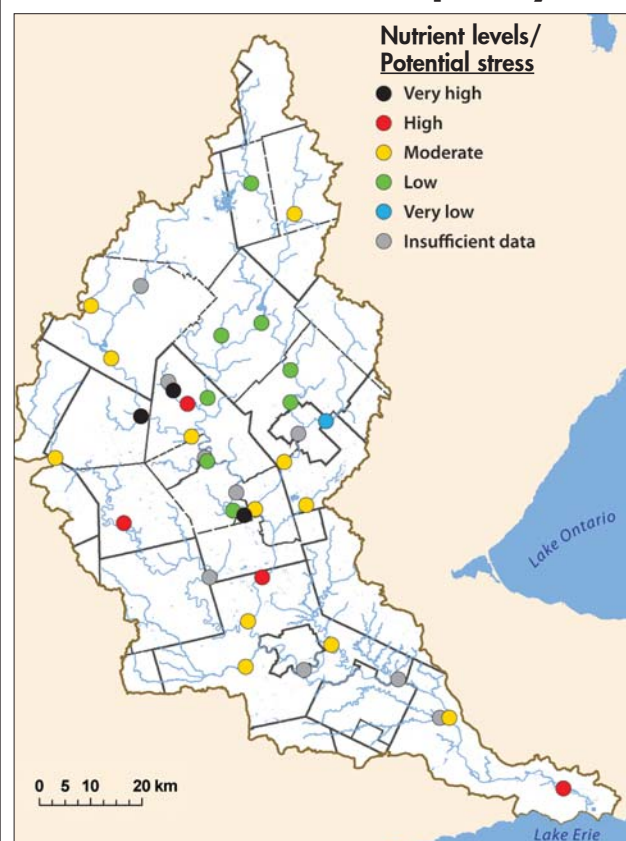
Flood control measures



Flood protection measures have been taken in many communities in the Grand River watershed, including construction of dikes and deeper river channels. Reservoirs can reduce flood levels by 50 per cent or more.



Status of water quality



High nutrient levels can lead to poor water quality. The nutrients promote plant and algae growth which reduces the amount of oxygen available in the water. These ratings are based on information collected from 2003 to 2007.

■ The Region of Waterloo is undertaking several major sewage treatment plant upgrades worth a total of \$500 million.

■ The Rural Water Quality Program was developed to help farmers keep water clean on their land.

■ Stormwater management systems are now required in new development to reduce the volume of sediment and pollutants getting into streams and rivers.

■ A groundwater monitoring network has been developed and major strides have been taken in surface water monitoring to provide better information on water quality.

The future

■ A focus of the new water management plan work will be finding ways to reduce the volume of nutrients in surface water. That means developing a better understanding of the proportion coming from sewage treatment plants (often called "point sources") compared to "non-point sources" such as farm and city runoff.

■ Another potential line of study is whether renaturalizing watercourses will help them to better assimilate nutrients.

■ The study will look at the projected impact of the round of sewage treatment plant upgrades that are taking place in several municipalities.

■ New water quality concerns are coming to the fore including the impact of climate change on river temperatures.

Water supplies

In all of Canada, the communities of the Grand River watershed stand out in the way they get their drinking water.

Across Canada, only 11 per cent of municipal drinking water comes from groundwater wells, mostly in smaller towns. About 89 per cent of municipal water comes from surface sources, says the 2010 Municipal Water Use Report issued by Environment Canada.

But in the Grand River watershed, the numbers are reversed: 69 per cent of municipal water comes from wells, about 31 per cent from surface water. Four of Ontario's fastest growing cities – Cambridge, Kitchener, Waterloo and Guelph – rely heavily on wells.

The water systems are complex, too. Across the watershed there are more than 200 municipal wells, four intakes on the Grand and Eramosa rivers, and one on Lake Erie.

Groundwater systems are susceptible to shortages as a result of extended droughts or aquifer contamination. The Region of Waterloo and Guelph have introduced intensive water conservation programs as one response to these issues.

Expanding well-based systems can also be a complicated and time-consuming process.

Communities drawing from the rivers are concerned about water quality issues posed by both natural events and human activities. High sediment loads during floods can make water difficult to treat. Upstream spills can force these communities to close their intakes for hours.

Agriculture also puts demands on water supplies. Water can be drawn from wells, creeks or rivers for watering animals or for irrigation. The demand for irrigation is particularly strong in the sandy soils of Brant, Norfolk and Oxford counties.

The past

Actions taken to ensure adequate water supplies since the 1982 Basin Study include:

■ New groundwater sources and enhanced water storage systems have been developed by the Region of Waterloo.

■ The Region of Waterloo started taking water from the Grand River in 1992.



Public education is part of municipal water conservation programs. These kids are learning at a Children's Water Festival.

■ Municipalities have developed comprehensive water conservation programs.

■ The GRCA modified its reservoir operating procedures to better meet the water supply and quality needs of municipalities.

The future

Faced with significant population growth, municipalities are developing long-term water supply strategies to address their needs for the next 25 years. Groundwater based systems such as the Region of Waterloo and Guelph are looking to get more out of existing wells and bring new ones online.

Brantford and Ohsweken are improving their water treatment systems to address quality issues.

Meanwhile, plans are being developed for a proposed pipeline from Lake Erie. There are several partners in the planning process, though none have made a formal commitment to the project. The partners are the Region of Waterloo, Brantford, the counties of Brant, Norfolk and Haldimand as well as the Six Nations and New Credit First Nations.

The new plan will address these questions:

■ What are the water needs of municipalities? Agriculture? The ecosystem?

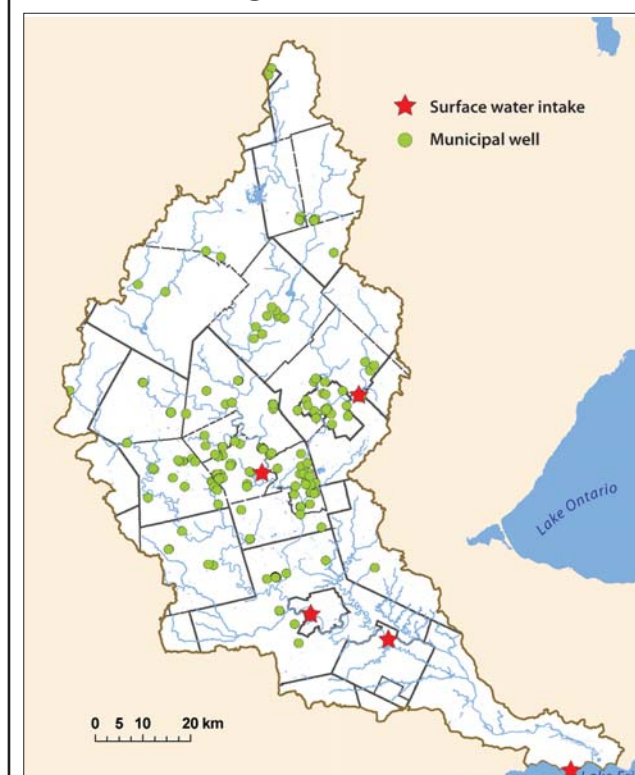
■ Where will municipalities find their future water supplies?

