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**THE URBAN FOREST AND CLIMATE CHANGE.**

Story on editorial page of Toronto Star, October 8, 2007. By Reese Halter, a tree physiologist at Humboldt State University in California and author of books on global warming.

In a remarkably short time, people have come to see climate change as the most pressing issue facing us. However, our world leaders remain largely evasive and unwilling to commit to programs to reduce greenhouse gas emissions.

In Canada, it is a city mayor who is making the ambitious moves. Toronto Mayor David Miller has put bold plans in place to reduce his city's environmental footprint while accommodating inevitable growth in the coming decades.

The commitments made by Toronto, the C40 (a group of the world's largest cities committed to tackling climate change) and the U.S. Mayors Climate Protection Agreement are monumental landmarks in our battle against global warming. Cities consume 75% of the world's energy and produce 80% of anthropogenic greenhouse gases. In addition, 50% of the world's population (80% of Canada's) lives in cities; that number is expected to rise to 60 per cent by 2030.

These numbers are stark, but Toronto and over 650 other cities around the globe are committed to addressing them. Toronto has set a target for a 30% reduction of greenhouse gases below 1990 levels by 2020. It is a bold initiative; how can it be achieved? The answer lies in part with the magnificent and all-powerful tree.

Urban trees play a vital role in the battle against climate change, by removing air pollution and smog. They save cities millions of dollars a year by stabilizing storm-water runoff. They filter out water pollution and reduce energy costs by as much as 40% for heating and cooling homes.

Perhaps most importantly, urban trees are great long-term carbon warehouses. The bigger they are, the more effectively they store CO<sub>2</sub>.

With trees, Toronto has an advantage on many other North American cities – its park system and forested ravines are exquisite and vital for the 5.5 million inhabitants of the GTA. Toronto has over 7 million of them spread out over 634 square kilometres.

Toronto is leading the way for other cities to show how they too can help combat climate change by reducing greenhouse gas emissions. Importantly, it is setting clear objectives and attainable goals to back up its promises. Miller has recognized the role trees can play and the city is undertaking a detailed urban study. Toronto has planted 500,000 trees in the past decade and is looking to add millions of trees in coming decades.

Trees will not in themselves solve our immediate problem of rising CO<sub>2</sub> and other greenhouse gases, but they will help to stabilize emissions by 2050 once all cities, globally, buy into reducing greenhouse gases by at least 30 per cent.

Beyond the actions of Mayor Miller, it must be remembered that global warming is a citizens' issue, not a political issue. Mayors and city councils have a vital civic role to play by setting targets, but each of us has our own role too. We need to reduce the amount of energy we spend at home, at work and while travelling.

And don't forget that splendid tree. There are over 80,000 tree species on Earth, which absorb approximately 1.8 billion tonnes of CO<sub>2</sub>. Try adding to that number by planting one tree in your yard for each member of your family.

We know what's causing climate change – now let's solve it together.

## SEEN IN A CHURCH BULLETIN

How long “just a minute” is depends on which side of the bathroom door you’re on.

Patience: you admire it in the driver behind you but not in the one ahead of you.

Pastor to his congregation: I’ve good news and bad. The good: we’ve enough money for our major project. The bad: it’s still in your pockets.

Sign on the back of a horse-drawn buggy: Energy-efficient vehicle. Runs on oats, grass and hay. Caution: don’t step in the exhaust.

A blossom can’t tell how far its fragrance will spread. Nor can a man tell how far his good influence will go.

## SEEING THE FOREST FOR THE TREES.

An article by Cameron Smith in the Toronto Star, Sept. 15, described the agroforestry intercropping experiments at the University of Guelph. From that article:

A farming practice that results in better soil, more earthworms, much higher capture of carbon dioxide, less nitrogen runoff, more birds and insects, and double the crop yield in drought years – it sounds too good to be true, but is just what is what agroforestry experiments at the University of Guelph are suggesting.

One astonishing conclusion is that if farmers did things this way throughout the 455,000 sq km of marginal or degraded land currently being farmed, Canada could come very close to meeting its Kyoto commitment with an 18.6% reduction in the nation's CO2 emissions.

The practice is called intercropping – planting crops between rows of trees. At Guelph, the rows of trees are 12.5 metres to 15 metres apart, and this year the crop is soybeans.

The experiments have gone on for several years, using different crops; results have been compared to identical crops grown in open fields.

Andrew Gordon, professor of forest ecology and agroforestry, has supervised the experiments, assisted by Naresh Thevathasan, manager of

agroforestry research and development at the Ontario Agricultural College in Guelph.

Thevathasan explains that the trees take up about 10% of the intercropped area. Yet in drought years, the yield has been double that in the open area, because the trees help retain moisture in the ground. In normal & wet years, yield in actual growing areas has been identical, but because of the space taken by trees, yield for the total area, trees included, has been about 10% lower.

Accompanied by two graduate students, Thevathasan gave me a tour. The soybean plants were ripening and a row of poplars stretched as far as I could see over a gentle rise. The trees were 40 cm dbh, and roughly 13 m high.

Fast-growing poplars can reach this size in 12 years, Thevathasan says. A couple of years ago, some were sold for \$100 to \$150 a tree.

In this experiment, he adds, there are 111 trees per hectare. They can be used to make plywood, low-quality lumber, chipboard, pulpwood, even pellets for heating.

They also produce a lot of leaves each year, which are shed where the crops are planted, making the soil richer in organic matter.

Earthworms in the leaf litter number 125 to a square metre, compared with 2 per square metre in the open field. Ten different kinds of birds foraged in the intercropped area, Thevathasan says, compared to four in the open area.

