We know that we draw out money from our bank account for our needs. We also know that we can only take out what is already in our account, or we will be in debt. If we are wise, we plan carefully so that we can cover the cost of items we really need without emptying our account.

We can use the metaphor of our bank account to understand the principles of a watershed water budget. We can only use what is in the bank (substitute fresh ground and surface water). If we waste this (deplete or pollute the aquifers and wetlands), there will be none available to us in times of need, such as drought, population growth, and increasing industrial and agricultural needs.

Water quality and water quantity are major components of The Grand Strategy. The water quantity component includes evaluating both surface water and groundwater resources within the Grand River drainage basin. This enables us to determine how much water is available, how much is being used and how much may be available for other uses. Water use includes both human demands and the natural environment’s water needs. The Water Budget is a compilation of all water uses, as well as an estimate of the quantity of water, for a number of areas within the basin. The difference between all water uses and the estimate of water quantity defines the Water Budget.

The results are much like a financial budget. Where positive, there may be surplus water, and may be able to support additional water takings. Where negative, a deficit may be occurring, and there is a risk that the resource is being depleted or over used.

A Water Budget forms the technical basis for making decisions related to water use. It also provides additional understanding of the main functions served by different areas of the watershed. This understanding will be used to develop management plans and policies intended to ensure the long-term sustainable use of the water resources in different parts of the watershed.

• See page 2
The Ontario Ministry of the Natural Resources and Ministry of the Environment has recognized work being completed in this field by the GRCA and Credit Valley Conservation. Funding of $250,000 has been provided to each Conservation Authority over a two-year period to develop watershed pilots. Watershed pilots document the Water Budget approaches taken by each Conservation Authority and serve as examples that could be implemented in other areas. Several milestones have been accomplished towards the goal of an overall Water Budget Plan for the Grand River watershed.

Water Use

The Water Use component is a collection of all human water uses within the watershed, and includes the following:

- Municipal Water Takings: Water takings, which supply municipal distribution systems.
- Rural Domestic Takings: Water takings for residents not connected to a municipal system (i.e., private wells).
- Agricultural Takings: Water required by the agricultural community for animal watering or crop washing.
- Irrigation Takings: Water required by the agricultural community for crop irrigation.
- Other: Any other takings that do not fall into the above categories. These may include industries or commercial areas, which are not connected to a municipal system, or golf courses and aggregate operations.

The natural environment’s water needs must also be considered. Further work is needed to establish the natural environment’s water needs to maintain function in different parts of the watershed.

Available Water

Available water has been defined as the amount of water remaining from precipitation after all natural processes have been accounted for (evaporation and streamflow). This quantity of water is also known as groundwater recharge. Groundwater Recharge = Precipitation – Evaporation – Streamflow.

The amount of groundwater recharge is estimated using a computer model, which predicts streamflow and evaporation. Estimates are made at the subcatchment level, with monthly variations included. The effects of certain drought periods on groundwater recharge can also be estimated using this computer model.

Water uses may also be supported from surface water sources. When considering the amount of water that can be drawn from a surface water source, the natural environment’s needs must be considered. Available Surface Water = Streamflow – Natural Environment’s Needs

Work to date has identified several regionally important areas in the watershed. Three of the most important areas are:

- The Dundalk Highlands in the extreme north tip of the watershed. This area contributes 5% of watershed recharge, 4% of watershed baseflow, and occupies 2% of the watershed area.
- The Central Moraine Area, which consists of an extensive network of moraines, including the Waterloo, Galt, Paris and Orangeville Moraines. This area contributes 46% of watershed recharge, 39% of watershed baseflow, and occupies 20% of the watershed area.
- The Norfolk Sand Plain, which is located in the southwest portion of the watershed and forms a majority of the Whitemans Creek watershed. This area contributes 8% of watershed recharge, 5% of watershed baseflow, and occupies 4% of the watershed area.

Municipal water use is a large component of water use in the Grand River watershed. Many of the municipal takings are drawing water from large regional aquifers. Work is progressing with the groundwater model, to better understand the extent of major regional aquifers and the interaction between human use and natural processes.

Caledonia Mill represents part of the industrial heritage of the southern Grand River. The river also plays a major role in the recreation of many watershed residents. The mill has recently been restored. Photo: Daryl Baxter.
between the groundwater system and the natural environment. The areas surrounding Guelph, Kitchener/Waterloo and Cambridge show extremely high water use, reflecting the large municipal takings occurring in these areas.

