Peak Oil and Climate Change

A Rural Community Guide

UNIVERSITY of GUELPH

School of Environmental Design and Rural Development
Wayne J. Caldwell, Project Director

Table of Contents

Preface: Note from the Authors iv
How to use this guide v
Background 1
Awareness for Resilience 5
Individual Awareness 5
Municipal Awareness 7
Community Awareness 9
Partnerships and Collaboration 11
How to Build Partnerships 12
Introduction to Actions 17
Service Delivery 18
Population and Employment 24
Livelihoods and Lifestyle 28
Agriculture 32
Food 38
Ecology and Water 44
Transportation 49
Conclusion 55
Resources 56

Published and Distributed in Ontario by School of Environmental Design and Rural Development, University of Guelph. Printed in Canada by CLICKsigns.

Inquiries regarding requests to re-print all, or part, of this publication should be addressed to:

Dr. Wayne Caldwell
University of Guelph
Guelph, ON
N1G 2W1

Project Director: Wayne Caldwell

Contributing Authors: Jennifer Ball, Erica Ferguson, Paul Kraehling, Émanuèle Lapierre-Fortin, Amy Lejcar, Eric Marr, Shannon McIntyre, Adam Wright

Graphic Design: Jennifer Sisson

Acknowledgements

We gratefully acknowledge our funders, Ontario Ministry of Agriculture, Food and Rural Affairs, MITACS, the Advisory Committee, and municipalities who completed the questionnaire. Our sincerest thanks to these groups and others that gave freely of their time and expertise and invested in this project.

Preface: Note from the Authors

Global climate change is a reality, and at the same time energy prices continue to rise. As these trends will fundamentally change our communities, how can municipalities work to increase resilience – to ensure that communities can withstand potential shocks and changes? What types of responses address both climate change and rising energy prices? This manual explores these questions as they relate to rural Ontario municipalities.

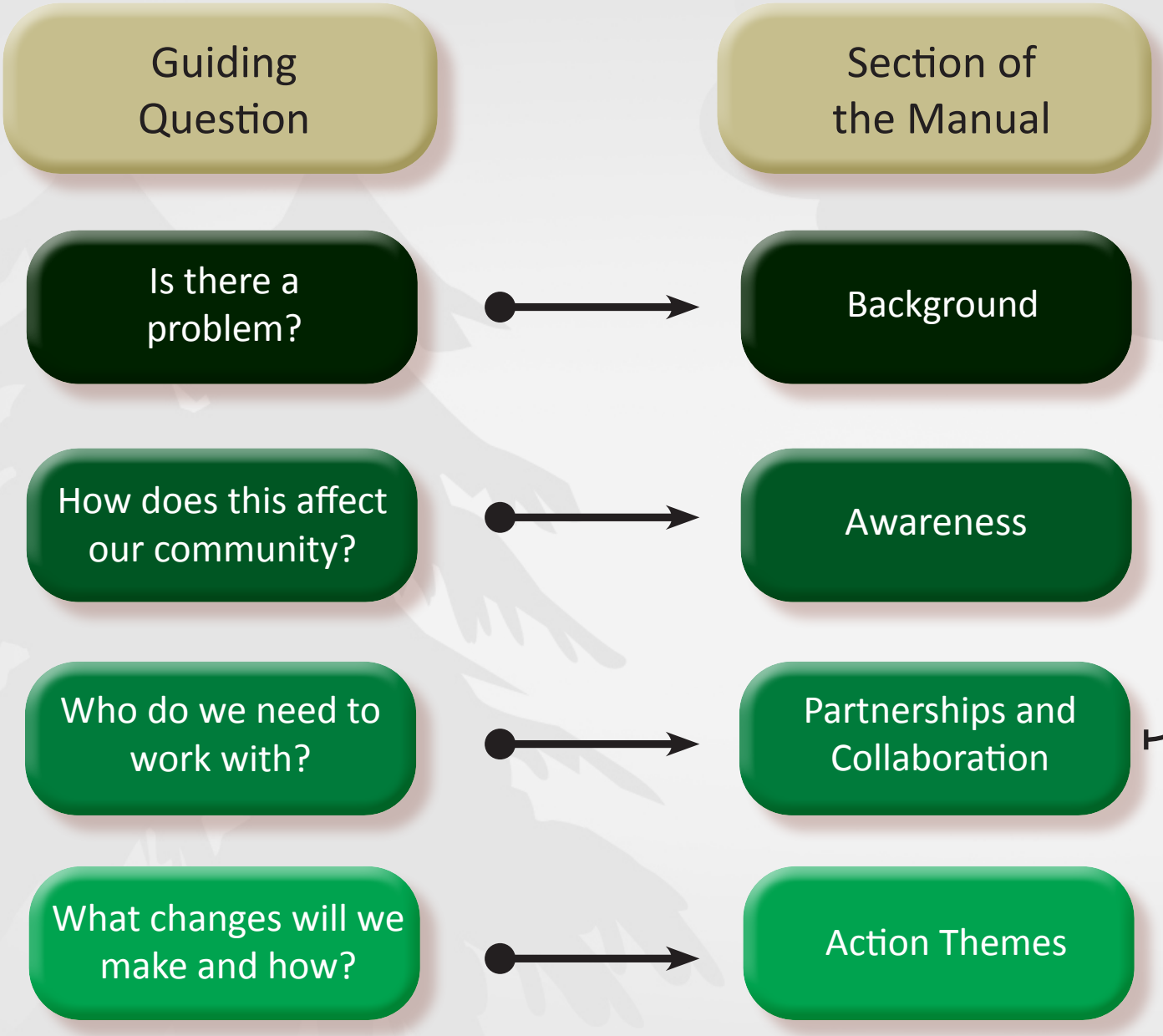
The authors of this manual have three guiding beliefs regarding community resilience in the face of climate change and increasing energy prices associated with peak oil:

1. The future is unknown: exact impacts of climate change and peak oil are unpredictable, yet there remains a need to develop a realistic response.
2. Municipalities can create a foundation for community action by balancing concerns for the future with a positive vision.
3. Communities and municipalities have options and opportunities to make informed and constructive decisions in the face of uncertainty; many of these decisions are “win-win” in the sense that they benefit the community in the short term, while also building resilience for the future. In essence, “win-win” actions are low risk with great potential for positive outcomes. Examples of this include planting a tree or creating community gardens and public parks.

We offer this manual to municipalities to support and inspire strategies to build rural community resilience in Ontario.

How to use this guide

Manual Organization - Guiding Questions and Relevant Sections of the Manual



Why this manual for municipalities?

Municipalities have intimate knowledge of their communities, as well as responsibility at the local level of government. This combination positions municipalities to inspire and inform community action. By creating collaborative vision and facilitating planning processes, municipalities can increase community resilience and preparation for difficult times.

The intent of this manual is to provide ideas and potential resilience strategies that are within the reach of rural Ontario municipalities, especially in those areas over which they have direct influence: local land use, infrastructure, transportation, buildings, energy efficiency, and economic development.

This manual addresses both peak oil and climate change, but focuses on peak oil and rising energy prices. For more information on climate change, the Canadian Institute of Planners has released Climate Change Adaptation Planning: A Handbook for Small Canadian Communities, which is available at www.planningforclimatechange.ca.

Background

The following definitions provide basic and brief information on concepts that at times can be quite complex. For this reason, key terms are defined and expanded upon here.

PEAK OIL refers to the point in time when the maximum rate of oil extraction is reached globally. There is consensus that oil production will not last forever. The peak is not when oil is running out, but rather the point when the most oil is being produced after which the price of oil and oil-related products is likely to rise rapidly. The easiest, cleanest oil was extracted first, and the remaining oil is in smaller, more difficult areas to reach, such as offshore or in tar sands. This means that environmental and economic costs to extract the remaining oil are greater. Since we are dependent on oil for so many necessities, it is beneficial to address its finite nature sooner rather than later.

How many of the things you use on a daily basis are reliant on oil?
A short list includes:

- most food products (need oil for fertilizer/pesticides/transportation);
- any plastic product;
- any product transported to a store;
- any product from any store you need to drive to.

It doesn't take much to have a very long list.

In the area of agriculture, increasing costs of fuel, pesticides, fertilizers, and higher operating costs of farm equipment may lead to increasing food costs and difficulties in maintaining current levels of production due to potential decreases in agricultural yields.[1]

CLIMATE CHANGE is ongoing and there have been significant variations in weather patterns over periods ranging from decades to millions of years. Climate includes temperature, humidity, wind, and precipitation, amongst other weather indicators. Current climate change is likely to disrupt average weather conditions and patterns and includes extreme weather events. According to Natural Resources Canada,[2] Ontario's average annual temperatures have increased by as much as 1.4°C since 1948. Water shortages and climate change-related extreme weather events have already occurred in Canada and Ontario and are likely to become more frequent in the future.

> A tank of petrol contains 8,000 human hours of work! If you worked for 8 hours a day, 7 days a week, 52 weeks a year that equates to about 3 years of work.[2]

PEAK OIL and CLIMATE CHANGE are so interconnected that they are often seen as "twin" issues. Fully one-third of greenhouse gas emissions that increase climate change are from oil use.[3] Communities worldwide face the challenge of adapting to climate change and peak oil. In the past, local governments in rural Ontario have dealt with various environmental and social problems that seemed overwhelming like the E. coli outbreak in Walkerton in 2000, or the tornado in Goderich in 2011. It is the experience of managing the "messiness" of complex problems that has prepared local governments for the challenges associated with peak oil and climate change.