In addition, there were a lot more parasitic insects in the intercropped area, which might be good news for pest management.

Nitrogen added to the soil through decomposing leaves reduced significantly the amount of fertilizer required for crops.

And, says Thevathasan, leaching of nitrates from the soil, which causes nutrient overloading in waterways, was reduced by 50 per cent in intercropped areas, because tree roots take up nitrogen.

It was Rachelle Clinch, one of the graduate students, who put her finger firmly on the issue raised by the experiments.

"We haven't changed our thinking about agriculture since North America was colonized," she said. "It's always been focused on clearing land to grow crops, with no place for trees.

"If only we would learn to use trees to help farming, instead of seeing them as a hindrance, we'd see many, many benefits."

In the struggle to control global warming, there's a simple, three-word memo government ministers of the environment and agriculture should be issuing to their staff. It should read: "Check this out."

FOR THE LOVE OF TREES—by Richard Hinchcliff & Roman Popaduk. ISBN 978-1-897113-73-8. \$24.95.

I just heard about this book. From the jacket flap:

(It) is an illustrated tribute to a unique collection of trees and a beautiful site—The Central Experimental Farm Arboretum in Ottawa.

The book profiles 92 tree species, using over 580 colour photos and 75 drawings. Profiles include tree shapes, leaves, flowers, bark and fruit, where they can be seen in the Arboretum, & comments from curators. Colour coded maps suggest tree discovery walks, and can be used to locate the trees or as a guide to meandering, discovering, and enjoying, the picturesque landscape.

Profits from the sale of this book will go to Friends of the Central Experimental Farm, a charitable volunteer organization helping to care for the Arboretum, the Ornamental Gardens, and other public areas of the Farm. They are at [www.friendsofthefarm.ca](http://www.friendsofthefarm.ca) or 1 613 230 3276.

Appears to be published by General Store Publishing House [www.gsph.com](http://www.gsph.com) 1 800 465 6072.

## WOOD PRODUCTS & CARBON STORAGE

I have the summer issue of Insights, a publication of the Ontario Forest Research Institute. Several interesting items.

Ontario's forests are projected to be carbon sinks over this century. Forest management can increase the amount of C stored by the forest.

As trees are cut and made into various forest products, the C is stored in those products, and is released only as the wood or paper decomposes.

Using wood rather than steel or aluminum reduces our C footprint, because wood products take less energy to produce.

In Ontario, an American model has been adapted to predict forest C budgets. It predicts carbon in live trees, understory vegetation, the forest floor, standing and down wood, and soil.

Ontario's forests, and its finished forest products, are expected to store 7% more C as this century progresses.

## WHITE PINE PILL

A white pine pill is described in Insights. It is noted that regeneration of white pine has been severely deterred by the potential effects of blister rust and white pine weevil. I recall quite a number of plantations, including my own, that years ago looked pretty well beaten up by weevil, but which several decades later looked not too bad. I also recall efforts to deal with these threats, going back to well before 1950, and involving eliminating of Ribes plants which form the alternate host to blister rust, attempts to develop rust-resistant strains of white pine, and so forth.

A decade or so ago a pill was designed that might be placed with each planted seedling, containing fungicide for blister rust, insecticide for the weevil, and a mixed fertilizer that might help stimulate initial growth of the seedling.

It seems this might work, but only if used as part of a pest management regime that includes: not planting on high risk sites, shelterwood to achieve optimum light conditions, timely and effective management of competing vegetation, and pruning to remove lower branches that might provide an entrance for the fungus.

The pill is not likely to be widely used unless an effective fungicide can be found that is permitted for this use. Trials showed vegetative management to be a more effective approach, where it affects soil temperature as well as nitrogen and moisture levels.

Cost is also a significant deterrent. But it is also pointed out that this is Ontario's provincial tree, that it has economic, ecological, aesthetic and cultural values that would justify significant investment. And it just might prevent the white pine from going the way of the elm and chestnut.

## WATER WOES

A Globe and Mail article in October describes water supply problems likely to affect Western Canada in future years.

Writer Gary Mason describes a conversation with Prof. Michael Byers, Chair in Global Politics and International Law at U of BC, and with Prof. James Byrne, one of Canada's leading experts on water resources, at U of Lethbridge.

Prof. Byrne has been monitoring the state of our lakes and rivers for a number of years, especially those in Western Canada that are mostly fed by runoff from mountain glaciers. Because of global warming, glaciers worldwide are receding at an alarming rate, those in Canada are no exception.

It used to be that winter came, the snow built up and then in the spring it began to melt and run off on still-frozen soil. Today warming of the earth means the runoff is earlier. More alarmingly, it is occurring atop soil that is no longer frozen. Consequently, the glacial melt is being absorbed by the earth instead of flowing into, and replenishing, our lakes and rivers.

It is called a crisis that no one yet talks about but will soon, as it will dramatically affect our lives."

In fact, the crisis stage has already been reached in several parts of the world. Books and scientific journals talking about this issue have proliferated in the past few years, and yet the dire forecasts many are making have yet to cause much of a stir in the mainstream media.

But water is huge. Prof. Byers, for instance, has been talking about the increasing pressure that Canada will be under in the coming years to export bulk water to parched areas of the US. Everyone seems to think Canada is awash in the stuff.

Prof. Byrne has studied the water system in BC's Okanagan region. In recent years, its population has boomed. It is also home to one of the world's

fastest-growing wine regions. Vineyards need enormous amounts of water which, in that region comes from one primary source: Lake Okanagan. The region is now dotted with reservoirs.