In order to manage the resource proactively, the Water Budget must be able, and has been designed, to account for possible changes in climate, land use, population increases or changes in water consumption.

The computer model developed to date is capable of estimating the effect of droughts and long-term variability on the water budget. The model is capable of estimating impacts of climate change. Additional work is being completed by Environment Canada to refine climate change estimates and GRCA staff are working closely with Environment Canada staff to estimate and quantify the impacts of climate change in the Grand River watershed.

Where do we go next? A range of future scenarios with projected population and land use changes will be completed to determine future implications to the water budget.

A three dimensional groundwater flow model is being constructed for the entire watershed. Infiltration estimates from the surface water model will be coupled with the groundwater model. The groundwater model will also provide a better understanding of the groundwater and surface water interactions and identify potential new sources of groundwater that could be developed in a sustainable fashion.

These new tools and a better understanding of the watershed water budget will help municipalities in planning for growth and changes in the way we use the land. It will provide guidelines to where efforts are best spent to protect the aquifers and the environmental areas that store and supply our water. It will help us all understand this valuable resource.

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**MILESTONES**

Milestones are progress or products of The Grand Strategy Joint Work Plan.

**Discover the Grand South**

Did you know that in the mid-1800s the Grand River was a busy commercial river with schooners, barges and steamboats transporting goods and people? Did you know that the southern Grand River valley is one of the richest archaeological areas in North America, with evidence of settlement dating 10,000-12,000 years ago? The southern Grand River has a rich and fascinating history, with ghost towns, stately homes, and locks and canals that facilitated river travel in the 1800s. The area has been greatly influenced by settlers, both of European and Aboriginal descent, loyal to the British Crown during the American Revolution, and who settled along the banks of the Grand River. It is a historically rich area that is largely undiscovered in Southern Ontario.

On Heritage Day, February 18, 2002, over 300 people filled the Cayuga Kinsmen Community Centre to learn more about the history and heritage of the southern portion of the Grand River watershed. The event was hosted by The Grand Strategy Heritage Working Group and sponsored by Haldimand County, Ministry of Tourism, Culture and Recreation, and the GRCA.

Speakers included Haldimand County Mayor, Lorraine Bergstrand; Historian and Author Bruce Emerson Hill; Archaeologist and Professor at WLU Brantford, Dr. Gary Warrick; and Mohawk Elder, Akland Davey. The first three speakers talked about the rich heritage of the southern Grand. Akland Davey reminded participants that we must view the river and its natural and cultural resources with more respect. We must continue to work together to find solutions to the many problems that have been created as a result of settlement and long-standing abuse of the environment.

The bright afternoon sunshine provided for perfect viewing of the historic sites and countryside during five bus tours led by knowledgeable guides. The tours included Chiefswood National Historic Site (home of poetess, E. Pauline Johnson), Odrohheka (The Gathering Place—Six Nations Tourism), York, Caledonia, Ruthven National Historic Site (home of David Thompson, promoter of the Grand River Navigation Company), Cayuga and Dunnville.

The Heritage Day Workshop and Celebration is held annually on Heritage Day to provide a forum for people to discuss opportunities to improve heritage planning, management and decision-making, to raise heritage awareness and appreciation, and to celebrate the designation of the Grand River as a Canadian Heritage River. In 2003, the Heritage Day Workshop and Celebration will be held in Guelph on February 17th.

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**WHAT’S HAPPENING?**

**Carbon and Habitat**

By Martin Neumann, GRCA

Why is Ontario Power Generation funding tree planting at Luther Marsh?

One of the rarest things in southern Ontario today is a big block of natural habitat. Luther Marsh is important for many reasons, but as much as anything, size counts! Luther Marsh Wildlife Management Area is the largest block of natural habitat in the Grand River watershed. Now Ontario Power Generation has committed to contributing $85,000 to plant 65,000 trees to make these big blocks of habitat even better.

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CARBON
from page three

In the rest of the watershed, forest cover is around 17%, and forests are usually small patches, often isolated from each other. A couple of notable exceptions are the forests along the Eramosa River and those on lands of the Six Nations of the Grand River.

Because of forest fragmentation in the watershed and southern Ontario generally, wildlife that depends on large or undisturbed forest habitats struggles to maintain healthy populations. Some species need their habitat to be at least 300 metres from the forest’s edge—a situation that’s hard to find in southern Ontario. Two examples of species that need interior forest habitat, and that might be seen at Luther, are the Blackburnian warbler and the red-shouldered hawk.