■ What are municipalities doing to manage water demand through conservation programs?

■ What are the potential impacts of the proposed Lake Erie pipeline?

■ What impact could climate change have on water use and water supplies?

Drinking water sources



Municipal drinking water systems in the Grand River watershed draw from groundwater and surface water, making them among the most complex in the province.



Bringing streams back to life

Shade trees hang over a bubbling stream as it meanders through a broad field. Butterflies flit among the bushes and trees along the stream bank.

It's an idyllic scene, and one that would make many people think about dropping a fishing line, launching a canoe or grabbing the binoculars to do some bird watching.

But Bill Annable sees something more. The trees and bushes keep the water cool, protecting water quality. The bubbling noises and the meanders are signs that the water is losing energy as it moves downstream, which reduces erosion. The field is the floodplain, a critical part of the river, even if it is dry most of the time.

Thinks about rivers

Annable, an engineering professor at the University of Waterloo, spends a lot of his time thinking about rivers, how they work, how they break and how to fix them. He's been involved in river projects from San Jose CA to Switzerland and is known locally for his work on Red Hill Creek in Hamilton – a \$7 million project that was one of the largest of its kind in Canada.

The thread linking these watercourses is that they suffer from years of human manipulation that has led to erosion, low summer flows, flash flooding and poor water quality.

In the Grand River watershed, some of those problems have been

Stream restoration projects can help the Grand deal with stresses of human changes

partially resolved by investing hundreds of millions of dollars in sewage plant upgrades and building reservoirs and dikes.

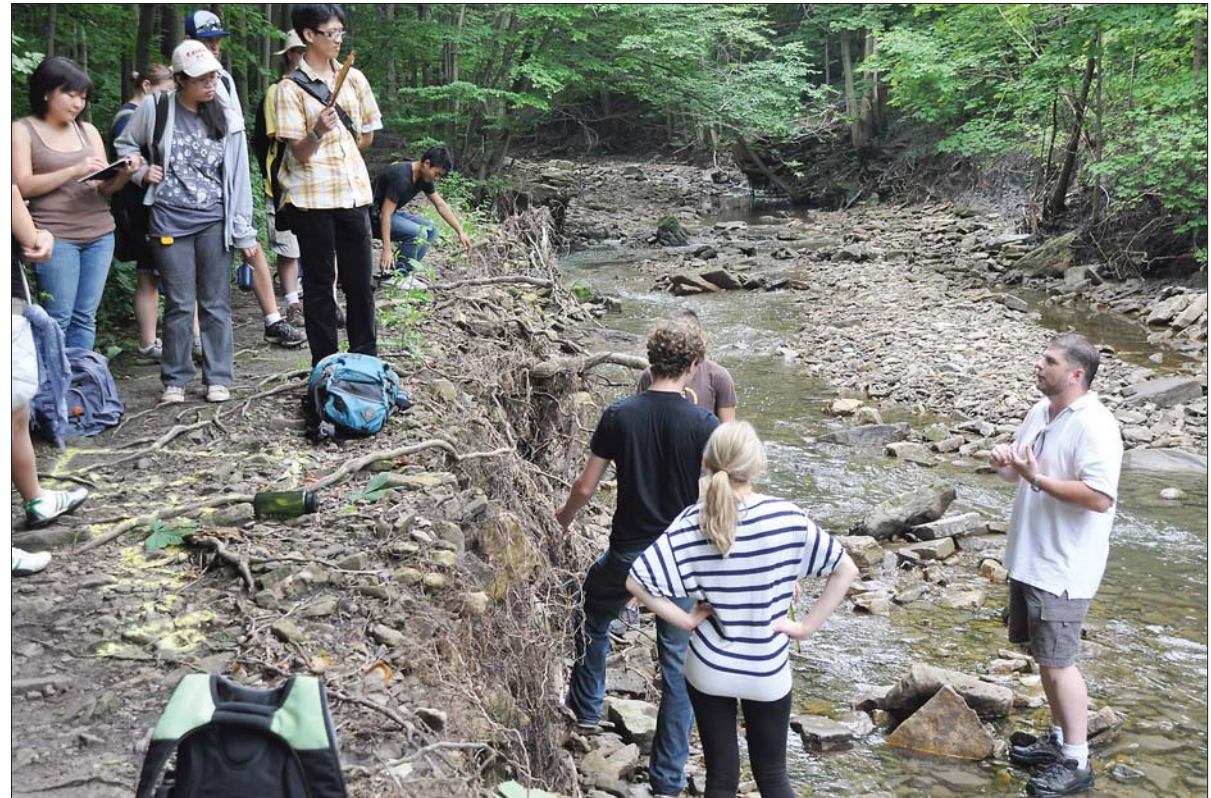
But going the next step may mean more emphasis on restoring watercourses to a more natural state. Cleaner, cooler water moving through rivers and streams can help them assimilate urban and rural runoff as well as treated effluent from sewage plants.

It can be an affordable and practical approach, says Annable. Many of the best stream restoration projects have been carried out by small teams of volunteers or community groups. (See story on Page 7 on the Mill Creek Rangers).

It requires thinking on a watershed basis and taking the time to get it right.

"The environment isn't a cup-of-soup," says Annable. "We're grown accustomed to instant communication, instant everything, but when it comes to the environment, it can take 10 or 15 years to see results."

The five rivers in the Grand River watershed (Grand, Conestogo,



Professor Bill Annable of the University of Waterloo talks to his students during a tour of the Red Hill Creek in Hamilton. Annable led the restoration of the stream, one of the biggest projects of its kind in Canada.

GRCA Photo by Dave Schultz

Nith, Speed and Eramosa) have a total length of about 650 kilometres. On the other hand, the watershed's many streams and creeks have a total length of about 11,000 kilometres.