A paper now under review predicts that over the next few decades there will be a 30% reduction in the snow pack that feeds Lake Okanagan. This will be a challenge for the region, forcing a change in water consumption habits, in agriculture and elsewhere. It is noted that city people (Vancouver was used as an example) use 400-500 litres of water daily, compared to Europeans who use about 150.

"There is a big social and political debate coming about what we do with our remaining water resources," says Prof. Byers. "There are going to be some big fights about who gets access to what. We are already facing scarcity in parts of Saskatchewan and Alberta. This crisis is upon us now. We can't leave it for another 10 or 15 years after it goes beyond critical before we do something about it."

## WINDSOR'S FOREST

In the fall issue of Carolinian Canada Coalition's newsletter is an item about Windsor's forest. The City is likely to lose over 6,000 ash trees to the Emerald Ash Borer, a tenth of the street tree population. Already 4,500 ash trees have died.

The borer, combined with Windsor's being in an area where forest covers less than 4% of the rural landscape, has sparked citizen awareness of trees and forests.

Bill Roesel, manager of forestry and horticulture for the city, notes that they used to plant about 1,000 trees/year, but now plant 2000-3000/year.

Choosing a suitable tree involves considering many factors. Trees that grow fast but are brittle will not stand up to weather extremes in the area. Honey locust which is nice but is thorny, is not used for liability reasons. Redbud with its low-branching structure is not used because of its effect on street sight lines. They plant as many Carolinian species as possible, such as Kentucky Coffee-tree, hackberry, tulip tree, and have had success with these, also pin, bur and red oak.

The city has its own tree nursery, partly for economic reasons, and also to control the kinds and quantities of planting stock available to them, including the genetic seed sources.

Also, as a street tree is planted, the city leaves a note with homeowners, asking if they will do follow up irrigation. Willing citizens thereby become involved in the upkeep of the trees.

#### GREENING CAROLINIAN CANADA

Large areas of unbroken forest are becoming increasingly scarce in Carolinian Southwestern Ontario. So it is good to see in the Carolinian Canada newsletter that the Thames Talbot Land Trust, with a geographic area including London and Middlesex and Elgin Counties, has acquired two large tracts of forest. One is Joany's Woods, a 367-acre tract along the Ausable River, where a fundraising campaign raised enough to purchase this site. The other is the gift of Newport Forest, a 110-acre property, by a London couple. It is on the south side of the Thames River near Big Bend, and is mainly lowland forest with some upland forest, meadow, ravine slopes, bluff forests, and floodplain. It is part of an area of about 4,000 ac. a complex of forest and farm land, the forest a complex of near-pristine and selectively logged, known as Skunk's Misery.

#### THE BOREAL.

In *Conservator*, magazine of Ducks Unlimited, is an article on conserving the Canadian Boreal Forest, a vast area of relatively untouched forest and subject of great interest in recent years.

From a bird population perspective, over 10 million ducks and nearly 3 billion songbirds go the boreal each year to breed and rear the next generation. The annual migration includes 35 species of ducks, geese and swans.

The region also supports a massive variety of fish and wildlife, including the grizzly bear, wolf and woodland caribou.

It is also home to a number of native First Nations communities.

It is the world's largest land-based carbon storehouse, so is a massive buffer against global warming.

In recent years, over 1,500 respected scientists from 51 countries have appealed to the Canadian government to support the Boreal Forest Conservation Framework (BCF).

Ducks Unlimited is the world's largest waterfowl and wetland conservation, a founding member of an alliance convened by the Boreal Initiative. The alliance includes major timber, gas and oil companies, conservation organizations, and First Nations Communities. It is committed to permanently protecting at least half of the forest, and to having a conservation framework guide in managing all of the forest sustainably. At the moment, only 10% of the forest is protected.

#### WOODED TRAILS

Couchiching Conservancy's (CC) newsletter for September has an article describing two projects involving wooded trails.

First, CC, with support from Huronia Community Foundation, has begun a five-year project to identify plant species found along the Township of Tay's Shore Trail. This trail can be picked up at the St. Marie Among the Hurons location, next to the Wye Marsh. More about the trail can be found on the Township's web site [www.tay.thwnship.on.ca](http://www.tay.thwnship.on.ca).

In another project, following a suggestion from a Casino Rama staff member, an interpretive walk has been developed in Grant's Woods, where CC's office is located, that highlights traditional medicinal plants. They acknowledge considerable help from the Rama Cultural Department, and others from Rama.

#### URBAN FOREST SEMINAR—CLIMATE CHANGE (CC).

The Ontario Urban Forest Council held its 2007 seminar October 18 at Black Creek Pioneer Village. It addressed the topic of climate change (CC) and the future of Ontario's forests: can we help our urban and rural forests adapt to change.

It was an urban forest event, but I think this whole climate change discussion might about as well in an event on private land forests of the south, and the crown forests of the north, including the boreal.

The brochure notes that CC will likely accelerate, fuelled by greenhouse gases emitted by human activity. Trees we plant today may mature in a climate quite different from today's.

That CC is gaining serious public attention, is demonstrated by the choice of Nobel Peace Prize recipients for this year: The UN's Intergovernmental Panel on Climate Change (IPCC, [www.ipcc.ch](http://www.ipcc.ch)), and former US Vice President Al Gore. Also, that everyone nowadays seems to have heard of it.

Speakers described climate change and its effect on urban forest management; its effects on a number of tree species, the need for green oases in asphalt-dominated school grounds, the effect of climate change on seed zones, choosing southern trees for planting today, and developing local seed collection programs.

There were several morning speakers; the one I mostly quote below is Dr. Bob Stewart, retired climate change advisor for Canadian Forest Service. A few of my own observations are included. (Bob served on Canada's delegation to IPCC). I've also drawn on the words of Dr. Dan McKenney, Senior Scientist with CFS.