What are the solutions to fragmented habitat? Prevent big blocks of habitat from getting smaller; plant trees next to them to make them bigger; and link them with natural habitats that are as wide as feasible. Luther Marsh already has large forest blocks, but 65,000 trees will go a long way to improving, linking and expanding these forests.

What is the connection between Ontario Power Generation and forests? Ontario Power Generation embarked on a Carbon Sequestration and Biodiversity Management Program to plant trees strategically across southern Ontario with these objectives:

- provide habitat for threatened species that are at risk due to the loss and fragmentation of habitat;
- expand key forested areas and connect woodland patches;
- improve water quality along riparian zones; and
- offset approximately 900,000 tonnes of carbon dioxide.

The program is intended to counteract the greenhouse effect by planting trees to take carbon dioxide from the atmosphere and store it as carbon in their woody parts. To maximize the benefits of the planted trees, Ontario Power Generation has focused the plantings on the rarest habitat: big habitat.

Ontario Power Generation, The Grand River Foundation, and the GRCA, along with other partners, will collaborate on the planting of 65,000 trees from 2002 to 2004. If you or your group would like to be involved in this important project, contact area staff at (519) 928-2832.

The Grand View

The Waterloo Community Arts Centre celebrated the Grand River and its status as a Canadian Heritage River by hosting a juried art exhibition called The Grand View. Last fall, invitations were sent to Waterloo area artists to submit art pertaining to the Grand River watershed. Response was overwhelming and over 100 pieces of artwork were entered.

The gala opening of the exhibit was held at the Waterloo Community Arts Centre on February 3, 2002, and attracted over 380 people. Two jurers selected 20 of the best pieces to be part of a touring show. One piece was chosen by the public as the people’s choice award.

These 21 pieces of art will tour Kitchener, Cambridge, Simcoe, Brantford, Guelph, Elora, Elmira, St. Jacobs and Waterloo until September 12, 2002. Look for a listing of the locations and dates in the Calendar of Events on page 8 of this newsletter.

The winners were announced at The Grand Occasion, a celebratory dinner held at the Arts Centre on February 15th. A catalogue, produced by Dennison Printing, will be available at all venues of the exhibition. For more information contact Sher DiCiccio or Gloria Armstrong at (519) 886-4577 or (519) 886-5961. Email: wcacsher@sentex.net

Say It With Trucks

The beginning of an innovative tourism marketing campaign for Haldimand County was marked in dramatic fashion on January 3, 2002, with the unveiling of the first of three full colour truck trailer murals at KRTS Transportation in Caledonia.

Kim Richardson, President of KRTS Transportation Specialists in Caledonia generously provided the truck trailers for the campaign for a five-year period “as a way to give back to our community.” The three trailers...
have been designed with 21 colour photos promoting tourism in Haldimand County, Six Nations/New Credit, the Grand River watershed and the Lake Erie shoreline. The Haldimand County logo, community names, tourism toll-free phone number and website are also displayed on all sides of the trailers.

The campaign was made possible with Provincial Rural Jobs Strategy Funding and in-kind partnerships between KRTS Transportation Specialists in Caledonia, the Grand River Southern Valley Marketing Strategy Partnership, Grand Erie Business Centre and Tourism Haldimand. The campaign is a component of an overall Marketing Strategy designed by the Grand River Southern Valley Marketing Strategy Partnership, a collection of area Chambers of Commerce and the Grand Erie Business Centre.

Areas such as Muskoka have had significant success with truck trailer tourism marketing campaigns. KRTS travels Central Ontario, Niagara and Western Ontario with each trailer traveling approximately 300 km per day, seven days a week for a total of 328,500 km per year. Surveys have shown that people prefer advertising on trucks 96% to 4% for stationary billboards. Tourism Haldimand will track the effectiveness of the trailers through its 1-800 phone number and internet marketing.

Healthy Waters

Ontario is investing close to $350,000 to improve and protect surface and groundwater in the Waterloo region, Agriculture, Food and Rural Affairs Minister Brian Coburn announced on February 5, 2002.

The Healthy Futures for Ontario Agriculture funding will offset half of the almost $700,000 project costs, with the balance of funds provided by the Regional Municipality of Waterloo and local landowners. The GRCA will deliver the project.