"If you put your energy into smaller streams, you'll see a measurable improvement in the Grand over time," said Annable. That's where you can get the "best bang for the buck."

Almost from the time they arrived, the early settlers started to manipulate rivers and streams to meet their needs. They straightened streams to increase flows and open more land for farming and urban development. They built dams for power. Rural drains and urban storm sewers took water off the land more quickly. In some cities, streams were forced into concrete channels or even into tunnels.

The work got the job done – in the

short run. But some left long-term legacies of environmental degradation: warmer water, more erosion, higher flood flows and loss of habitat and species.

High social costs

There were social costs, too. Governments had to return time and time again to dredge ponds, rebuild bridge abutments, clear debris and repair washed-out roads.

Restoring a watercourse to a more natural system makes both environmental and economic sense, says Annable. If it's done right, some maintenance costs will disappear, or at least be significantly reduced.

"It has to be cost-effective or no

one will buy in," says Annable. "It's hard to tell a municipality to rip out bridges and other infrastructure.

"You should try to emulate, as much as possible, the characteristics that kept the stream in good shape before we started to interfere with it."

However, it's not just a matter of doing projects at various locations along a stream. It's important to take a look at the stream's entire drainage area to ensure that the right fixes are being applied in the right places.

Unfortunately that hasn't always happened.

"Agencies and groups have their own projects, so you end up with a patchwork," he said. "Instead, you have to stand back and take a watershed view."

The process starts with identifying objectives for the stream – reasonable expectations for water quality, temperature, biological diversity, erosion, sediment movement and so on. Then it's possible to identify the best places to carry out the projects and put prices on them.

Restoration techniques

- Plant trees and bushes to create a three to five metre buffer along the bank to reduce erosion and cool the water
- Install fencing to keep cattle out of a river to reduce erosion caused when they trample the banks.
- Allow the stream to find its own stable path instead of trying to constrain it. A meandering stream will move more slowly, reducing erosion
- Remove impediments to flow, such as old dams
- Recognize that the floodplain is an important part of the overall river system, and that it's sometimes a good thing for a river to spill over its banks (as long as public safety is protected)
- Try to keep water on the landscape longer through the use of stormwater management systems, cisterns, infiltration trenches and other means.
- Do as much as you can at the source to have the greatest impact downstream.
- Tap into local knowledge of farmers, anglers and others who are familiar with the stream



The environment isn't a cup-of-soup.'

Bill Annable,
University of Waterloo



Busy commuters boarding buses at the transit terminal in downtown Galt (Cambridge) are probably unaware there's a stream flowing beneath their feet.

For most of its 25 kilometres, Mill Creek flows through farms and forests. But it spends its last 500 metres underground before it empties into the Grand through an unmarked culvert.

That's the fate of a lot of urban streams. They're forced into concrete channels or through long tunnels as a way to control flows, limit flooding, reduce erosion and open up more space for development.

Too often, out of sight also means out of mind. Most people don't put too much thought into taking care of something they can't see.

Mill Creek is different, though. There's a large group of people who are putting a lot of effort into protecting and improving this important cold-water stream.

Initiated projects

They're called the Friends of Mill Creek. For more than a decade they've initiated projects ranging from tree planting to channel reconstruction, all designed to keep the water clean and clear and to support a thriving ecosystem.

Geography defines the creek. It flows along an old riverbed created thousands of years ago by rushing water from melting glaciers. Alongside the creek are the Galt and Paris moraines – rolling hills of sand and gravel pushed into place by those glaciers.

Rain and melting snow soak easi-

Cool running

Years of work have helped Mill Creek return to health

ly into the loose soil where it is cleansed as it moves downward. Eventually the water re-emerges, feeding springs and wetlands that, in turn, feed the stream. That creates a welcoming habitat for brook trout and other coldwater species.

But geography has worked against the creek, as well. The presence of that sand and gravel has attracted aggregate companies to the area. The construction of Highways 401 and 6 forced changes in the creek alignment. Old mill and farm ponds have interfered with the flows. Farming has led to erosion. Runoff from city streets and parking lots means more warm water entering the stream.

"Land development over the last 50 years has had a significant impact on the aquatic habitats of Mill Creek," wrote Larry Halyk in a 2004 article. A long-time member of the Friends of Mill Creek, he is a biologist and co-ordinator of the Wellington County Stewardship

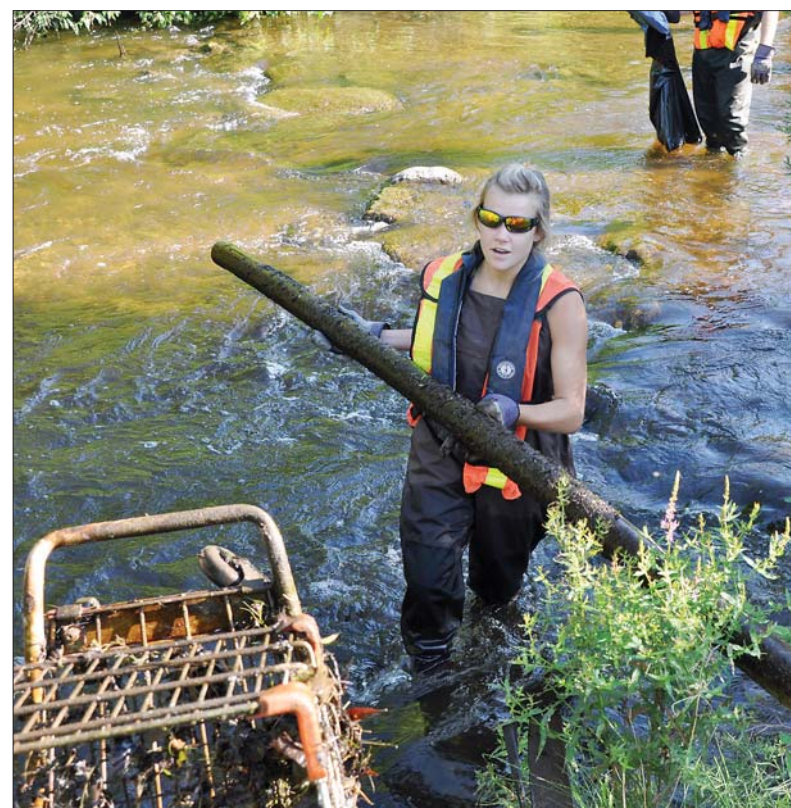
Program.