COMMUNITY RESILIENCE is the ability of a community to sustain and renew itself into the future within an environment characterized by change and uncertainty. Community resilience is achieved when communities have the capacity to respond to and influence changes that affect them.[4]

LOCALIZATION is the process of increasing the goods and services that are produced or provided at the local level, which reduces dependence on large urban centers and distant countries. Localization does not mean isolating your community; it simply means becoming more self-reliant.[5]

Localization:

- Helps a community withstand economic change;
- Generates local dollars and keeps them circulating within the local economy;
- Builds a sense of community pride and loyalty to local businesses;
- Capitalizes on a community's unique strengths and assets, which can lead to increased tourism and can attract industry to the region;
- Helps communities adapt to rising fuel prices and climate disruption.

TRANSITION INITIATIVES are community-led responses to peak oil, climate change, and economic instability. The Transition response is optimistic, hopeful, collaborative, and focused on tangible actions. Started in the UK, the Transition movement is now a global movement as any community with a focus on collaboration for resilience can become part of the Transition network. In less than three years, 20 official Transition initiatives have started across Canada, with the highest concentration in Ontario. Many more are in the formative stages. There is likely one near you.

The Transition movement recognizes that every community will likely have different actions, priorities, and needs. It supports community members and municipalities to create a shared vision for the future that considers peak oil and climate change. For more information, visit www.transitionnetwork.org for tools and examples.

Transition Initiatives organize around many issues, including:

- local energy generation and green homes;
- local food production, gardening and composting, and farmers markets;
- local economies, barter, and alternate currencies;
- skill-sharing and education;
- recycling and repairing;
- car-sharing, and promoting cycling.

Location of Transition Initiatives

The above map shows the number of transition initiatives in a given area, for more information, refer to: www.transitionnetwork.org/initiatives/map

NO REGRETS or WIN-WIN ACTIONS will have positive results regardless of climate change or peak oil. 'No regrets' actions can also be considered 'win-win' as they have the potential to benefit all stakeholders. Often a first step in determining what a 'win-win' action looks like requires building community awareness, as discussed in the following section.

CUBA

When peak oil is discussed, the case of Cuba is often brought up. While acknowledging the complex political, economic, and social factors, some general themes of the Cuban experience are:

- Cuba had been reliant on the Soviet Union for oil and for much of its economic activity.
- The Soviet Union collapsed in 1990, initiating a rapid deterioration economically, and a loss of oil imports for Cuba.
- Oil imports were decreased by at least 50 percent, and food imports decreased by approximately 80 percent.
- The Cuban people went through a period of great hardship.
- Communities worked together to creatively transition from a conventional agricultural system to a local, organic farming, and food distribution system.

"The Power of Community: How Cuba Survived Peak Oil" is a film that profiles the transition of Cuba and the resulting approach to community and food security that persists. It is available at www.powerofcommunity.org.

Awareness for Resilience

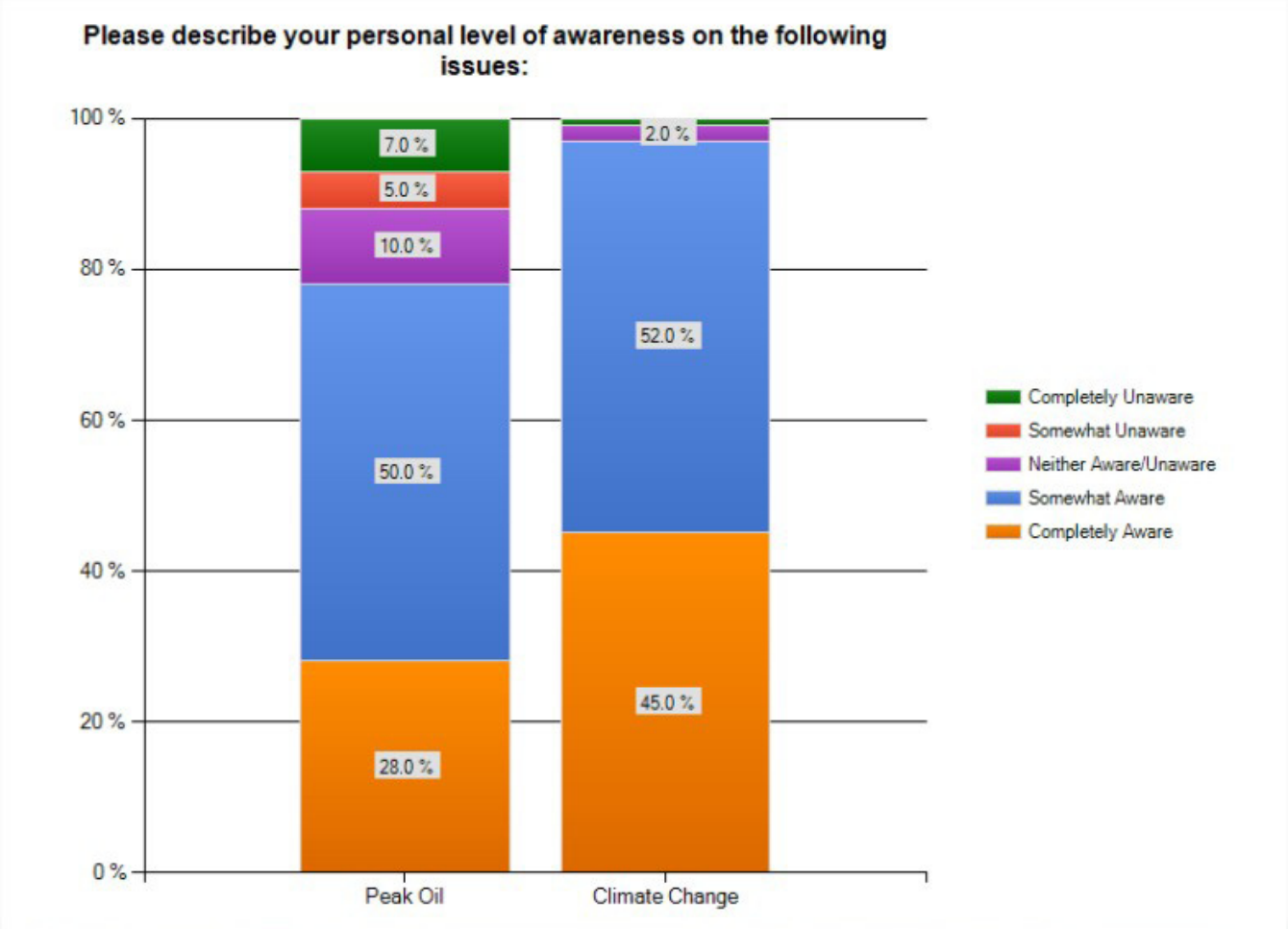
The first step in making planned change at any level is to increase awareness of why change is needed and important. To gauge levels of individual, municipal, and community awareness, our research team created a rural Ontario municipalities survey to ask municipal employees – largely planners and clerks - to rate their personal level of awareness on climate change and peak oil as well as the levels of awareness in their municipality, and their community.

Question

Do you know enough about peak oil and climate change to make personal decisions based on their potential impacts? Does your municipality know enough? Your community? How can you support learning to build a foundation for change?

Individual Awareness

Although peak oil and climate change may seem theoretical, their implications play out in both our personal and professional lives. The survey respondents were asked about their personal awareness of climate change and peak oil and showed that while there is substantial personal awareness of climate change, awareness of peak oil is dramatically lower (see following graph).



[5]Completed in 2011, the results are based on 100 respondents (municipal officials). A full paper on survey results is available at www.waynecaldwell.ca/Projects/regionalresiliency.html

Leadership and Champions

Within municipalities and communities, different forms of leadership and champions are emerging:

- Leadership is changing from more traditional roles to promotion of collaboration and shared leadership structures.
- Champions are in positions to make a strong case for change and to publicize actions, which increases buy-in from the municipality and community.

There is great potential within our personal and professional lives for each of us to champion change and provide leadership for resilience-building activities.

Questions

If gas went up to $5 a litre, how would this impact your life choices? Where you live? Your job? Extracurricular activities?
Do higher temperatures and changing precipitation patterns affect you personally? If there was an extreme weather event (i.e. Goderich tornado in 2011), how would your family and community cope? How would your work be affected?