Climate change is matter of concern for forest ecosystems, their management, and through its effect on the forest, implications for the economy & public health in Ontario, Canada, & the world.

Important, in that the wood-using forest industry employs 84,000 people directly and indirectly, and there are important small industries such as maple syrup, with its 3,600 producers, and Christmas trees, with 900 farms.

Change is upon us. We see it every day. Mean temperatures are up, precipitation is more uneven, frost free and growing seasons are longer (by 15 days within my adult lifetime), as are numbers of growing degree days and corn heat units. There is more heat accumulation—i.e. more energy—in the global ecosystem. Climate and weather conditions are moving north a few km. each year. Extreme events (heavy rain, snow, ice, tornado, hurricane, droughts) are more frequent and more severe.

Precipitation on average is not down, but because seasons are longer and warmer, evapotranspiration is up, so in effect it is drier.

There are weather extremes in some areas and not in others. Individual events are difficult to link to climate change, but taken together they appear to be very consistent with CC. Making a direct connection is complicated by the 1930's being a cold decade (I remember!) and the 1960's a warm one.

## EFFECTS OF CC ON ONTARIO'S FORESTS.

Growth rates are changing; so is the pattern of competition. New species are appearing. Tree species are migrating northward—thus in time the area of boreal forest could shrink. There are regeneration implications. Changes are conducive to more fires, and more severe fires. Resistance to insect and other pests may be compromised. Man-made pollutants complicate things, as do imported pests with no native predators with potential for devastation, and for decimating commonly occurring tree species.

An example of the latter is the western pine beetle that is devastating stands in BC, has jumped the mountains to AB, and no one knows what will happen if/when it goes from lodgepole pine into jack pine.

A particular menace in S. Ont., the emerald ash borer has broken out of quarantine in SW Ontario and in 5 US states. The Asian longhorn beetle is not yet contained in the Toronto area. The brown spruce longhorn beetle has done great damage in Halifax city parks and has broken quarantine. CC is not helping: it is stressing native trees and is hospitable to imported pests.

CC seems to have increased the frequency and severity of extreme weather events, which occur across the urban and rural landscape. Severe winds can uproot trees or whole patches of forest, of which we had several in rapid succession in Toronto this past summer which did massive damage to older street and other trees. Or ice storms, such as caused such destruction to the east in 1998. Or torrential rains that do such damage in countries like Bangladesh, in certain normally dry areas in North America, and which caused major washouts in Toronto a couple of summers ago. This on a landscape that seems to be increasingly drought-stricken.

Ecosystems will be affected worldwide and locally, in their growth rates, in species

composition of tree cover, shrub and herb vegetation, in soil populations, and more.

Biggest changes will tend to be in the higher latitudes (and altitudes?). Does not seem to bode well for the boreal forest.

Plant hardiness zones will change, generally moving north. Plant (and animal?) species ranges will move similarly.

## RESPONSES IN A WOODLOT

CC is bound to affect city trees, rural woodlots, and other forested areas. The effect is likely to be unique to each forest area, so there seem to be no one-size-fits-all response. Each forest owner or manager needs to watch for effects in his/her own forest.

The key thing is that things are not normal. A close eye needs to be kept for signs of trouble—weather events, diseases, insects, etc. The management plan may need more frequent updating, and may need to include risk management.

Response to CC may include shorter rotations. I have heard suggestions that the rotation age for plantation red pine may be much shorter than previously thought. (After all, much is planted on land that had been depleted. Plantations may be unnatural in important ways. Added to that has been the combined effect of root rots in the soil and repeated drought years). It may be important to maintain forest access to watch for problems, and to conduct salvage, should that become advisable. More detailed inventories. And more.

## PLANT HARDINESS & CLIMATE CHANGE

All living organisms have a range of climatic variables in which they can thrive, or survive. This is the basis of plant hardiness maps, and the studies that produce them. They are not always well defined: species can live outside their observed range. The validity of existing plant hardiness maps is compromised as CC takes place.

Rise in temperature by several degrees from the present global mean of 15.7 deg C will in time

mean that the earth is warmer than at any time in the past 500,000 years.

This is expected to have widespread effects such as loss of species, human health issues, shrinkage of glaciers and ice sheets leading to significant rise in sea level.

It also means that existing plant hardiness maps may no longer valid. (Never thought of it before: also means that maps shown in John Farrar's *Trees in Canada* and other books, showing range of tree species, may need adjustment).

So the subject of hardiness zones is being revisited by many people in Canada and US, of whom Dan McKenney, of Canadian Forest Service, is one.

All living things have a range of climatic and other variables in which they can survive, or thrive. A plant hardiness project is linking plants and climate continent-wide, producing maps for many species of trees, shrubs, perennial flowers, grasses, vines, etc.

The project uses information from a wide range of sources, including, in Ontario, MNR, Cdn Forest Service, master gardeners and many more. So far 2 million observations have been gathered on 4100 plant species, including 286 North American tree species.

For trees, 18 climatic variables are used, including mean temperature, minimum temp in coldest month, maximum in hottest month, precipitation, precipitation during the hottest month. Areas of most common and less common occurrence of species are shown.

Plant hardiness maps can be done for present climate, and also for future predicted climate, so migration patterns of species can be estimated. At the same time, however, it is not clear how or how fast species can migrate in response to change.

It is likely that a plant's range will shrink. If the plant migrates readily the range could move accordingly, and shrink relatively little, say 10%. If it can't migrate, the range would shrink a lot more. Those that would shrink most are those that already have relatively small ranges.