A total of 218 Best Management Practices (BMPs) will be implemented in tandem with the Waterloo Rural Water Quality Program. BMPs include such activities as: diverting clean water away from manure storages and exercise yards; restricting livestock access to water-courses; adopting nutrient management plans; protecting wellheads, and plugging unused wells; establishing contour cropping systems designed for erosion control, and erecting erosion control structures; and retiring fragile land from production. Through the course of the project, BMPs will be promoted throughout the region, and farmers will be encouraged to participate. The project also includes site visits, water quality sampling and final inspections on the participating farms.

Waterloo Region’s Rural Water Quality Program has been in existence since 1998. That year, the Region committed $1.5 million to rural water quality projects. Since then, grants totalling $850,000 have been made for more than 200 projects. Another 100 are to be completed this year.

Waterloo’s programs are administered by the GRCA, which pays the administrative and support costs of the programs as part of a commitment it made in the mid-1990s to improved rural water quality.

The GRCA delivers similar programs to farmers throughout the watershed. In total, more than $1.4 million in grants have been provided to farmers to assist with 350 projects. The landowners, in turn, have contributed more than $2 million and provided an additional $350,000 worth of labour and materials to water quality projects.

Other areas with rural water quality programs administered by the GRCA include the following.

Wellington County and the City of Guelph initiated a Rural Water Quality Program in 1999. The county contributed $900,000 and the city $450,000 to a five-year program. In May 2001, the provincial agriculture ministry added another $740,000. In Wellington, over $480,000 has been spent on more than 150 projects under Rural Water Quality and Healthy Waters programs. Another 200 projects are expected to be completed this year.

Brant County and Brantford have each contributed $50,000 to a Rural Water Quality Program this year. An additional $10,000 is coming from the Millennium Grow Green Committee. An application has been made to the provincial Healthy Futures for Agriculture program for support.

Dufferin and Haldimand county farmers can take advantage of a program financed by a grant of $209,000 from the Agricultural Environmental Stewardship Initiative of Agriculture and Agri-Food Canada.

The GRCA also delivers rural water quality programs, on behalf of the Upper Thames Conservation Authority, to farmers in Oxford and Perth counties. For more information on all of these programs contact Tracey Ryan at (519) 621-2763, Ext. 269. E-mail: tryan@grandriver.ca

A Bird’s-Eye View

So many farmers are putting up fences to keep their livestock out of streams and rivers that our watershed is starting to look different. It must look different, too, from a bird’s-eye view.

Where once there was pasture, closely grazed to the water’s edge, now there is long grass, and newly planted trees and shrubs. These plants in the “buffer strip” help keep the water clean by filtering the run-off and utilizing nutrients. Fish are not the only animals that appreciate these changes. From a bird’s-eye view, these strips of natural vegetation along drains, streams, and rivers are starting to look like a pretty good place to make a home.

Meadowlarks, bobolinks, savannah

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BIRD’S EYE

from page five

sparrows, mallards, and blue-winged teal are some of the ground-nesting birds that may be found in wider buffer strips. Where mature trees are close to the watercourse, wood ducks and yellow-shafted flickers may be found nesting in natural cavities in trees.

A surprising number of bird species nest in cavities in trees, but trees with cavities are a rare commodity. The vacancy rate for tree cavities is so low that boxes with holes of an appropriate size can be substituted. If you build it, they will come.

Tree swallows and bluebirds can be enticed to nest in boxes on fence posts, so all these new fences along streams can do double duty. The kestrel (sparrow hawk) would nest in a box on an extended (higher) post attached to a fence post. House wrens and screech owls are other species that will move in to a home provided for them.

Of course, starlings and other uninvited guests, like deer mice and parasites, also move into nest boxes. The human landlords of these nest boxes must be very diligent about design, placement, and maintenance to make sure that the intended birds are truly benefiting. For more details about nest boxes, please contact Brenda Armstrong at (519) 621-2763, ext. 250, for informative factsheets.

Many of these buffer strips are planted with shade trees to help cool down the water temperatures in the summer. Birds will use these trees, too, but increasing the variety of plant life will attract a greater variety of bird species. Native berry producing trees and shrubs provide a good source of food that will attract birds to feed and nest in the buffer. Even after the buffer’s original planting, a diversity of trees and shrubs can be added each year to enrich the habitat. For guidance on species selection, or to order trees and shrubs for this purpose, please contact Martin Neumann at (519) 621-2763, ext. 258.