A comprehensive study of the 104-square kilometre watershed in 1996 highlighted the stresses and strains on the creek. Brook trout, which thrive in cold water, could survive only in the upper part of the creek, where human influences were minimal.

Working together

The study inspired individuals, businesses, government agencies, service clubs, farmers and others to take action. The Friends of Mill Creek came together in 1997 "to work together with the common goal of protecting and restoring the natural features of Mill Creek and its watershed," wrote Halyk. (More information is available at www.friendsofmillcreek.org.)

"Individual members don't always have the same perspective on growth, development and land use," Halyk wrote, but "all (are) committed to the restoration of Mill Creek and leave their differences behind."



Mill Creek Ranger Reilly Henderson pulls garbage from the creek.

A decade later, the creek is showing significant signs of improvement, says Robert Messier, an ecologist with the GRCA who works closely with the Friends of Mill Creek.

"We stabilized something at risk," he said. "We've gotten rid of warm pools and physical barriers to fish movement."

Now the creek supports a self-sustaining population of brown trout which can live in water that is slightly warmer than that needed for native brook trout.

If the Friends are the brains of the operation, the muscle is applied by the Mill Creek Rangers. Every summer five students are hired to do a wide variety of projects. The program began in 2003 and is financed by the private sector businesses, service clubs and agencies that are part of the Friends.

Over the years the rangers have removed ponds, planted trees, installed fences to keep cattle out of the stream, cleaned out debris ranging from fallen trees to shopping carts, and helped to rechannel the stream into a more natural path.

It's a low-cost and effective way to get a lot of work done, said Messier.

One major project involved re-routing the creek around an old farm pond to keep the water cooler and keep sediment moving through

the system. If the job had been contracted out it might have cost about \$80,000, said Messier.

In fact, it cost close to nothing. Heavy equipment, operators, aggregate and professional services for the design, were all donated. The Mill Creek Rangers supplied the labour to get the job done.

Water temperature dropped

The project had its desired effect.

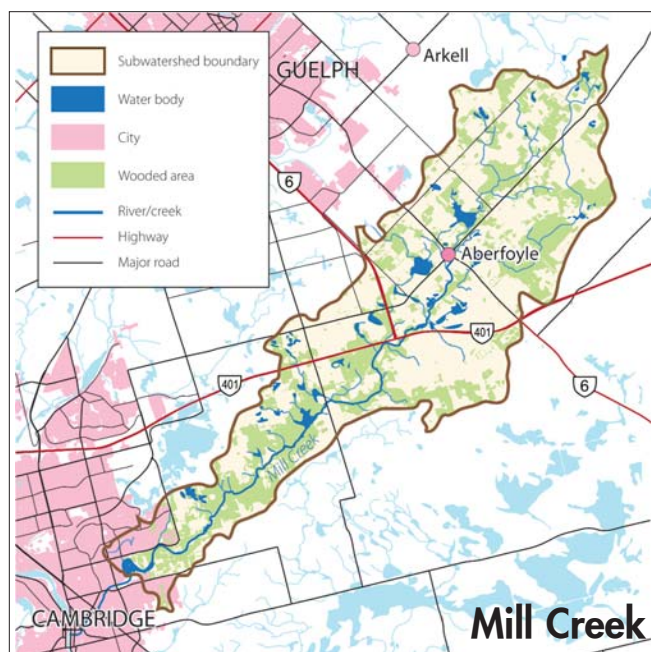
Prior to the project, the pool of warm water and the presence of the small dam both acted as barriers to fish movement. Once the new 180 metre bypass channel was built, the water temperature dropped four degrees and fish could move upstream easily.

"The fish tell us they like it by now occupying the new reach of creek. Brown trout are now successfully spawning and hatching," said Messier.

The stream will never return to what it was 200 years ago. There have been too many permanent changes on the landscape to allow that to happen.

But the work has definitely paid off. Every year, the water entering the Grand from Mill Creek is that much cooler, cleaner and healthier, said Messier.

"It took us centuries to mess it up," he said. "We can fix it if we take the time."



Mill Creek enters a tunnel in Cambridge.



Getting to 30% forest cover

By Janet Baine

GRCA Communications Specialist

There are no two ways about it: we need to plant trees like never before.

Environment Canada recommends 30 per cent tree cover for a healthy watershed. Now there is 17 to 19 per cent tree cover in the Grand River watershed, depending

on which study you consult. Trees lead to environmental sustainability for future generations. The United Nations is also striving for 30 per cent tree cover in the Billion Tree Campaign, so 30 per cent is an internationally recognized benchmark.

Scientists say trees give us many benefits: they clean the air, purify the water, sequester carbon, provide habitat and help prevent floods and erosion. Homeowners can tell you

Reaching the goal for forest size will require time and dedication

that mature trees moderate temperatures and increase real estate value. Agricultural researchers say trees increase crop yield, cut heating and cooling costs, cut snow removal costs and even decrease odour

problems around livestock barns. The list of benefits goes on and varies, depending on who you are and the variety and location of the trees.

Current tree cover in the watershed is equivalent to 1,200 square kilometres of forests. To reach

'The best time to plant a tree is 20 years ago. The second best time is now.'

Traditional proverb

30 per cent, another 800 square kilometres will have to be squeezed onto the landscape. With a booming economy, growing population and heavy demand for land, is this

goal realistic?

The answer is yes.

Martin Neumann, supervisor of terrestrial resources, did a computer exercise to determine if the 30 per cent goal is practical. He studied aerial photos of Guelph/Eramosa Township and added trees wherever he thought they would provide the biggest benefit. He added them on fallow land, along watercourses and fencerows until he got to 30 per cent tree cover.

The exercise convinced Neumann that there is room in most parts of the watershed to achieve the 30 per cent goal. But real tree planting takes money, commitment, the willingness of many partners and many decades.