Migration could be several hundreds of kilometres.

Richness of species will tend to decrease in much of the USA and be the same or increase in much of Canada.

Attempts to predict migration will be complicated by such factors as different regional soils, insect and disease pests (especially imported ones), fire, severe weather events. Species have a variety of ways of migrating, e.g. seed and/or pollen carried by wind, by waterways, by animals, etc.

Attempts are also complicated by a scarcity of information on a lot of this.

## SCHOOLYARDS

Adrina Ambrosii and Heidi Campbell, of the Toronto District School Board, spoke of tree planting on school grounds. They noted that the school board is one of the larger owners of land in the city, and I'd imagine the same applies to most urban municipalities. Looking after all that real estate is a real challenge; at the same time what happens in the schoolyard can influence, for better or worse, the neighbourhoods in which they are located.

Also, kids spend 25% of their school day outdoors; this is likely to increase with growing emphasis on physical activity during each school day. Unshaded paved play areas can be up to 20 deg C warmer than the surrounding air.

Trees help cool the asphalt by shading, thus the kids play in a cooler atmosphere. The presence of trees will do something for ecological literacy. They can also be positioned so as to cool the school building. Cool islands of trees and other plant material can be created within paved areas.

There is growing interest in the school system in making the schoolyards more environmentally friendly, in involving outside organizations, citizens, and the school communities themselves, and providing guidance to interested people on what to plant, how to plant it and take care of it, and on knowing the benefits arising from such activity.

The Toronto Board has had an inventory of trees under way since 2004, using the inventory system Neighbourhoods developed at the Faculty of Forestry, U of T.

The long term vision is to manage the urban forest of the Toronto District School Board.

## OAKVILLE'S FOREST

Copies were distributed at the Ontario Urban Forest seminar of "Oakville's Urban Forest: Our Solution to Our Pollution," a handsome 59-page report. It describes the quantification of the Oakville forest structure and functions, using randomly located sample plots along with pollution and weather data, using UFORE, (Urban Forest Effects Model) developed by the US Forest Service, to assess the economic and other values of the town's forest. The information gained will be used to help design the town's future forest.

The table of contents includes chapters such as: Pollution effects on human health—e.g. more ozone in the air means more respiratory emergency room visits.

Urban forest benefits—engineering, economic, environmental, architectural, aesthetic and social. One I'd not heard before; makes sense: shading of pavement improves pavement condition resulting in saving in maintenance and repair.

Another: suggestion that appropriate vegetation like mowed grass and high-canopy trees reduce crime rate because "vegetation has a mitigating effect on mental fatigue, itself often a precursor of outburst of anger and violence."

Discussion of the UFORE project in Oakville, its goals, methodology, costs, results and discussion, implications for urban forest management.

Some conclusions of the study: Oakville has demonstrated that municipalities can take a scientific approach toward measuring the ecological services provided by their urban forest. (Timely given the steady warming of the climate).

Some strategies toward enhancing ecological services include:

Diversity of species, sizes and ages—reduces impact of pests.

Increase the number of healthy trees.

Maximize use of low VOC emitting trees.

Sustain or increase existing tree cover.

Sustain large healthy trees (they have the greatest effect).

Use long-lived trees.  
Use low maintenance trees.  
Plant trees in energy conserving locations.  
Plant large trees in energy-conserving locations.  
Plant large trees as part of transportation corridors and parking lots where possible (extend life of pavement, reduce CO<sub>2</sub>, shade parked vehicles, reduce their VOC emissions).  
Plant trees in heavily polluted and heavily populated areas.  
Avoid pollutant-sensitive species.  
Utilize evergreens for year-round particulate matter removal from the air.

#### THE OCEANS AND CLIMATE CHANGE.

It may be unwise to count unduly on the capacity of the world's oceans and land base to absorb CO<sub>2</sub> released by human activity. Reporting on work by a team of scientists from the UK, USA, Australia, Austria, and France, a recent paper published by the National Academy of Sciences, as reported to the Globe and Mail, October 23, notes that that capacity is decreasing, so global warming may actually accelerate.

CO<sub>2</sub> levels rose faster in the last 7 years than at any other time since records began in 1959, are now as high as they've been in 650,000 and possibly 20 million years.

About half the CO<sub>2</sub> emitted by human activity becomes absorbed by the oceans and the plants on land. Failure to absorb as much as the once did is said to be due to global warming, raising the possibility of weather destabilization and an accelerated rate of change. The buildup of CO<sub>2</sub> in the atmosphere over the past 7 years is unprecedented, and will make it progressively more difficult to bring climate change under control.

Numerous major droughts in mid-latitudes have led to reduced plant growth, reducing their CO<sub>2</sub> intake from the atmosphere, so more than expected is staying in the atmosphere.

As if that is not enough, C emissions due to the burning of fossil fuels have increased in this century twice as fast as through the 20<sup>th</sup> century, and the fastest of any time since the start of the industrial revolution. This is mainly related to the rapidly expanding economies of the larger developing countries like China and India.

For the first time in 3 decades, CO<sub>2</sub> emissions are growing faster than the world's economic growth rate. Up to now, it has taken less fossil fuel to produce each unit of output, with increasing energy-efficient production measures. That has recently reversed.

A number of coincidental factors are increasing challenges to the stabilizing of CO<sub>2</sub> levels.

#### WORLD CLEAN AIR FOREST INITIATIVE (WCAFI).

Those of us who get e-mail news from the CIF President and National Office may have seen the draft issued October 30 of the World Clean Air Forest Initiative and Jiffy Alliance.

WCAFI has a worldwide tree planting program of 9.1 B trees in support of a program of the UN's Environment Program. The idea is to "grow clean air" by planting a tree for each living person by 2050, that growing clean air is a sustainable benefit.