Frogs and turtles will also take advantage of the new habitat in buffer strips. Buffer strips along streams often connect two woodlots, and this, for wildlife, may be one of their most important functions.

It’s a lot to gain from converting some pasture or cropland to more natural habitat: cleaner, healthier streams; connections between natural areas; and, grassland and wooded habitat next to water. It’s looking better all the time from a bird’s-eye view, and for people too!

The calls of the tiny Spring Peeper are a welcome sign of spring in Ontario. Frogs are often the first victims of environmental degradation. Photo: Mary Gartshore.

Are Our Marshes in Trouble?

The marshes of the Great Lakes play an important role in our lives. They filter dirt and toxins out of our water, store that water during times of drought and flood, and house and feed a myriad of wildlife species.

The Marsh Monitoring Program (MMP), with the help of hundreds of volunteers, monitors marshes, and their resident birds and amphibians, all around the Great Lakes basin.

A recent MMP report on Great Lakes marshes revealed some startling trends about this extremely valuable, yet vulnerable, part of our world. The MMP acts as a Great Lakes watchdog to alert governments and the public to impending concerns. Preliminary results suggest that some well-known marsh birds and amphibians are in decline. The Marsh Monitoring Program is interested in increasing the number of marshes monitored in the Grand River watershed, both for marshes never monitored before and new marshes.

The MMP offers everyone—from amateur naturalists to professional biologists—a unique and rewarding opportunity to help learn about and conserve Great Lakes amphibians and marsh birds, and their threatened habitats.

If you are interested in taking part in the MMP, contact Kathy Jones, toll-free, at 1-888-448-2473. Email: aqsurvey@bsc-eoc.org or visit the website at www.bsc-eoc.org. The MMP provides training materials to guide volunteers, and help them polish their identification skills. Learning to identify calling frogs and toads is relatively straightforward. However, bird surveyors need to be able to identify, by sight and song, most of the common marsh bird species. There is no fee to participate.

The MMP is managed by Bird Studies Canada in partnership with Environment Canada, and has been developed and expanded through the additional support of the U.S. Environmental Protection Agency and the Great Lakes Protection Fund.

The MMP depends on the commitment of individuals, foundations, governments and non-governmental organizations that together form a strong partnership working towards effective conservation of wetlands and their inhabitants.
Historic Quilts

By Kathleen Lefaive

Woodside National Historic Site would like to exhibit heritage quilts during the Waterloo County and Area Quilt Festival from May 18 to 26, 2002. If you are a designated national historic site, or have heritage quilts pertaining to any heritage sites along the Grand River, we would like to display them in our historic house during the festival.

Woodside is the boyhood home of William Lyon Mackenzie King, Canada’s 10th prime minister. The home is beautifully restored to 1891. Every year, we participate in the Quilt Festival by displaying over 15 quilts and this year we would like the opportunity to promote National Historic Sites along the Grand River. If you are willing to lend us your quilts, please contact Kathleen Lefaive, Marketing/Special Events Coordinator at 528 Wellington Street North, Kitchener, Ontario, N2H 5L5. E-mail: Kathleen_Lefaive@pch.gc.ca

Kids Give to Conservation

When Connie Vukson of Cambridge celebrated her 12th birthday in January, she and her party-going friends did it in style with a donation to the Community Programs at the new Shade's Mills Toyota Nature Centre in Cambridge.

Connie and her classmates were first introduced to the importance of the environment through their grade 4 teacher, Kit Bresnahan, at Saginaw Public School in Cambridge. Through the publication of a special newspaper and a class bake sale, they raised money to adopt a Peregrine falcon (named “Toledo” because he came from Ohio)—and ever since have had an interest in conservation and the environment.

With the opening of the new nature centre at Shade's Mills, weekend programs are now offered to families and organized youth groups. Connie chose an Environmental Birthday Party for her special day. Instead of her guests bringing presents, they were each asked to make a donation, and a fantastic contribution of $175 was made to the nature centre and its programs.

You and your family can participate in the outdoor education programs at all the GRCA nature centres. For more information, check out the Nature Centre and Coming Events sections of the GRCA website at www.grandriver.ca

The Man Who Planted Trees

If you could single-handedly make your community a better place to live or change the look of an entire township by planting trees, would you do it? Bob Hamilton took on this challenge.