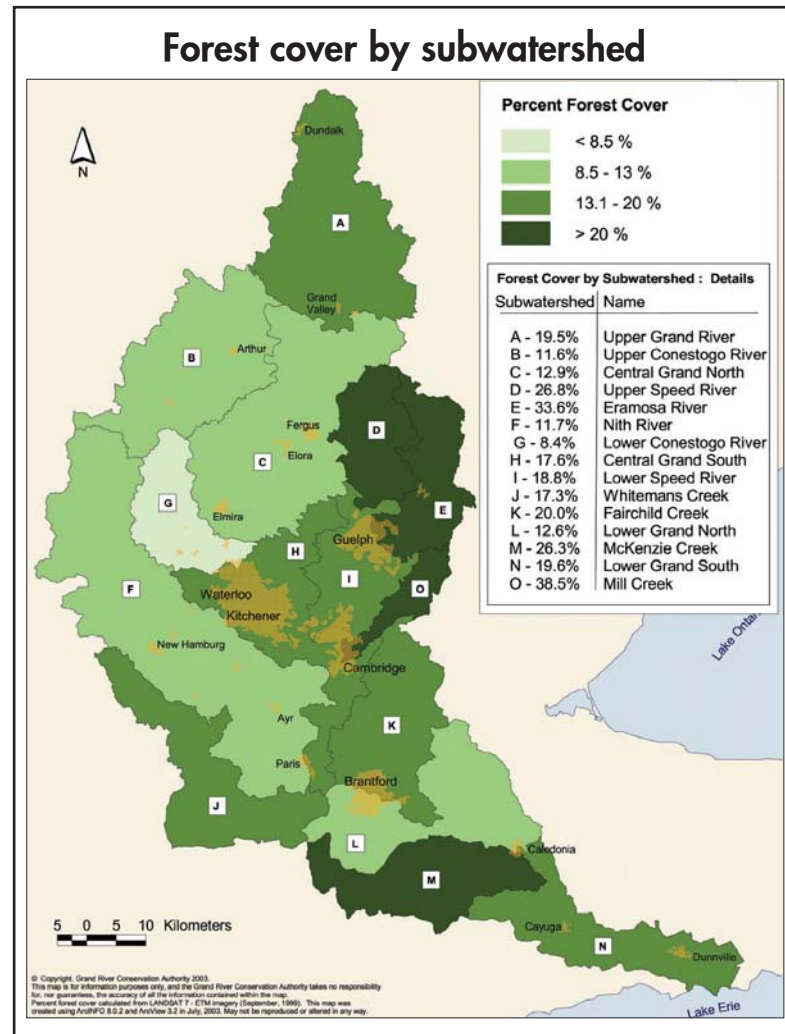
Like some other watershed municipalities, Guelph/Eramosa Township council has committed to bring tree cover up to 30 per cent from the current 19 per cent. That will involve planting five million trees within 50 years.

Wellington County's Green Legacy program is also making a concerted effort to increase forest cover. The municipally-funded organization has been planting since 2004 and on Oct. 3 will plant its millionth tree. Volunteers include 6,000 students who gain a connection to nature as they grow and plant trees.

Even though the Wellington organization is growing and planting more than 156,000 trees each year, program organizer Rob Johnson said the rate needs to be stepped up significantly. He would like each resident of Wellington County to plant 10 trees a year, so that almost a million trees would go into the ground annually. In Johnson's mind, more important than the trees is the connection people are making to nature as they become stewards of the land.

Trees for Mapleton

The 30 per cent benchmark is more challenging for parts of the watershed such as Mapleton Township. Flat and windswept,



Ernie Martin measures four years of tree growth. He was the first person to sign up for a tree program offered by Peel Township, now part of Mapleton.

Mapleton has some of the most intensively-farmed land in the province. Tree cover is very low, averaging only nine per cent, or as low as three per cent in some areas — a long way from the 30 per cent tree cover recommended by Environment Canada.

"The community of Mapleton has been shortchanged, both in appropriate tree cover and also information based on science that found it pays to grow trees in strategic places," says Paul Day, a resident and tree planting advocate who founded Trees for Mapleton.

Day said farmers often think of trees as an enemy, since they take up space that could otherwise be used for production. In fact, farm income can be raised \$20,000 on an average farm, with the right tree plantings helping to cut wind damage and raising yields.

Ernie Martin, a neighbour of Day,

was the first in the township to sign up for a tree program in 2001. The trees close to his vegetable garden are growing quickly and helping increase the yield. Trees near the road have cut down on the snowdrifts that used to form in his laneway. In the winter, Mennonite horses show noticeable relief when they hit a stretch of roadway with trees.

Over the last 20 years, nearly 470,000 trees have been ordered through the GRCA for Mapleton Township landowners. Trees for Mapleton has the goal of planting trees around every farm, which will go a long way to bringing the township up to 30 per cent.

Not just numbers

It could be discouraging for people to think that at the current rate of tree planting, getting to 30 per

Continued on Page 9





Students plant trees in Brantford as one of many Earth Day events.

Forest cover

Continued from Page 8

cent could take hundreds of years. But it is important to remember that forest cover in this watershed dropped as low as five per cent around 1900, and has since risen to 17 to 19 per cent. If that rate of tree planting could be continued, the 30 per cent target could be met in 100 years, said Neumann.

"There is a danger in getting too

caught up in the numbers associated with bringing forest cover up to 30 per cent," he said. It would be very costly to verify exactly what the tree cover currently is and so conservationists are working with estimates. Unlike buildings and other infrastructure, trees are a moving target, because they grow, regenerate, die and are chopped down, so it is not as easy as monitoring money in a bank account.

It's also important to do a good job of picking where to plant trees

what types to plant.

Trees have additional benefits in some locations, such as beside a river or building. Native species have more habitat benefits than non-native species. Bigger forest blocks have huge value, since they are more biologically diverse and some species can only live in the centre of a large forest.

Unfortunately, the average size of tree planting plots is declining as land values increase and communities extend into rural areas.

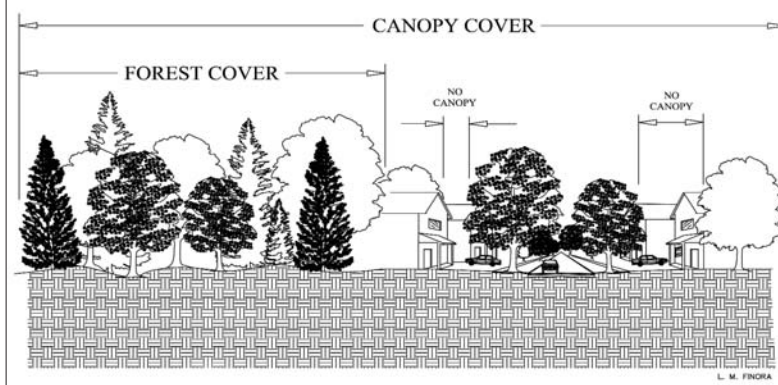
The 30 per cent goal is for the entire watershed, and not necessarily each municipal jurisdiction.