WCAFI is a U.K. based NGO created to establish a seamless world forest network by funding tree planting and purchasing existing established forests internationally. Jiffy, the co-founding patron of WCAFI, & a leading global manufacturer of quality forestry, horticultural, and home gardening products, will design, produce and exclusively market under license, a uniquely branded product collection called "Earth Clean Air", in support of the WCAFI's fund development campaign.

Inspiration for the WCAFI mission came from . Wangari Maathai, founder of the Green Belt Movement in Kenya and 2004 Nobel Peace Prize Laureate, who said "*When we plant trees we plant the seeds of peace and of hope*", and from Al Gore, the 2007 Nobel Peace Prize winner, for his work on the issue of Climate Change, who was the recipient of the very first WCAFI Clean Air Tree, supporting his famous phrase from An Inconvenient Truth "*Plant trees, Lots of Trees!*"

**UNEP: the UN Environment Programme's mission is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations.**

### **Green Belt Movement**

*Wangari Maathai is the founder of the Green Belt Movement, an environmentalist, a civil society and women's rights activist, and a parliamentarian. You can read about her life and her organization through her two books, [Unbowed: A Memoir](#) and [The Green Belt Movement](#). You can also scan condensed versions of her [life](#) and [achievements](#), including being awarded the [2004 Nobel Peace Prize](#).*

And closer to home, at the OUFC seminar was distributed an Ontario government release indicating that the Province, in partnership with Trees Ontario Foundation, will plant 50 million trees on 25,000 hectares of private and public land by 2020.

### CANADA'S CARBON NEUTRAL FUTURE FOREST INDUSTRY.

A Toronto Star article, October 30, notes that the Forest Industry will become carbon neutral by 2015, in their forestry operations and the products they produce, without having to deal in offsetting credits.

They will do this by: becoming energy self-sufficient, switching from fossil to renewable fuels; using energy-efficient technologies; increasing diversion of used products from landfills; capping landfills to reduce methane leaks; increasing cogeneration by utilizing waste heat to produce electricity; increasing woodland potential to store C; maximizing recycling of paper and wood products.

### STRESSES IN THE URBAN FOREST

The attention urban forests are receiving nowadays is heartwarming, but it seems all is not clear sailing. A Toronto Star article, November 7, notes that many cities are cash-strapped, so cannot make the desired investments. Trees get planted, but if they are to be an effective part of the urban forest they must be looked after. And a city with a budget for a tree maintenance program can have that program derailed by events like severe storms that cause a surge in numbers of trees needing emergency attention, and likely don't do much for the health of the remaining trees. The budget squeeze means that routine maintenance procedures are not done nearly as often as would be desired.

During severe drought conditions trees should be watered, but even without all the other problems, Toronto for one could never have watered its trees enough.

Trees become stressed by all the heat from urban hard surfaces and other sources. General maintenance would increase the chances of the trees staying healthy.

Pruning reduces the risk of large branches being broken or damaged during severe weather. It also helps ensure that tall crowns will not come in contact with utility wires, and that branches will not be low enough to interfere with vehicles and pedestrians.

Fertilizing of trees, and use of a compost tea which provides beneficial microorganisms would increase the trees' health and longevity.

Roots can be the forgotten part of the tree, often covered with hard surfaces that restrict roots' access to water, air and nutrients. Tree roots are often dreadfully torn during excavation or construction.

### TORONTO'S GREEN CANOPY

This is an editorial in the Toronto Star, November 19, which refers to a two-page article a couple of days earlier by arborist Todd Irvine.

Few of Toronto's resources are more valuable than its trees – yet none seem more neglected. A healthy green canopy, shading streets and homes, reduces summer energy use by keeping buildings cooler. Trees beautify a city, help filter out air pollution and further enhance people's health by producing oxygen. The average tree generates 117 kilograms of oxygen in a year.

Yet Toronto's urban forest is dwindling. Only 17% of the city's total area has canopy cover. Many cities do better. For example, about 27% of Ottawa is blanketed by green while Washington, D.C. has 40% coverage.

As part of its fight against global warming, Toronto has a plan to shade 34% of its surface by 2050. But there is serious concern that such growth in tree cover will never happen without significant policy and attitude changes.

Also, as Todd noted in the earlier article, many of Toronto's trees are aging, dying, falling down in storms, etc. Its priceless ravines and other open spaces are being seeded with exotic trees that cause ecological havoc. Storm water is doing lots of damage. Drought is increasingly common and many trees are drought-stressed. And the trees lack the protection from drought that they might enjoy in the closed forest. He notes that our trees have a way to go before they will provide all the benefits we attribute to them.

Todd Irvine has suggested several promising ways to broaden the green canopy. These include mandatory rules for new development requiring that at least 20 per cent of a project be tree-covered, at maturity. Developers could be encouraged to exceed that with a promise of lower taxes, or reduced service charges, based on the amount of canopy they provide.

New reward programs could be set up encouraging homeowners and businesses to replace stretches of asphalt or concrete with soil and trees. Little-used driveways, parking lots and pockets of old industrial land could turn green and healthy under such an approach.

Finally, an existing tree protection bylaw, requiring the replacement of any cut-down tree past a certain size, should be better policed and enforced. Evidently, bylaw inspectors are finding it difficult to keep up with development proposals that require replacing existing trees.

These recommendations deserve serious study, and fast action if they live up to their promise. Time is critical because many of Toronto's trees are dying of old age, especially in the city's downtown neighbourhoods. Just replacing them will diminish Toronto's green cover for years to come. That is because towering trees, almost a century old, are being supplanted by 1.5-metre saplings that will take decades to match the canopy of trees they are replacing.