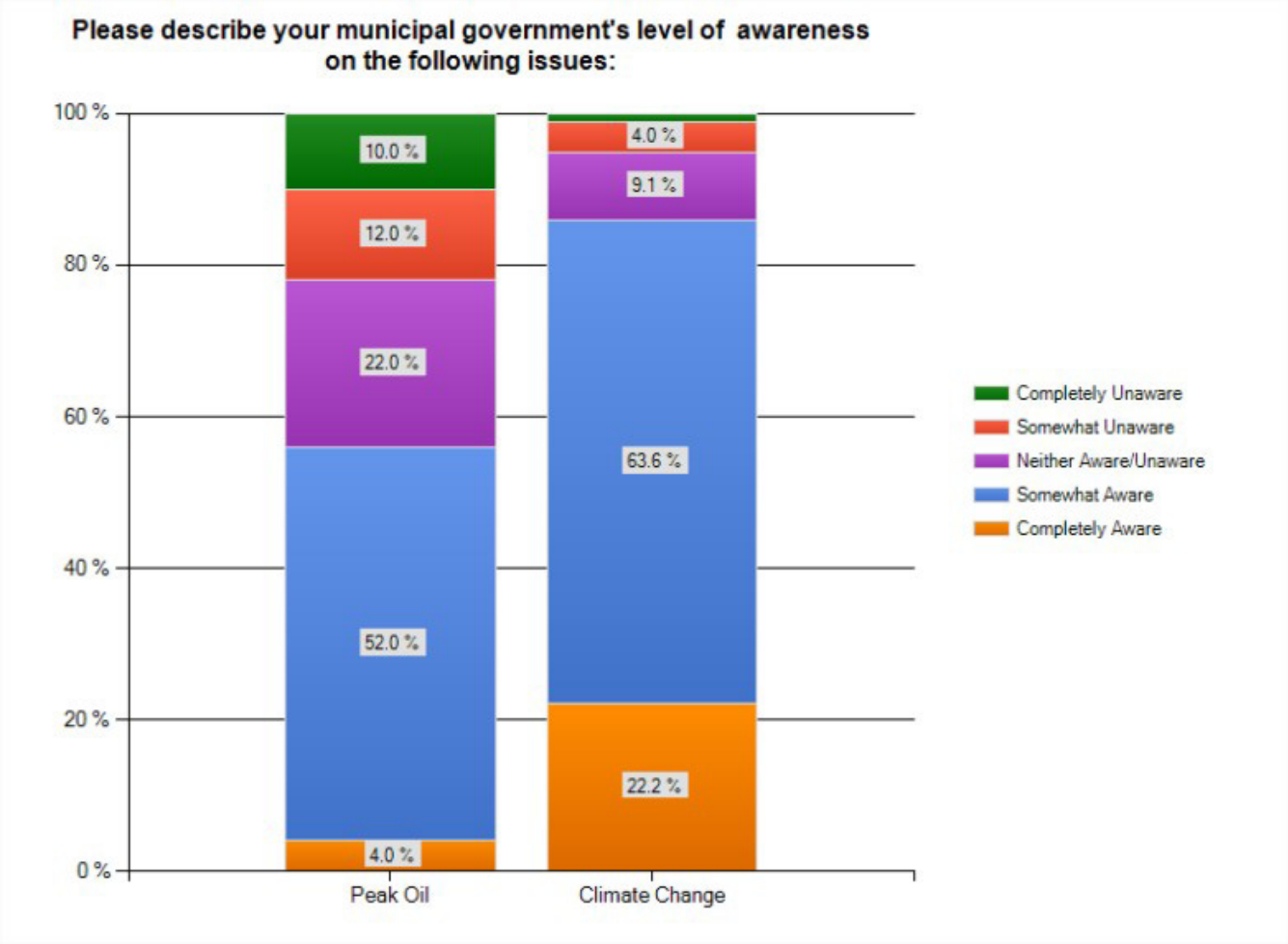
To increase your personal knowledge of climate change and peak oil:

- Check out the resources sections in this manual,
- Contact a local Transition initiative .

Municipal Awareness

Municipalities are responsible for the communities they serve. In order to make the best choices for the long-term resilience of communities, municipalities must be informed of global challenges that have local implications.

The rural municipality survey asked respondents to rate the level of awareness of climate change and peak oil in their municipality. According to the respondents, there is a critical lack of awareness about peak oil, and only 22 per cent of the municipalities are “completely aware” of climate change: [6]



While there may not be consensus within your municipal office on these issues, providing relevant, factual information helps municipalities to make informed decisions.

If increasing awareness leads to disagreement regarding the cause of change or potential future scenarios, there can still be agreement on plausible strategies or ways forward. This can be accomplished by looking for 'no regrets' or 'win-win' solutions as discussed in the background section.

Community Awareness

At the community level, increased awareness provides broader support for actions and interventions. A better understanding of climate change and peak oil and their potential implications creates a strong foundation on which to build partnerships, collaboration, and community action.

In the rural municipalities survey, respondents estimated that 24 per cent of their broader community is unlikely to be aware of climate change. For awareness of peak oil, that number increases to a full 68 per cent. If these percentages of community members are not aware of the potential challenges to their communities, it is difficult to imagine them pursuing change and supporting resilience-building strategies to their fullest.

Tools

Transition initiatives ask: "What is the best way to raise awareness about climate change and peak oil in our community?" There are many examples of activities that have been used: film screenings, conferences, presentations at existing groups' meetings, editorials in local newspapers, big community events, workshops etc. It is important to give information, provide space for dialogue, and encourage people to find their own response.

Grassroots organizations and other institutions engaged in resilience-building activities are potential partners and collaborators – there may already be initiatives or awareness campaigns that the municipality could engage with and support. The next section on partnerships and collaboration describes the importance of municipal relationships with other community players in achieving resilience goals.

Questions

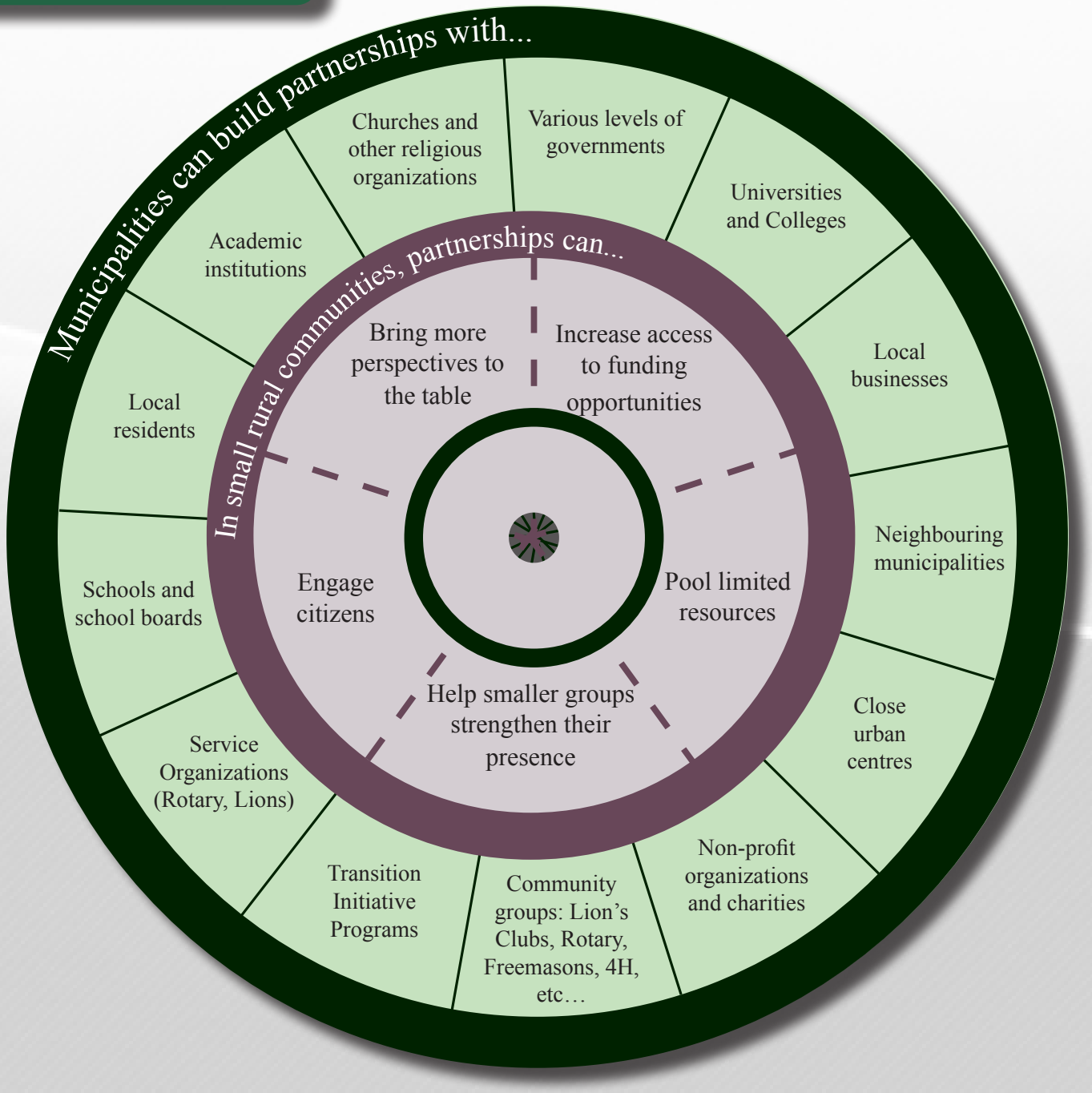
How knowledgeable is your council on climate change and peak oil?
How knowledgeable are the municipal employees?
How can you increase the awareness of your colleagues? Of your council? What strategies work best? Workshops? Informal discussions? Provision of background materials on the issues?
What is the best way to provide relevant information to your community? How can you be involved in raising awareness in your community? How can the municipality be more involved?

Extreme Weather Events: The Goderich Tornado

Building Resilience at the Community Level

Partnerships and Collaborations

Because peak oil and climate change affect all segments of society, they require an engagement strategy that inspires multiple stakeholders to create a shared path forward. The partnerships and collaboration that unify community response need various sectors and players that trust each other and work well together. When many partners are able to harness individual strengths and combine forces, the potential for shared community resilience is heightened.