At the same time, trees in urban areas or beside buildings are a huge asset for those living or working nearby. For these reasons, bringing forest cover up to 30 per cent is only part of what we need to consider as we plant forests for the future.

It is very easy to get caught up in the tree planting numbers when the tree planting goal is a number, but it's also a big mistake, said Tracey Ryan, supervisor of conservation services for the GRCA.

"Success is on an individual basis, at a farm scale and at a property level," Ryan said. "Neighbours influence each other, and as one plants trees, others soon follow. Eventually the landscape is transformed."

FOREST COVER & CANOPY COVER



Urban areas strive for 40% canopy

The challenge of tree planting in urban areas is different from that of rural areas, because the recommended goal is for 40 per cent forest canopy cover, instead of 30 per cent tree cover.

This recommendation comes from American Forests, a big non-profit organization that has been around for many years. Governments and organizations are making this goal their own, including the GRCA. Only a small fraction of the Grand River watershed is urban and would potentially have the 40 per cent target.

The tree canopy is a different measure. One big tree can provide the same benefit as 10 or 20 medium-sized trees. The benefit comes from the foliage that can stretch up above houses, roads and rivers.

Mature neighbourhoods that are 30 or more years old have big old trees. If you are in an airplane looking down over an established community, you may see more trees than buildings. This is not the case with new neighbourhoods, because most trees are removed during construction and new ones have not had time to grow. Urban intensification will mean more people living in urban areas, so lot sizes will be smaller and there will be more multi-unit and multi-storey buildings. This leaves fewer places for trees to grow and less ability for them to stretch above rooftops.

There is still room in industrial and institutional areas and along roadsides. Green roofs, city tree bylaws that encourage planting and protect existing trees and updated

planning regulations can help bring urban areas up to 40 per cent canopy cover. Trees are an essential part of the urban infrastructure.

About 80 to 90 per cent of the urban forest is on private land, so education and awareness to encourage people to plant more trees on privately-owned properties will go a long way to increasing urban canopy cover.

Want to cut your heating and cooling costs, attract birds and nature into your yard, enjoy an outdoor lunch break at work and feel confident that your kids have sun protection in the schoolyard? Trees help solve all these problems and more.



Stopping a forest invasion

It is not enough to plant a forest, walk away and come back in 20 years to see how it has grown.

If left to grow on their own, forests in this watershed may be overtaken by invasive plants. Native trees that have been planted can be swallowed up by the stronger invasives. A newly planted native forest in Guelph may end up full of invasive buckthorn while a planting in Brantford may be overtaken by Manitoba maple.

"In extreme circumstances, we might be forced to spend as much to control invasives as we spend to plant the forest in the first place," Neumann said. "We don't want to end up with invasives

instead of the desired outcome."

Today's plantings are often more diverse and complex than conventional reforestation. They are also more at risk of animal damage. This focus on quality over quantity is due to a trend toward more expensive and smaller plantings. Large blocks of land are not as readily available for forests as they were over the previous century. On the other hand, once established, the diverse forests are more resilient to threats.

"There is less focus on cranking out trees in the ground and more attention to how, why and where trees are planted," Neumann said.



Putting a price on water

How much is water worth? It's a simple question to ask but it's not so easy to answer.

"Priceless" is one answer. Safe, clean water is in limited supply and essential to life, so no price is too high.

"Nothing" is another answer. Water is free to anyone who wants to tap into the nearest creek or drill a well — as long as they file the proper paperwork and pay the appropriate fees.

Actually, most Ontario residents would probably agree with both answers. Water is so important that it ought to be free to all.

But it's a fact of life that when something is free, or nearly free, it's open to abuse and waste.

And that's been the experience in Canada, which has traditionally had some of the cheapest water in the world.

"Canadian water prices are remarkably low by international standards," points out Steven Renzetti, an economics professor and author of *Wave of the Future: The Case for Smarter Water Policy*, published in 2009 by the C. D. Howe Institute.

Higher rates help keep our water supplies safe and may encourage water conservation

"By having such low water prices, Canada has encouraged its households, farms and businesses to be among the heaviest users of water in the world," said Renzetti, who teaches at Brock University in St. Catharines.

There's a correlation between prices and use, says a study published by the Expert Panel on Groundwater.

Europeans use less

Germans, for example, pay six times as much for water as the average Canadian, and use only a third as much. The pattern is the same for France, Italy, Britain and even the U.S. where higher prices and lower consumption go hand in hand.

A recent study issued by Environment Canada carries the same message: "There is strong evidence to suggest that volume-based pricing is associated with lower

municipal water use," said the 2010 Municipal Water Report.

But cheap water has other consequences, too. There are important implications for public safety.

That's a point highlighted by Justice Dennis O'Connor in his 2002 report on the Walkerton tainted water tragedy.

Even though raw water may be virtually free, there are considerable costs to pump, treat, store and distribute it.

O'Connor pointed out that "the pressure to keep water rates low may mean that sufficient revenues are not being generated" to pay for maintenance and improvements in the system.

That's no longer the case across much of Canada, and particularly in the Grand River watershed. In the watershed's five cities — Brantford, Cambridge, Guelph, Kitchener and Waterloo — water use is metered and users pay a charge for the vol-



'Pricing can help society achieve its goal of water sustainability'

Steven Renzetti,
Economics professor
Brock University

ume of water they consume each month.

More significantly, water rates have doubled and even tripled over the past decade to raise money for system operation and upgrades.

Meanwhile consumption has dropped dramatically and the watershed cities are among the lowest in the province in per capita water use.

Whether the two facts are connected is a matter of some contention

Doing the right things

Renzetti says the cities of the Grand River watershed are doing the right things to encourage conservation and properly finance their

water systems.

He is also co-author of a how-to guide for water pricing called "Worth Every Penny: A Primer on Conservation-Oriented Water Pricing" published by the POLIS Project on Ecological Governance at the University of Victoria.

The primer outlines the steps a municipality should take to introduce "conservation-oriented water pricing."

"Pricing is most certainly not an end in itself, but rather an instrument that can help society achieve its goal of water sustainability," says the primer.

Three things are key to making conservation pricing work: individual water meters, charging for water based on the volume used, and a water rate that is high enough to affect a user's decision making.

"On the whole, I'd say (the Grand River cities) are doing quite well," Renzetti said in an interview.