In the face of that reality, Toronto must work hard to double the size of its urban forest by 2050. Besides the city's efforts, homeowners may have to make some sacrifice, like a sugar maple instead of a new pool, or a bit less paved parking space; trees placed strategically around houses and other structures to conserve energy. People will need to become much more knowledgeable about our need for urban trees, and of the needs of those trees. But the rewards

of success are immense: a cleaner, healthier, more energy efficient and a far more visually attractive place to live. Future generations will be grateful.

My own feeling is that progress has been made; much much more is needed. Progress? Citizen awareness has grown; increasing numbers of concerned citizens volunteer for tree planting and other work; and there is the work of non-profit organizations like LEAF (Local Enhancement and Awareness of Forests) and the Toronto Green Community, who do a lot of promotion of citizen awareness, and a lot of on-the-ground work; and the city's own program and plans.

## TREE GIRDLING

Taken from an article in November, 2007  
Atlantic Forestry Review.

A woodlot normally has many dead trees, attracting a number of cavity nesters and providing lots of delicious insects for other wild creatures.

In an urban forest, public safety usually necessitates removal of dead and dying trees and replacement with healthy young ones.

The author's home is on a wooded urban site, and he tells of dealing with a large poplar which had dominated part of his wooded acre. To cut it would have led to a major cleanup. So after some careful thought, in spring 2006 he girdled the tree, making two chain saw cuts about 12 inches apart. Each cut through the bark and cambium. The bark between the two cuts was then removed.

This tree is different from most, in that it was near the author's house, so the changes were observed in some detail almost day by day.

For the first year, and into 2007, the tree looked and acted as though nothing had happened: leaf fall in 2006, winter, new leaves in 2007. Meanwhile the sap oozing from the cut attracted a host of insects, and insect-eating birds.

By early summer 2007, the new leaves began to shrivel and fall, and by August just a skeleton remained.

As the tree died and gave up its leaves, a number of things happened around it. As it no longer took up large amounts of moisture or light, the lawns and gardens greened up, and understory semi-tolerant trees began to develop crowns.

In the late summer large numbers of branches, small and large, began coming down, and were gathered up by the wheelbarrow load. Dead branches on the tree started attracting birds.

And he feels the tree, without all those leaves acting as sails, is less prone to windthrow. Over several years it will gradually break up (he notes the prospect of some pre-dried firewood). When the trunk comes down, its fall will be cushioned by the developing understory of semi-tolerant hardwoods.

(This reminds me that about 25 years ago, faced with a couple acres of Scots pine jungle, girdled as many of the trees as I could. Some died very quickly, others took several years. Previously the cones from the large crowns had attracted hordes of squirrels. As the trees died, the woodpeckers must have thought this was Heaven. Over the years, many of the trees broke up, some of the tops being hung up away up in the developing maple understory. For a while there were a lot of very crooked young maples, from having the Scots pine tops lodged in them, or from having to find their way up through the crowns. A few are still standing, minus most of their limbs, the more crooked young hardwoods seem to have disappeared, and what is there now is a promising maple sapling stand.)

#### THE WOODLOT AS AN INVESTMENT

In Atlantic Forestry Review, the same author, David Pallmer of Fredericton, wrote (he had spoken) of the woodlot as an investment.

He notes that timber investment management companies that have purchased and managed woodlots tend to outperform other investment options. But he also notes that in the absence of management work, growth in woodlots may decrease. Tree growth in 10-acre woodlot plots at the Univ of New Brunswick has been monitored since 1946, with the managed plot producing 2.5 times as much as the control (And I would imagine the quality would also be substantially higher).

The woodlot is compared to a good mutual fund, and individual stands to holdings within the mutual fund.

The most important decision is when to harvest. This has some flexibility to adjust to other factors like availability of good (loggers), operating conditions, and markets. But when it is time, it should not be delayed too long, or both the return and the prospect for future growth, are diminished.

#### ONTARIO HERITAGE TRUST

Ontario Heritage Trust publishes a publication Heritage Matters that reaches its members and volunteers. The latest issue, in November, has a number of items of interest.

Species at Risk: It notes "Ontario, with its broad geography, is blessed with incredible biologically diverse landscapes. Most of us take this amazing biodiversity for granted and do not fully appreciate the variety of wild plants and animals and their unique habitats.

At the moment, Ontario has over 170 species at risk. Five are named as examples: American hart's tongue fern, Monarch butterfly, Peregrine falcon, Five-lined skink, and Kentucky coffee tree.

Sheppard's Bush: This property located in Aurora, was donated by the Sheppard family to the Ontario Heritage Trust in 1971, and is managed as the Sheppard's Bush Conservation Area by the Lake Simcoe Region Conservation Authority. It is on the north boundary of the Oak Ridges Moraine, has a small tributary creek of the Holland River. Its 23.5 hectares includes 15 hectares of maple-beech forest, said to be in a remarkably natural state, given the intensity of urban development around it. Roughly 3 km. of trails offer visitors opportunity for natural heritage education.

Another Ontario Heritage publication recognizes the donor of 3.7 hectares of land in the Municipality of Grey Highlands north of Flesherton, in the Beaver Valley. This gift secures 300 metres of the Bruce Trail, and includes some Niagara Escarpment cliff edge, some upland forest, and a small ephemeral (intermittent?) stream.

## FORESTRY IN AFGHANISTAN.

Readers may have seen the article in the September-October For. Chron. by Neil Stocker of OMNR in Sault Ste. Marie. When I wrote to compliment him on it he asked me to send it to my MP and MPP. Following, somewhat edited, is what I sent.