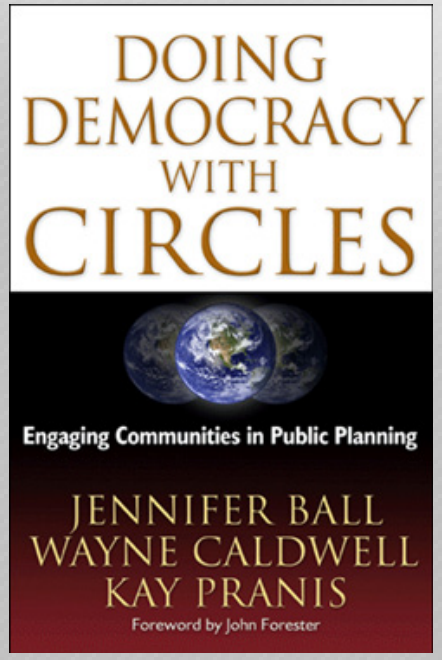


How to Build Partnerships

1. Assess what strengths and resources exist, and where your municipality can make a difference.
2. Identify existing organizations and efforts in your community that are focused on climate change and rising energy costs, and determine appropriate areas of collaboration.
3. Determine which potential partners need to be at the table, and make contacts as necessary.
4. Be clear on how leadership works, and how to be accountable to the group.
5. Use spaces for collaboration where everyone feels comfortable, such as a local coffee shop, school gym, or town office.
6. Find common goals, and determine the direction and focus of the partnership's efforts.
7. Clarify responsibilities and expectations by discussing what strengths and interests each partner brings, and what mutual benefits exist.
8. Identify potential sources of conflict at the beginning. Healthy ways to reduce conflict include:
    - Focus on problems, not personalities;
    - Look for options with mutual gain;
    - Put yourself in their shoes;
    - Take time to consider all options in order to determine the best approach;
    - Use an appropriate engagement strategy, like the circle technique.

THE CIRCLE IS:
A way of talking together in which all of us…
• are respected and treated equally;
• have the opportunity to speak without interruption,;
• tell our own stories;
• speak and listen in a deeper, more heartfelt way.[7]

For more on the Circle dialogue process see: "Doing Democracy with Circle: Engaging Communities in Public Planning" by J. Ball, W. Caldwell, & K. Pranis.



9. Create strategies for ongoing evaluation of working relationships, efficiency, and effectiveness.
10. Find ways to recognize and celebrate partnerships and community leaders for their service and contributions (through award dinners, summer BBQs, or other events).

Leadership

Engaging community leaders from all sectors and asking for their participation encourages a proactive and collaborative approach to emerge. Keeping leadership shared is a difficult task, but it helps to ensure that participation continues. While this can be time consuming, these efforts increase both the success of specific initiatives, and the resilience within the community as a whole.

Rural-Urban Linkages

The fundamental connections between rural and urban areas will become more apparent with peak oil and climate change. These linkages will require relationships between municipalities as each recognizes the benefits of collaboration. Urban municipalities will increasingly look to outlying rural areas for accessible supplies of food, and will collaborate to improve distribution networks. Equally, rural areas will need improved access to urban centres for goods and services that are unavailable in the rural locations as global channels become too costly. As production, out of need, becomes more localized, the incentive to rediscover interdependence will increase as different areas of Ontario will look to collaborate for mutual benefit.

Recently, and for the first time ever, more people globally live in urban centres than in the countryside,[8] with urban centres heavily relying on the surrounding rural areas for resources. This has been picked up on by the "Farmers Feed Cities" campaign that highlights the connections between rural and urban regions. "Farmers Feed Cities is committed to increasing the understanding of the value that farmers contribute to Ontario's economic, physical, and social health." [9]

Case Study: Niagara Climate Change Network

Partnerships take time and intentional effort, which the Niagara Climate Change Network (NCCN) has come to understand in forming a collaborative to tackle climate change composed of community members, industry, and government leaders. The NCCN was initiated by Brock University, which sought to bring leaders from many sectors together to address climate change and to bring the work of the NCCN back to their sectors and constituencies.

The members of the NCCN went through the following process:

- Introductions, learning about each other and initiatives already being pursued;
- Information sessions on the potential impacts of climate change on the Niagara Region;
- Participants describing their efforts and plans related to climate change;
- Identifying discrete areas for potential collaboration as they emerged.

It took seven months and many meetings for the core group to form. This core group includes 18 participants from eight sectors. From the core group, the NCCN elected a steering committee, which reports to the rest of the NCCN membership. The NCCN has initially focused on engaging community leaders, even though broader community engagement is central to the desired outcomes.

After more than a year of forming as a group, the NCCN is poised to assume leadership on climate change in Niagara. As such, the NCCN's engagement process holds important lessons for community engagement and participation elsewhere.

For more information, send a request via email to: niagaraclimatechangenetwork@gmail.com

Case Study: Eden Mills Going Carbon Neutral (EMGCN)

Eden Mills is a village near the City of Guelph that has made significant use of collaboration in its efforts toward 'going carbon neutral.' Eden Mills had unanimous support at the township level, secured free space from the Community Club, and became a project under the umbrella of the Millpond Association, which has charitable status.

EMGCN has a strong working relationship with the Township of Guelph-Eramosa resulting from their collaborative approach. According to Chris White, Mayor of Guelph-Eramosa, the role of the township in responding to climate change and peak oil is that of a partner and follower. This role has inspired Guelph-Eramosa to support EMGCN in the following ways:

- being aware of opportunities, and playing a connecting role;
- connecting EMGCN with upper levels of government;
- bringing exposure to the EMGCN model;
- educating citizens on the model;
- providing seed money with which to leverage other grants;
- providing stability and credibility.

For more information, visit www.goingcarbonneutral.ca

Introduction to Actions

Awareness, partnerships, and collaboration find the most traction and have the most meaning when they centre on concrete actions.

Opportunities for action-based initiatives within communities are plentiful. In the following sections, different avenues for awareness, partnership creation, and action are identified. Each of the following areas highlights challenges that may arise with climate change and peak oil, and determines questions to consider as well as potential actions. Case studies are provided for examples and ideas from other communities.

Although discrete action areas can be identified, they tend to overlap. Because of this, it is helpful to view each action area as related to other areas by considering how awareness, partnerships, and actions might intersect in more than one area.

The following sections provide some areas in which municipalities can build resilience. There are areas that this manual does not cover, as resilience work happens at many levels and in many ways. This discussion is intended to provide thought-provoking inspiration for the beginning of larger, broader, more expansive discussions and approaches for municipalities to use within their communities.

Service Delivery

Municipal governments are on the front line of delivering everyday services. Because of this, they tend to be closely attuned to community needs. Many municipal services, such as solid waste collection, road maintenance, and snow removal, are highly dependent on fossil fuels for delivery. Climate change places other municipal services at risk. For example, storm water management will be affected by more variable rainfall events. Other infrastructure such as roads and bridges may also be threatened by flooding and extreme weather.

Despite the opportunities for municipality-led, small scale renewable energy production, municipalities do not currently play a major role in energy production, conservation, and efficiency. Through initiatives such as the Feed In Tariff (FIT) program, municipalities have the opportunity to reap financial rewards from renewable energy production. The role of renewable energy sources will differ for each municipality, depending on their location and the possibilities for wind, solar, geothermal, or bio-digesters.

The FIT program has made the economics of municipal biodigesters feasible. Brockton and Meaford are two municipalities that are turning waste into electricity using biodigesters that use fermentation to manage biodegradable waste and sewage sludge. As the waste is digested, it releases renewable energy in the form of biogas that consists mostly of methane and carbon dioxide. These gases can be used directly, or can be upgraded to a natural gas. The resulting solid waste produced can be used as fertilizer. As well, the Waterloo regional government is collecting methane from its landfills, which power over 4,000 homes. For more information on the FIT program, please visit fit.powerauthority.on.ca/fit-program.

The cost of electricity is another area for concern. Ontario relies heavily on nuclear and hydroelectricity and although oil is not primarily relied upon for electricity, it is still an essential source of heat for many rural residents and requires attention when considering energy needs. Electricity use and cost may increase substantially if electric vehicles become widely used (see the transportation section). As a result, increases in electrical production will be necessary, and prices will increase. This may lead to improved energy conservation and the use of sustainable electricity sources along with research and incentives to explore alternatives.

Combined, these issues suggest that municipalities need to anticipate the increasing cost of service delivery and the potential for service interruption. Municipalities should also consider the potential impacts on infrastructure as well as long term changing trends in energy provision.