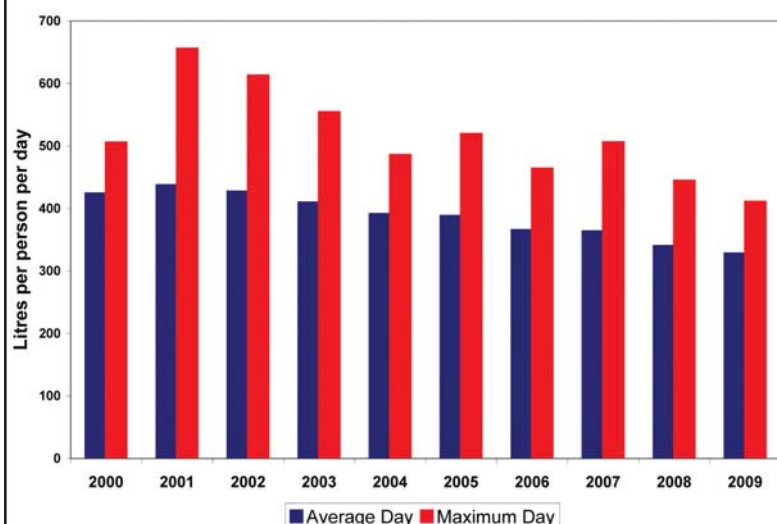
The City of Guelph attributes at least some of the decline in water consumption to the decision to raise prices.

The Guelph water system serves about 120,000 people and draws water from 19 groundwater wells and the Eramosa River. During 2002 — a particularly dry year — Guelph had trouble meeting demand and implemented its outdoor water use bylaw to encourage conservation.

Big price increases

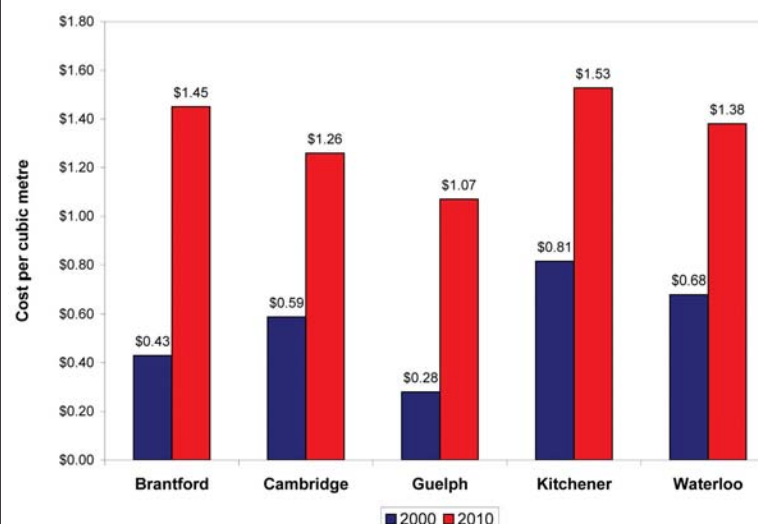
In 2000 Guelph had the cheapest water of all the cities in the Grand River watershed. It was just 28 cent a cubic metre — less than half the rate in some cities. (A typical household uses about 250 cubic metres a year.)

Water use in Grand River cities



Water consumption is tracked two ways. "Average day" is the amount of water used per person for day-to-day activities, year round. "Maximum day" is the peak amount used during one day, or one week, usually in the summer because of additional demand caused by lawn watering.

Water prices in Grand River cities



Municipalities have raised water prices considerably in the past 10 years to cover the cost of operating and maintaining their water systems. In addition to volume charges, all of the cities except Kitchener also charge a minimum monthly fee.



Now it charges \$1.07 a cubic metre – a 280 per cent increase — bringing it in line with the other watershed cities. Guelph has also implemented other conservation programs: outdoor water use restrictions, rebates for water efficient toilets, a program to encourage industries to cut water use, and a leak-plugging program for city mains.

Since 2000 per capita water consumption has dropped by 23 per cent.

Wayne Galliher, water conservation project manager with the City of Guelph, believes conservation pricing accounted for some of the reduction.

"We're seeing reductions in water use that are over and above what we would expect to see from the other measures," he said. "We think they're driven by the price increases."

Total consumption down

The conservation program has been so successful that the city's



City of Brantford photo

total water production has dropped despite significant population growth. The city is forecasting even more reductions in the future.

That provides some real benefits to city taxpayers, he pointed out. Falling consumption means that the city can wait a little longer to carry out expensive expansion projects.

Guelph considered introducing a pricing strategy that would put even more emphasis on water conservation called "increasing block rate pricing." In such a system, larger water users pay more for each cubic metre of water they consume over a base amount.

Although it wasn't adopted, it may be back on the table in the future, he said.

The Region of Waterloo has also seen a big drop in water consumption in the past decade, although officials there think the regional government's ambitious conservation program deserves most of the credit, rather than price increases.

The Region's Integrated Urban System treats water from about 125 wells and a Grand River intake. It provides water to the cities of Cambridge, Kitchener and Waterloo which each operate their own distribution system. The integrated system serves about 480,000 people.

Consumption per person has dropped about 20 per cent since 2000, from rates that were already relatively low.

Water prices during the same period rose 87 per cent in Kitchener (which already had the highest rates), 100 per cent in Waterloo and 114 per cent in Cambridge.

The Region of Waterloo has one of the oldest water conservation programs around. It was strengthened with a stringent outdoor water use bylaw in 2005 that limits lawn watering to once a week.

Offers incentives

The Region of Waterloo was one of the first municipalities to offer financial incentives to replace toilets with low-flow models. Toilet flushing consumes about one-third of the water used in a typical household.

About 60,000 toilets have been upgraded to low-flow models, said Steve Gombos, manager of water efficiency for the region. That's a big part in the reduction of day-to-day water use.

Like Guelph, the drop in water consumption in the Region of Waterloo has allowed it to put off a major water project — construction of a pipeline to Lake Erie. The proposed pipeline is now planned for 2035, a delay of about five years.

Gombos is skeptical that rising prices have much of an impact on

household water use.

Water is such a small part of the household budget that most people don't notice the increase, he said.

Renzetti said there's some truth to that argument. However, he believes that if a municipality publicizes big price increases, that will encourage people to pay attention to water costs and encourage conservation. From that perspective, rising water prices work hand-in-hand with other conservation measures.

Gombos said rising prices may have more of an impact on major water users, such as factories and institutions. Water consumption in that category is down 21 per cent in Waterloo Region in the past five years.