If you share my feeling that this is a very exciting topic, I'd encourage you to compose a letter of your own (or use mine, if you like) and send it to your own MP, MPP, and anyone else who might be able to do something with the idea.

My e-mail:

Dear Mr. Volpe: I am a constituent in your riding, a forester, long retired. I'd like to tell you about an article in the Sept.-Oct. Forestry Chronicle, published bimonthly by the CIF. The 5-p. article is called A Forester Soldier in Afghanistan, and is written by Neil Stocker. Neil is a fellow forester, a boreal (forest) silvicultural specialist with the Ontario Ministry of Natural Resources in Sault Ste Marie. He is also a Captain in the Canadian Army; in that role has served in Afghanistan.

For whatever reason I was unable to send you the article in an e-mail. So here roughly is what Neil wrote:

His service in the field in Afghanistan gave him an opportunity to see a lot of that country, and to observe its geography, its history (especially the past century), its people, its governance, its economy, its need for stability, and its forest.

In that forest, as a forester, he sees magnificent opportunity for someone, for example Canada, to make a solid contribution to restoring peace and stability to the country.

He notes that the country's forestry department is a victim of decades of conflict and unrest, that its forests have been victim of exploitation and misuse, for example by the country's warlords, so that it is no longer the source of a number of basic needs or environmental protection--for its people. Forest renewal has suffered badly from things like excessive grazing by herds belonging to nomadic people. Thus the past century or so has seen a

deterioration of forests which had previously been well cared for.

(My own thought is that given the history of colonialism the past 200 years, the western world may bear some of the responsibility for this deterioration).

Neil sees some exciting possibilities for forest restoration in the country, and the possible role someone (and why not Canada?) could play in that restoration. He notes the abundance of slopes too steep for cultivation, but which could be highly productive if forested, and notes the long-term contribution such a renewed forest could make to the economic, social, cultural and environmental--well-being and stability of the country.

Forest restoration itself would be a long term proposition and have many of the same benefits.

Global climate change is right now receiving a lot of attention worldwide; I would think that making forest restoration a reality in that country would make a significant contribution to offsetting climate change.

He feels that bringing stability to a troubled nation is the very reason why Canadian and other forces are active in Afghanistan. He notes that forest restoration and management would help bring genuine peace, not to mention the prospect of fewer casualties among Canadian and other armed forces.

Canadian involvement in such restoration would surely show Canada to the world for what it is: eager to help wherever it can with the many problems that beset the world, and thus help make the world a better place.

Neil would like to make Canadians and their elected representatives aware of this magnificent potential. It is one that would not be accomplished overnight, but would take long term effort, money and other resources. In the long run it could be far less costly in so many ways than the armed combat in which we are now engaged.

I hope you will find this an exciting idea, as I certainly do; that you will be able to promote it among your fellow MP's. If you want to learn more, I'm sure Neil would be more than pleased to hear from you, he is at Neil.stocker@ontario.ca .

Thank you so much for your attention to this.

#### CROP TREE RELEASE IN YOUNG HARDWOODS.

A number of patches, fringes, etc., on my property have young hardwood, some of it naturally regenerated over several decades, some of it took over after removal of "Scots Pine Jungle". They add up to a significant proportion of my 100 acres. So I was interested to see, in the winter issue of the Ont Woodlot Associations S&W Report an article on crop tree release.

This is described as a management tool for use in young even-aged hardwood stands 20-60 years old. Often the work is described as pre-commercial, being done on trees too small to have commercial value.

In this technique, crop trees are chosen and marked (with blue paint or tape). There are 200-220 of them per hectare when in the dbh range of 15-25 cm., and fewer, 140-180 when the trees reach 27 cm. I.e. spaced roughly 7-8 metres (20-25 feet) apart. This gives roughly 70-90 crop trees per acre.

The trees chosen will, as far as possible, be dominant or co-dominant, with a healthy crown, and be in or above the main canopy. The trunk will be well formed and straight, free from forks, crooks and seams. Trees of more valuable species should be chosen. And they should show vigorous growth and be disease-free.

Crop tree release can begin with the fine-branched species (yellow birch, black cherry) at 15-25 years, and with the coarser branched species (maple, ash, oak) at 25-40 years.

This is a gradual process, taking place over an extended period, in several stages. The number of trees will be reduced, from an average of 835 per hectare for 15 cm. Trees, to 230 for 35 cm. trees.

I am not sure how many times this happens during the stand's life; each time, only the trees actually competing with the crop trees are removed; some are far enough away from the crop tree to stay and may yield a commercial log the next time around. Some are suppressed trees, which compete minimally if at all with the crop tree. It is very important not to overdo it and open the stand too much, so as to encourage the crop trees to grow straight and not develop epicormic branching.

This technique is pretty much non-commercial in its early stages, unless the small stuff can be used for firewood. However, whatever is cut and left will add to the soil's organic content.

The main benefit, of course, is that as the crop trees are ready for harvest, they should be larger and of higher quality.

#### SEEN IN A CHURCH BULLETIN

Charity: a virtue or a deduction?

Sue: a nice name for a girl or a course of action.

Eagles soar, but weasels don't get sucked into jet engines.

I've a photographic memory, but forgot to put in film.

It wasn't raining when Noah built the Ark.

Aspire to inspire before you expire.

Knowledge: I know a tomato is a fruit.

Wisdom: I know enough not to put it in a fruit salad.

I took 15 years to learn I had no talent. Then I couldn't quit—I was too famous.

A WISH: that 2008 will be a year of health, goodness and prosperity for all fellow CIF members and those around them.