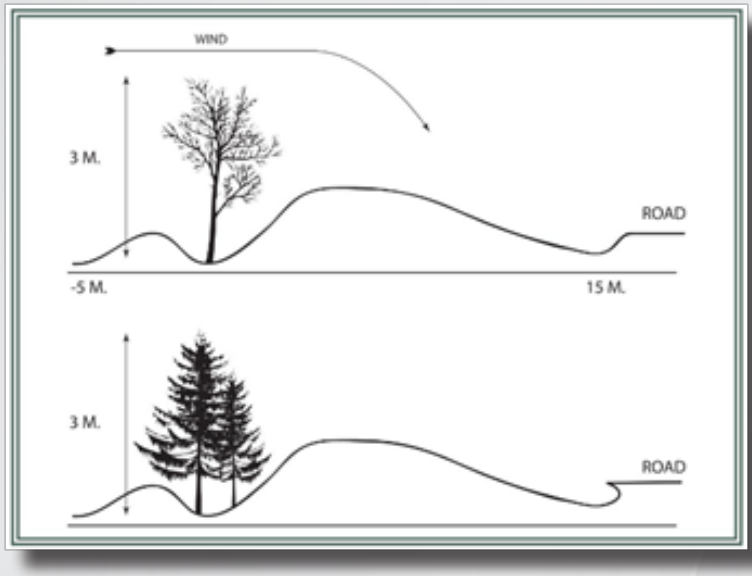
Questions

- Given the range of services that municipalities provide, which ones are particularly vulnerable to a change in climate or an increase in extreme weather events? How would a flood, tornado, or ice storm affect services? Which services are essential? Do you have an emergency plan? Do people in your community know where to turn in an emergency?
- How can partnerships streamline service delivery? Who are potential partners for the areas identified above?
- Are opportunities to reuse or recycle valuable materials through waste collection being explored (i.e. recycling programs, "new to me" stores)? Is your municipality providing composting and comprehensive recycling programs (i.e. reclaiming materials from building demolition)?
- How can your municipality use the provincially mandated energy conservation plans to improve the efficiency of energy use?
- How can your municipality produce more energy locally and support alternative energy production in your community?
- Is there an opportunity to improve the efficiency of energy use in municipal buildings and operations?
- What role can the municipality play in retrofitting private dwellings?

Actions to Consider

1) Undertake a vulnerability assessment of services and develop plans for risks associated with climate change and peak oil. Ensure there is a plan for service delivery that minimizes reliance on fossil fuels, and prioritizes essential services in emergency situations. For example, the City of Guelph has completed a long-term energy forecast, available at guelph.ca/living.cfm?smocid=2407.
2) Look for opportunities to incorporate green infrastructure when upgrading or replacing systems, such as living snow fences.

Green infrastructure refers to natural vegetation, vegetative systems, and soil in volumes and qualities adequate to sustain vegetation and absorb water and supportive green technologies that replicate ecosystem functions.[10]



3) Pursue and encourage, however possible, a range of practical applications related to composting, recycling, and water conservation (low flow toilets/shower heads, etc.), energy conservation (use of clotheslines), recycling, or reusing.

- Partner with community organizations to promote energy efficient technologies.
- Local environmental organizations may already be engaged in educational programs.
- Prevent restrictive covenants on sustainable practices, such as development agreements that prohibit clotheslines.

4) Work with the community to plan for using less energy at the municipal level. The Guelph Community Energy Initiative is a great example of a proactive approach. Their goals are to:

- use less energy in 25 years than we do today;
- consume less energy per capita than comparable Canadian cities; and
- produce less greenhouse gas per capita than the current global average.

Natural Resources Canada has published a step-by-step guide to developing a long-term community energy plan that can be accessed at www.smartgrowth.ca/research/cep/CEP-SGCN.pdf

5) Participate in the FIT program to use renewable energy as both a sustainability component and a viable financial venture.

- Identify potential sources of power generation in your community. Some of the most popular sources are solar and off-gassing from landfills. Others to consider include dams that are already in existence for hydroelectric generation, and community-owned wind or solar power.

Several municipalities in Huron County have municipal solar energy projects. Some lease solar panels, others own them or choose joint ventures. This link provides a list of all renewable energy projects in Ontario: www.ene.gov.on.ca/environment/en/subject/renewable_energy/projects/index.htm

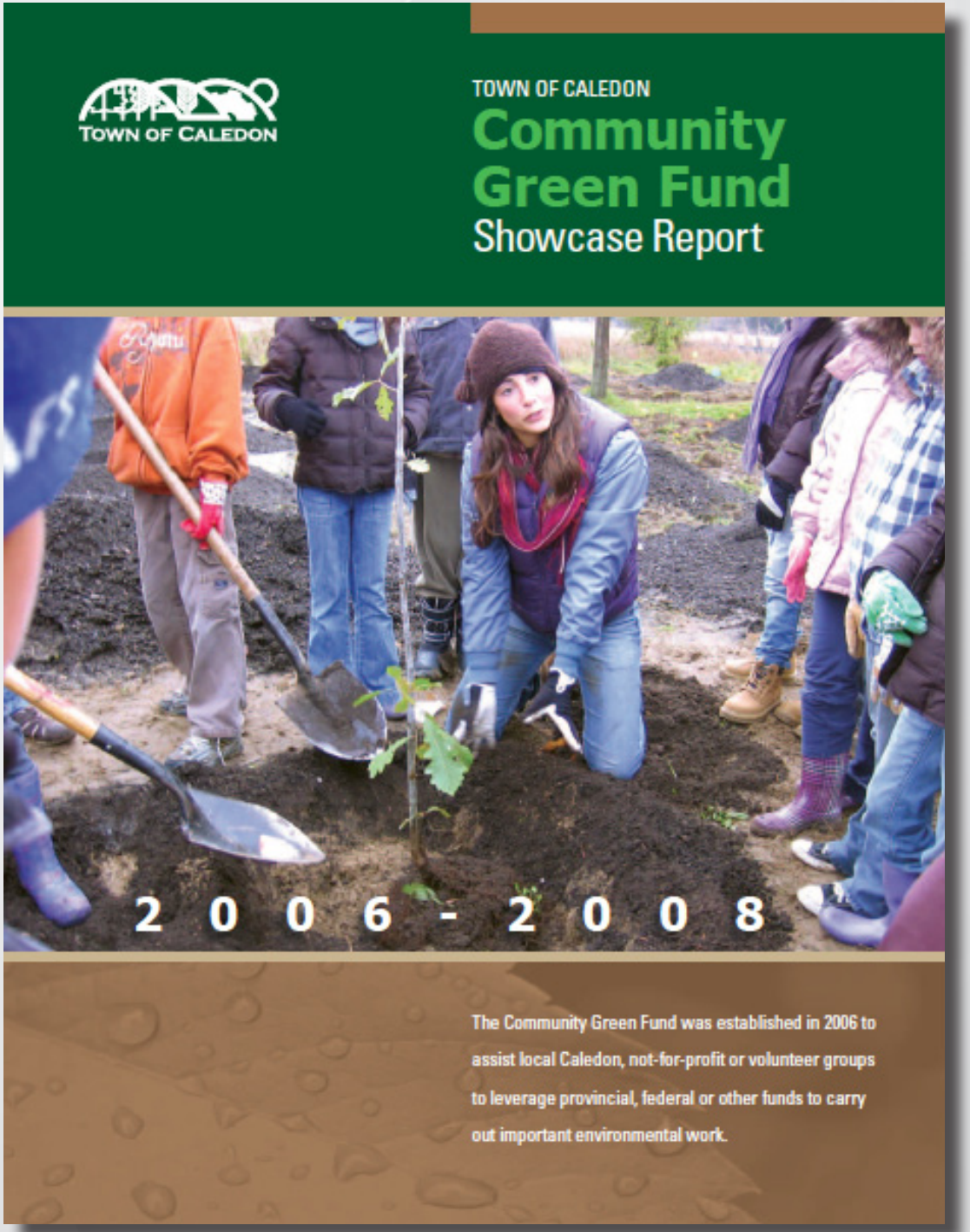
Case Study: Town of Caledon

A good example of a municipality on a path towards preparing for climate change and peak oil is the Town of Caledon.

Some of their initiatives include:

- Community Climate Change Action Plan: www.caledonclimateplan.ca/
- Environmentalist of the Year Award: www.town.caledon.on.ca/townhall/departments/administration/CEACEnvironmentalistoftheYear.asp
- Community Green Fund: www.town.caledon.on.ca/environment/communityfund.asp
- Corporate Energy Plan: www.town.caledon.on.ca/contentc/environment/Caledon_Corporate_Energy_Management_Plan.pdf

To find out more, visit: www.town.caledon.on.ca/environment/



Population and Employment

In rural Ontario, the potential changes to population trends and employment due to peak oil and climate change include the following:

- A return to increased local production and consumption in rural economies due to the increasing costs of importing and exporting products.
- A decrease in commuting for employment due to increasing costs, resulting in greater need for local employment opportunities.
- An increased need for youth retention that can only be achieved by providing regional employment and education opportunities.
- An influx of migrants from urban or international settings.

Questions

- What assets can be built upon for Community Economic Development (CED)?

CED can be different depending on the community, but in general CED is action by people locally to create economic opportunities and better social conditions, particularly for those who are most disadvantaged. CED is an approach that recognizes that economic, environmental, and social challenges are interdependent, complex, and ever-changing.[11] In rural Ontario, best practices in CED are outlined in *Prospering with a Stable or Declining Population: Best Community Economic Development and Planning Practices for Rural Communities* by Wayne J. Caldwell, Ph.D., MCIP, RPP. For further information, refer to: ruralplanninganddevelopment.ca

- How can your municipality contribute to the creation of sustainable employment for local residents?
- Will using more local products increase local economic growth? If so, where can local products be used instead of imports?
- Are services and employment opportunities centralized within your community? How will this affect smaller settlement areas if commuting becomes too expensive?
- Is your local economy reliant on exports, or a single industry? What would happen if increasing transportation costs made exports less practical or the major industry closed?
- Where are the opportunities to reduce transportation of products through local production and consumption?
- What will the changes resulting from peak oil mean for tourism in your region?
- As transportation costs increase, will industries that have left the province (e.g. the manufacturing industry) return to Ontario?
- Can we expect on-farm employment to increase as mechanization becomes more expensive?
- What can we expect our community to look like with a transition from urban to rural regions?
- Would the community be receptive to an influx of multiple ethnicities and cultures?