In 1978, Bob Hamilton, then Road Superintendent for Eramosa Township, east of Guelph, decided that he would cause trees to be planted on all the available planting spots along “his” roadsides. Like many townships, its ample inventory of sugar maples, planted in the early 1900s, was starting to get patchy. Bob made it his personal mission to renew Eramosa’s roadside trees on his “watch”.

By the time Bob retired in 1993, he had caused 24,200 trees to be planted—mainly native bare-root deciduous saplings along the road allowances. One thousand saplings were planted each year for a full decade—an astounding pace of roadside planting for a rural municipality.

Today, Eramosa Township’s roadsides are lined with surviving centenarians intermingled with Bob’s trees, ranging in age up to 25 years. These trees are big enough now to have

- See page 8
TREES
from page seven

a strong impact as even the youngest are 10 years old. These trees have changed the face of Eramosa Township for the next century, helping to create a more beautiful and environmentally sustainable community.

Why was this possible in Eramosa Township when other townships could undertake similar initiatives, but generally do not? The answer is simple: one person elected to make it his mission. This is a true-life version of the fable of The Man Who Planted Trees, and it evokes the same message—one dedicated person can make all the difference.

Bob Hamilton was recognized for his efforts in 1987 with a conservation award from GRCA, which supplied most of the trees. The people of Eramosa will appreciate Bob’s work for the next hundred years!

THE GRAND STRATEGY CALENDAR

March 4 to 26, 2002, Grand View Touring Art Exhibition, Walper Hotel, Kitchener.

March 28 to April 18, 2002, Grand View Art Exhibition, Cambridge Centre for the Arts.


Saturday, April 13, 2002, 3rd annual Home Depot tree planting, Forwell Creek Valley, Waterloo. Contact Bruce Hawkins at (519) 747-8737 for more information.

Saturday April 20, 2002, Sunoco Earth Day Festival, Southwest Optimist Park, Kitchener. 9:00 a.m. to 2:00 p.m. Tree planting, Clean Air Fair and more. For information contact Jessica MacMillan, (519) 621-2763 ext. 259.

Sunday April 21, 2002, Earth Day Festival at McLennon Park in Kitchener. 11:00 a.m. to 2:00 p.m. Activities include tree planting, the Clean Air Fair and the launch of the new Clean Air “Anti-idling” Campaign.

Saturday, April 27, 2002, Cambridge City Green Strategy Tree Planting at Churchill Park in Cambridge. All volunteers are welcome. For more information contact Brenda Sims at (519) 740-4650 ext. 4526.

Saturday, May 4, 2002, Tree Planting at Kiera’s Forest, Guelph Lake Nature Centre. Drop in any time between 10 a.m. and 2 p.m. Call (519) 836-7860 for information.

Luther Marsh Tree Planting Days, Saturday, May 4 and Sunday, May 5, 2002, sponsored by the Ontario Power Generation, and with help from the Wellington District of Scouts Canada; also

Saturday, May 11, 2002, with the Outdoor Experience for Women. The Upper Grand Longbeards, local chapter of the National Wild Turkey Federation, will also be planting at Luther Marsh. For more information contact Martin Neumann, at (519) 621-2763, ext. 258.

ABOUT THIS NEWSLETTER

This newsletter is produced as a communications tool by the Grand River Conservation Authority on behalf of the partners in The Grand Strategy. This newsletter can be seen on the Internet at www.grandriver.ca

For information on The Grand Strategy
Contact Barbara Veale, GRCA, 400 Clyde Road, Box 729, Cambridge ON N1R 5W6.
Phone: (519) 621-2761 or 621-2763, ext. 274.
Fax: (519) 621-4844
Email: bveale@grandriver.ca
Website: www.grandriver.ca

For newsletter submissions
Contact the Editor, Liz Leedham, c/o Barbara Veale at the above address.
Newsletter submissions must be made by the 15th of the month prior to publication, and may be subject to editorial change. Tax deductible donations and sponsorships toward the cost of producing this newsletter are always welcome.

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DID YOU KNOW?

• The several hundred thousand leaves of a mature maple spread about 0.2 hectares (half an acre) of green to the sun. Each leaf is a tiny factory, taking carbon dioxide from the air to use in the production of energy for growth. Leaves also give off oxygen as a byproduct of food-making activity.

• In 1855, maple sap was used not only to produce maple sugar, but also beer, wine and vinegar. Maple sugar was commonly used as a seasoning by many aboriginal people, much as we now use salt.