Economic trend

It's partly because of the economic trend away from manufacturing toward high tech industries. But some may be the effort by factories to cut energy and water costs, which often go hand-in-hand.

He also points to a growing "con-

servation ethic" among corporations who want to be seen doing their bit to help the environment.

Brantford has had some of the biggest price hikes in the past decade and also some of the biggest drops in water consumption. The water system, which draws from a Grand River intake, services about 93,000 people.

Supply shortages are not much of a problem in Brantford, but quality issues are a major concern, therefore Brantford has been investing a lot to upgrade its treatment and storage systems.

Water prices in Brantford have jumped more than 230 per cent since 2000. At the same time, average day water consumption has dropped 28 per cent. Although Brantford has an every-other-day lawn watering policy, like Guelph, it doesn't have the incentive programs the other communities offer.

Leanne Knuckle of the City of Brantford engineering department agrees that it's hard to pick out what part of the drop was a result of rising prices rather than the other conservation measures.

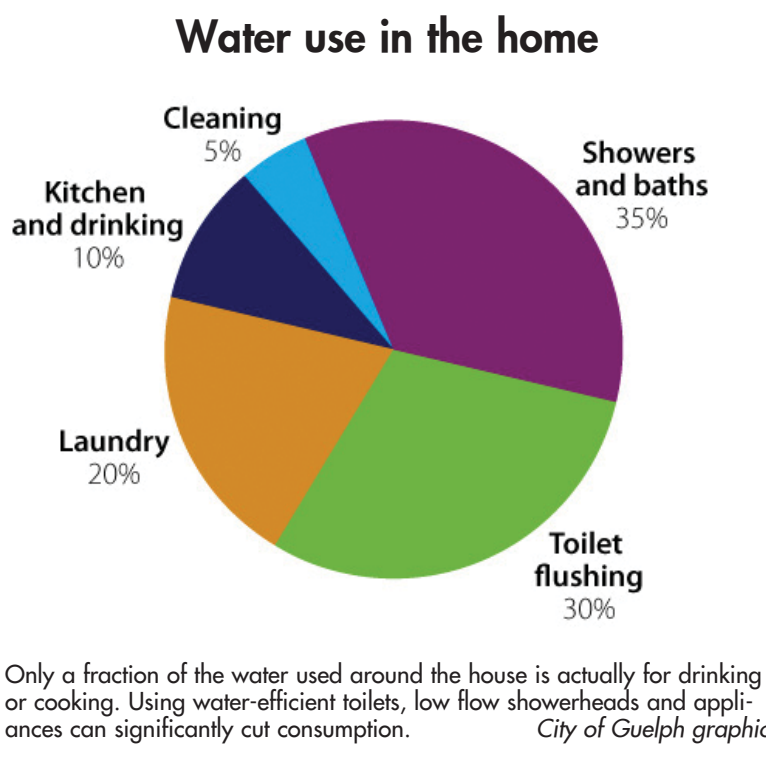
But, she noted, despite the sharp rise in price there have been remarkably few objections from Brantford residents.

The city has put a lot of effort into letting residents know what they're getting for their money she said — better water quality and a more reliable system.



Municipalities offer low-price rain barrels to residents as an incentive to reduce outdoor water use.

Region of Waterloo photo





The GRAND RIVER CONSERVATION FOUNDATION

Building a foundation for health

A healthy Grand River watershed helps make healthy communities

If you step into Doug Brock's backyard, you won't have to look very far to understand why he supports the Grand River Conservation Foundation.

The Grand flows directly behind his Waterloo home, bringing nature to his doorstep. Birds flit around his bird feeders, including his favorite, a red-breasted nuthatch that likes to hang upside-down. Bald eagles sometimes soar above, including young teenagers that are not yet old enough to have white heads.

"I really believe the Grand River is a very valuable community

resource that is undiscovered by many in the community," Brock says. "You realize how essential the river is when you live on it. It is almost a different ecosystem, it is five degrees cooler here than in downtown Waterloo."

Brock says the river is a tremendous community resource not only because of its natural beauty, but also because of the recreational opportunities it provides so close to home. A long-time nature lover, he cycles about three times a week, regularly kayaks and occasionally wades into the river with a rod to try his luck.

Joined in 2005

Brock joined the board of the foundation in 2005 after he was invited by Marilyn Murray, a past foundation chair who also co-chaired the \$2.2 million Living Classroom — Campaign for Outdoor Education.

"The river is an important part of our local ecosystem, because it has a major impact on the trees, the birds and people who depend on it," he said. "I don't care who you are, we

all breathe air and we all drink water so we are all part of the environment. If we protect our environment better, we might not need quite so much health care."

Serving as vice-chair

Brock is excited about the future of the foundation and assumed the role of vice-chair this year. He also contributes money to it and has made it part of his estate plan.

The GRCF has been growing through many recent changes and is well prepared to take on the challenges of the future as a result.

Board members now have a limited term and meet more often. Everyone on the board brings a unique set of skills.

Brock started out studying geology at McGill University, then completed an MBA at the University of Western Ontario.

Doug Brock,
Foundation
Vice-chair

'The Grand River is a very valuable community resource.'

He went on to a 30-year career in investment planning with Merrill Lynch and CIBC. He has served on a wide range of business, charitable and not-for-profit boards including Wilfrid Laurier University, Waterloo Region Police Service, the Ontario Arts Council and the Waterloo Community Foundation. His expertise as a member of the foundation is planning and marketing. Brock says the foundation is forging a stronger connection both to the community and the staff of the Grand River Conservation Authority.

"I think the timing to raise the profile of the foundation couldn't be better. Environmental issues are at the top of the list of priorities for most people, along with health care and education," he said.



Doug Brock's property backs onto the Grand River, so nature and many outdoor activities are only steps away.

GRCA Photo by Janet Baine

Foundation donors, he said, feel they are partnering with the foundation when they give to it. Fundraising is about "friend-raising" first, so it is important to listen to the ideas of others — something he has been doing a great deal lately.

"The interesting thing is if you do something good on the river upstream it affects everyone all the way down the river, so those who live the furthest along get the most benefit from everyone upstream," he said.

You can help, too!

For more than 40 years, the Grand River Conservation Foundation has improved our quality of life by enriching the natural values of the Grand River watershed and encouraging people to enjoy, and to learn from, the great outdoors.

For more information:

- Subscribe to RiverNews, the Foundation newsletter by signing up on www.grcf.ca
- To donate, visit www.grcf.ca
- Phone toll-free 1-877-29-GRAND
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