Actions to Consider

- Use land-use planning to retain local services and commercial opportunities that increase the economic viability of villages and hamlets.
- Make use of economic development corporations to encourage local employment opportunities through supporting local entrepreneurs, and home-based businesses.

> The Community Futures Program (CFP) is a Government of Canada initiative that supports 61 Community Futures Development Corporations (CFDCs) in Ontario. Historically, CFDCs have played an important role in economic development.

- Diversify and do not put all your eggs in one basket. Consider a range of employment opportunities rather than concentrating on a single major employer.
- Explore opportunities for local training and education through online learning or satellite campuses.
- Conduct a needs assessment with local employers to determine gaps in skills or trades that may be filled by local youth through targeted training programs or apprenticeships.
- Use local marketing and products wherever and whenever possible.
- Find economic opportunities in transitioning to a green economy founded on green jobs.

> Green jobs are either: a) jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources; or b) jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources. For more information see: www.bls.gov/green/green_definition.pdf

• Community preparation for rural settlement of urban people, including immigrants. This can include community-based inclusivity training, and finding ways to welcome migrants to rural communities.

Case Study: Northeast Community Network (NeCN)

The NeCN was formed in 2007 to promote regional economic development and to act as 'one voice' for its Northeast Ontario membership of 17 municipalities, First Nation communities, and Community Future Development Corporations in Cochrane District. It was created out of a recognition that, in order to compete at the provincial, national, and international levels, the communities must work collaboratively.

The NeCN and its members recognize the challenges and opportunities associated with peak oil and climate change. This is particularly true on the topic of agriculture, which is a primary area of interest for the organization. While the current agricultural sector in Cochrane District is small and declining, recent studies have identified potential for agricultural expansion due to the underused and vast area with suitable soil, as well as manageable climatic conditions. Because of this, the NeCN has a strong interest in expanding the agricultural sector. Their motivation to expand in agriculture is compounded by their current reliance on the boom-bust sectors of forestry and mining.

The recent interest in agriculture in this region is encouraged by two realizations related to climate change and peak oil. First, climate change projections typically show that Northeast Ontario's growing conditions will improve through increases in crop heat units that increase the yields and range of crop production. Second, because of northeastern Ontario's remoteness, some level of food self-sufficiency is important. This has encouraged the NeCN to pursue agricultural production in the region to encourage their economic and food resilience.

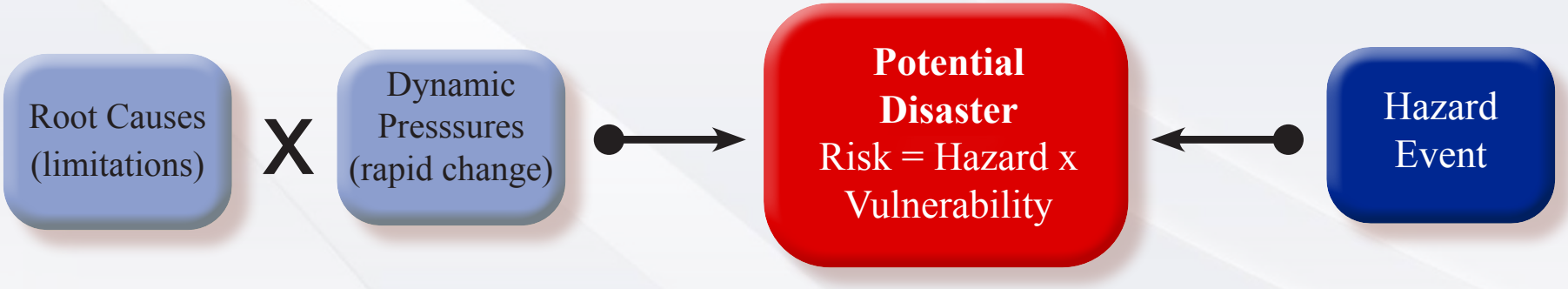
For more information, refer to: thenecn.org/

Livelihoods and Lifestyle

Community Vulnerability

In its simplest form, vulnerability refers to the potential to be harmed physically and/or psychologically and is often understood as the converse of resilience.

People who are more vulnerable are more likely to be affected by change. The reasons for a person's vulnerability can be rooted in physical limitations such as physical ailments or handicaps, social exclusion (limited social network, i.e. has nobody to help them), or geographic location. Vulnerability can be viewed at an individual and community level, and differs between individuals and regions. The following diagram captures many of the components of the progression of vulnerability in a community:



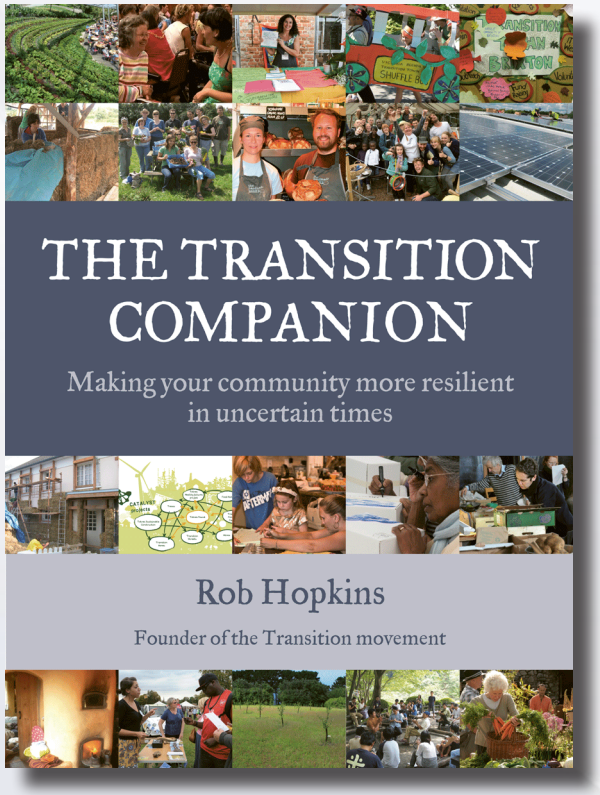
Vulnerability can be conceptualized as a spectrum, and each individual and community has a degree of vulnerability. As peak oil and climate change will increase vulnerability in many circumstances, individuals and communities who are already at risk will likely become more vulnerable. People in poverty will be at increased risk of further marginalization and impoverishment. Similarly, remote communities and communities with diminished populations or reliance on one industry, will have increased community-wide vulnerability.

Early planning and specific attempts to strengthen the social fabric can diminish vulnerability. The chart below outlines how municipalities could play a role in increasing resilience in this regard:

	Probable Impacts and Vulnerabilities	Some Actions to Consider
Financial and Physical Assets *employment, income, assets, savings, housing, material goods.*	• Job market and employment options change, inability to commute • Food and heating costs increase and require more of the family budget • Less disposable income, reducing lifestyle choices like travel, relocation, or investment	• Explore opportunities to create local work and local economies • Policies to support co-housing initiatives • Reinvigorate social clubs (Kiwanis, Lions, churches) • Provide spaces for people to meet • Encourage and support community gardens • Consider use of barter and alternative monetary systems or local currencies.
Mental and Emotional Assets *mental health, self-esteem, confidence, cultural identity, leadership abilities, meaning making*	• Stress • Depression • Isolation • Social changes – increased gap between rich and poor, unsettled community • Changing social networks and family structures • Discord / conflict: personal, within families, community discord	• Partner with groups that already address poverty and are increasing social capital / strengthening the social fabric (eg. United Way) • Intentionally provide and promote programs that bring people together to build relationships and support networks, such as public libraries, farmers markets, recreational activities. • Support and partner with health support providers for health promotion: Public Health, schools, and other health care providers. • Support and create avenues for local culture – local food, talent, and music • Consciously include vulnerable populations that have restricted mobility, limited incomes, or are otherwise marginalized. • Develop promotion and retention strategies for health care and health services including: hospitals, retirement centres, and medical clinics.

The Transition approach encourages experimenting with local currency that is produced locally and can only be spent in a certain region. An experiment with this was the Totnes Pound, created in Totnes, UK. As Rob Hopkins reports in The Transition Companion: Making your community more resilient in uncertain times:

"The first Transition local currency experiment, the Totnes Pound, was a limited issue of 300 £1 notes, accepted in 18 local shops. The second issue was made available at a 5-per-cent discount, so that 95p sterling bought one Totnes Pound, creating a 5-per-cent subsidy for supporting local businesses. The current issue of the Totnes Pound is a straight one-for-one exchange, accepted in over 80 businesses."[12]



Questions

- In general, how vulnerable is your local community? What makes the community vulnerable? What makes individuals and families in the community vulnerable?
- Where could your municipality have the most impact in terms of increasing personal and family resilience?
- Where could your municipality have the most impact in terms of increasing community resilience?
- Make a list of the opportunities that currently exist to build connections and support. Is there the opportunity to support these pro-actively before a time of crisis? What is missing?
- What does a healthy community look like to your municipality from an economic, social, and environmental perspective? Is your community a healthy community?

Case Study: Heart and Soul of the Transition Model

The Transition model provides suggestions on working groups that can increase community and individual resilience. Once of the working groups that many Transition Initiatives have started is called the "Heart and Soul" group that works with individuals to support them emotionally in the stages of recognizing the need for change, and moving towards a different future. Transition Guelph has formed a Heart and Soul group that defines itself as follows:

The Heart and Soul of change working group focuses on the impact of change on individuals and society, and the process of how social change happens. Its role in Transition Guelph centers on helping communities handle the profound changes that are coming for society, and in understanding the impacts those changes will have (and are having) on ourselves, our communities, and our way of life. For more information visit: www.transitionguelph.org

Case Study: Canada Walks

To improve community health and promote active transportation, Simcoe County and the towns of Collingwood and Wasaga Beach turned to Canada Walks - a national non-profit organization dedicated to walkable communities and active transportation. Walkable communities improve mental health increase social cohesion, and encourage physical activity.

In 2007, the first ever Walk21 'Walkability Roadshow' took place from April 15 to May 4. The Walkability Roadshow was organized by Green Communities Canada and Walk21. The roadshow raised awareness of walkability issues, the positive aspects of creating a walkable community, and the characteristics of walkable communities to strive for.

In conjunction with other organizations, Canada Walks runs marketing campaigns to change attitudes towards walking for both pleasure and purpose. Canada Walks uses an interdisciplinary approach within a community, working with many players including: public health, recreation departments, citizen groups, schools, land-use planners, and all levels of government. For more information on Canada Walks and Collingwood's efforts refer to:

.

Agriculture

Industrial agriculture is dependent on fossil fuel products that contribute to changing climate patterns. Climate change has the potential to alter the types of crops that can be grown, change the growing season, and increase available crop heat units, with some communities benefiting at some times while others could be harmed. Variable weather and the associated uncertainty will have a large impact. At the same time, increasing oil prices directly affect the cost of agriculture services - i.e. the diesel required to run farm equipment, fertilizer production, the process of drying, storing, transporting crops, etc.

The risks that climate change and fossil fuel dependence pose to the food supply chain are concerning, as the very nature of conventional agriculture makes it vulnerable to peak oil and climate change.

Even though industrial agricultural production is at an all-time global high, the factors required for maintaining and increasing production are areas of concern:

- Modern agriculture has come to rely on inputs of chemical fertilizer and pesticides to maintain and increase current yields. These inputs have variable impacts on the environment and human health, some of which are detrimental in both the short- and long-term.
- Agricultural inputs, especially nitrogen fertilizer, are often based on fossil fuels that may be limited in supply.
- Mechanization of agriculture is reliant on fossil fuels or biofuels.
- Production and use of biofuels has faced much criticism. Critics suggest that biofuels increase food prices that disproportionately affect people in poverty, and that biofuels have a very low Energy Return on Energy Invested (EROEI).
- Industrialization frequently resorts to the use of monoculture systems that increase the potential for pests and diseases, and diminish soil health.
- Genetic modification of crops is occurring for many reasons, and faces criticism on a number of fronts (for more information, see CBAN: www.cban.ca).

- Ontario's farming and food processing sectors have annual sales of more than $30 billion, making it the second largest goods-producing sector in the province.
- 700,000 jobs depend on Ontario's farming and food processing sectors.
- One in seven Canadians are employed by the agri-food system.
- Ontario exports more agri-food products than any other province (a total of $8.4 billion in 2003).

For more information, visit: growourfarms.ca
(Adapted from Agriculture in Ontario - Facts and Figures)

Bio-Fuels

Bio-Fuels are attractive as liquid fuels because they easily fit into our existing system, even though it is much more efficient to use biomass for other energy uses. Bio-fuels are often presented as carbon neutral because they are processed from plants that absorb carbon dioxide, which in theory, cancels out the carbon released when the fuel is used. Biofuels are also considered a renewable resource since we can grow more crops to turn into fuel. Which, in turn, has the potential to create new livelihoods for farmers.

On the flip side of this argument, there is discussion on the affordability of bio-fuels. There is concern that growing crops for bio-fuels will drive up food prices, and reduce the amount of land available for growing food. "Even if we devoted all our cropland to biofuel production we would only produce a quarter of our current fuel consumption."[1] Growing and processing bio-fuels consumes a lot of energy, much of which is from oil-based sources, so the net gain from bio-fuels is negligible. Cellulose-based plants such as grasses and saplings may be more efficient than our current commercial bio-fuels in the future.[13]

Actions to Consider

- Without degrading ecosystems, maximize suitable acreage for food production to compensate for decreased yields due to weather events or reduced availability of fossil fuel products.
- Support innovation and diversity: various farmers have adopted organic farming, urban agriculture, permaculture, no-till agriculture, and various other technologies and production practices. Municipal understanding and awareness can help to support and encourage these ventures.
- Encourage farms to incorporate more diverse or non-traditional crops in order to have a diverse and more resilient farm mix.
- Recognize that different sources of protein require different acreages of land for production, with plant-based sources producing much more efficiently than livestock. With global population growth of 70 million per year, it is increasingly important to encourage the consumption of plant-based protein, as well as to promote sustainable techniques such as forages used in rotation to maintain soil quality – this feeds cattle and sheep without the use of edible human food.
- As the average age of farmers is increasing, work to attract and support new farmers in whatever ways are possible.
- Involve children and youth in food production, and encourage farming as a career choice.
- Prioritize fuel for farmers in the event of a fuel shortage.

Questions

- What types of severe weather events might impact local agriculture? What are the risks of severe weather events in your area?
- If fossil fuels are more expensive, how will this affect the profitability of local farms? What would it take for the farmers you know to consider a different way of growing? How much would changing their approach challenge their financial viability?
- How dependent is the economy of your local community on agriculture for employment? For export? For local consumption?
- Are you encouraging the diversification of the agricultural sector? What are the traditional crops from your area, and what diverse crops are currently being grown or could grow well?
- How can municipalities encourage farmers to explore different ways of growing their crops (no-till, organic, permaculture, use of perennials, agroforestry, use of cover crops)? Where does the municipality have influence?
- Are there crops that can provide the same nutritional benefit while using less land?
- How is it possible to encourage diets that are more balanced and incorporate alternative sources for nutrients?
- What is the municipality's role in innovation? How can farmers be supported to come up with different approaches?
- How can farming become more viable and attractive to youth?

Community Supported Agriculture (CSA)

CSA provides a share system for consumers. Consumers pay an annual fee for a share in the harvest of a farm. This provides farmers with a guaranteed market, and support in the event of difficult growing conditions. It also allows consumers to learn more about their food and increase their farming knowledge and appreciation. Often CSAs promote alternative agricultural methods like organics or permaculture approaches. CSAs are growing more common, and a list of CSAs in Ontario can be found at: csafarms.ca/.

Case Study: FarmStart

Food security is dependent on recruiting and training new farmers to begin successful farming careers. Because of this, FarmStart works to support a new generation of farmers through agricultural enterprises that bind the entrepreneurial to the ecological.

The average age of Canadian farm operators is 52 and 80 per cent of current farmers want to sell or transfer their farms in the next ten years. At the same time, the difficulties, risks, and disincentives facing those who wish to start a farm enterprise are often overwhelming and discouraging. FarmStart works with new farmers to help them vision and plan for a future in farming.

FarmStart promotes farm diversity and land management that includes cover crops, green manure, compost, mulch, crop rotation, and no till methods. FarmStart advocates for organic methods and supports certified organic agriculture, yet does not exclude other approaches. Started in 2005 at the Ignatius Jesuit Centre just North of Guelph Ontario, FarmStart provides:

- Farm incubators with test plots and rental land as a first step to pursuing a career in farming;
- Business development assistance for farm businesses to be sustainable financially and ecologically, as well as with reduced inputs;
- Mentorship linking;
- Farm linking - increasing access to land and addressing some of the succession issues facing farming communities in Ontario through providing tools, resources, and encouragement.

For more information, visit: www.farmstart.ca.

Permaculture

Permaculture originated in Australia in the 1970s as a result of collaboration between Bill Mollison and David Holmgren. The term "Permaculture" was originally used for systems of perennial or self-perpetuating plants and animals that are useful to humans. The meaning of permaculture has evolved and grown, and it is closely related to the Transition movement in seeking long-term sustainable agriculture and development patterns on both small and large scales.

David Holmgren explains the more current definition of permaculture as:
"Consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre, and energy for provision of local needs. People, their buildings, and the ways in which they organize themselves are central to permaculture. Thus the permaculture vision of permanent or sustainable agriculture has evolved to one of permanent or sustainable culture." [14]

Case Study: Everdale Organic Farm and Environmental Learning Centre

Everdale is a 50-acre charitable farm dedicated to sustainable farming and education in Erin Township. Everdale runs a successful Community Shared Agriculture (CSA) program with over 300 members. The CSA relies on farm interns who come to Everdale to learn sustainable farming practices. Everdale also provides a program called Farmers Growing Farmers (FGF) for new farmers pursuing farm enterprises. FGF helps with planning, mentorship, start-up, and establishment of ecologically based farms that focus on direct marketing.

Through workshops that are hands on and linked to public school curriculum, Everdale also teaches schoolchildren on site, and visits schools to provide interactive farm programming. During the summer, Everdale offers a farm camp that has been very successful. For more information, visit: www.everdale.org

Food

Despite Canada's rich agricultural history, much of the food currently consumed in Ontario is grown in places like China, Mexico, Chile, and California. Over 70 per cent of food products sold in Canada have been imported and most of the food products that are produced within Canada contain imported ingredients.[15]

In order to be less reliant on imports, different models of food production and marketing are required. The new models that are emerging patch together a food system that increases food security and supports local farms. These strategies often include:

- Community gardens;
- Locally focused direct marketed farms;
- Business models that may include community supported agriculture (CSA);
- Farmer's markets; and
- Co-operative models of purchasing.

As climate change will undoubtedly alter existing food production and delivery systems, and as transportation costs increase, our food systems are poised for radical change. Even though municipalities have little influence on the agrifood industry, local government and employees can plan for and respond to uncertainty and change in their local context.

The Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA) has a resource centre to assist farmers in making their farms more profitable, which can be found here: www.omafra.gov.on.ca/english/busdev/gyfp/marketing.htm.

Case Study: Local Community Food Centre

Stratford is home to a pilot community food centre that invites people to come together to grow, share, prepare, access and advocate for good food. The mission is clear: To increase access to healthy food in a manner that maintains dignity, builds community, and challenges inequality. Stratford's Centre is based on the model of 'The Stop' – a community food centre in Toronto that aims to decrease food bank use through skill building cooking and gardening opportunities. For more information, refer to: thelocalcfc.org/ and www.thestop.org

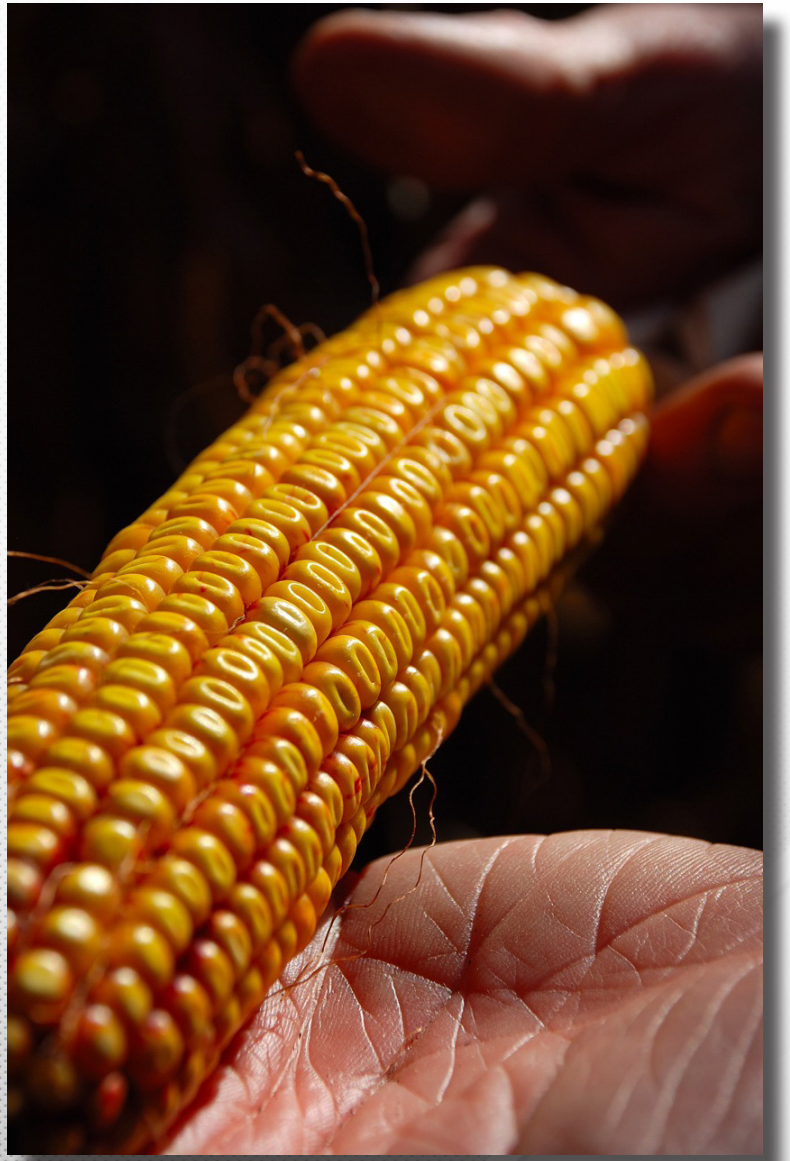
Questions

- Is there a local supply of accessible healthy food within your community in every season? Is there local food production and a local food distribution network? Where can food be stored in the off-season?
- How would your community cope if energy prices or crop failures significantly changed the price of food?
- Are some residents limited in their ability to access healthy food because of poverty,

mobility, or access to transportation? How can their food security be increased?

- At the municipal level, have you provided support to the local food sector through procurement policies, local food charters, or other related actions?

Actions to Consider



- Build the local food sector by finding creative ways to increase agricultural diversity, and support organizations that do this (see case studies in Agriculture section).
- Support farmers markets to bring producers and consumers together. This distributes fresh and local food, reduces transportation costs, and provides an opportunity for people to meet and discuss their food and community.
- Support community gardens and provide space for them on public lands in more urban centres. This will encourage food security by increasing local household food production.
- Create or support food related events like festivals that celebrate local crops. These are good for the economy and elevate the status of local foods. Hosting a food discussion may increase awareness and enhance communication.
- Provide community local food education and awareness building in collaboration with local health units, school boards, farm groups, and others.
- Many regions have created local food maps to increase support to local food initiatives. If your region does not have one, there are many examples to follow, like the Grey Bruce map and directory that can be found at: www.foodlinkgreybruce.com
- Develop a food charter identifying the connections between food and health, education, sustainable development, environment, culture, and social justice. More information on food charters can be found at: sustainontario.com/resources/food-charters
- Create local procurement policies and find ways for the municipality to support local food production – i.e. schools, senior's homes, and cafeterias.

Case Study: Canadian Organic Growers

Organic agriculture aims to diminish the adverse effects of agriculture on the natural environment. Organic agriculture uses industry-developed standards that are verified by third party organizations, and underwritten by government regulation. These standards come from seven principles:

1. Protect the environment, minimize soil degradation and erosion, decrease pollution, optimize biological productivity and promote a sound state of health.
2. Maintain long-term soil fertility by optimizing conditions for biological activity within the soil.
3. Maintain biological diversity within the system.
4. Recycle materials and resources to the greatest extent possible within the enterprise.
5. Provide attentive care that promotes the health and meets the behavioural needs of livestock.
6. Prepare organic products, emphasizing careful processing, and handling methods in order to maintain the organic integrity and vital qualities of the products at all stages of production
7. Rely on renewable resources in locally organized agricultural systems.

Canadian Organic Growers (COG) is a national organization with members as diverse as “farmers, gardeners, processors, retailers, educators, policy-makers, and consumers.” Organic operation is not necessary for COG membership, as members are united by a “vision for a sustainable bioregionally-based organic food system,” and a “belief that organic food production is the best choice for the health of consumers and producers, for the protection and enhancement of the environment, and for the sustainability of the food production system.” To learn more about COG, visit: www.cog.ca

Case Study: People's Food Policy

The People's Food Policy charts a national course towards "a food system that can provide adequate amounts of healthy, acceptable, and accessible food for all." It was created over two years by Food Secure Canada, with the input of more than 3,500 Canadians.

"The People's Food Policy is rooted in the concept of food sovereignty. This is an internationally recognized approach where food is viewed as a primary foundation for healthy lives, communities, economies, and eco-systems. Key elements include:

- Ensuring that food is eaten as close as possible to where it is produced (e.g. domestic/regional purchasing policies for institutions and large food retailers, community-supported agriculture, local farmers markets, etc.).
- Supporting food providers in a widespread shift to ecological production in both urban and rural settings (e.g. organic agriculture, community-managed fisheries, indigenous food systems, etc.), including policies for the entry of new farmers into agriculture.
- Enacting a strong federal poverty elimination and prevention program, with measurable targets and timelines, to ensure Canadians can better afford healthy food.
- Creating a nationally funded Children and Food strategy (including school meal programs, school gardens, and food literacy programs) to ensure that all children at all times have access to the food required for healthy lives.
- Ensuring that the public, especially the most marginalized, are actively involved in decisions that affect the food system."

In ten discussion papers, all of which are available online, the People's Food Policy provides recommendations and guidelines for action in these areas:

- Indigenous Food Sovereignty;
- Food Sovereignty in Rural and Remote Communities;
- Access to Food in Urban Communities;
- Agriculture, Infrastructure, and Livelihoods;
- Sustainable Fisheries and Livelihoods for Fishers;
- Environment and Agriculture;
- Science and Technology for Food and Agriculture;
- International Food Policy;
- Healthy and Safe Food for All;
- Food Democracy and Governance.

Refer to: foodsecurecanada.org/policy/resetting-table-peoples-food-policy-canada for more information.

Case Study: Guelph Wellington Food Charter

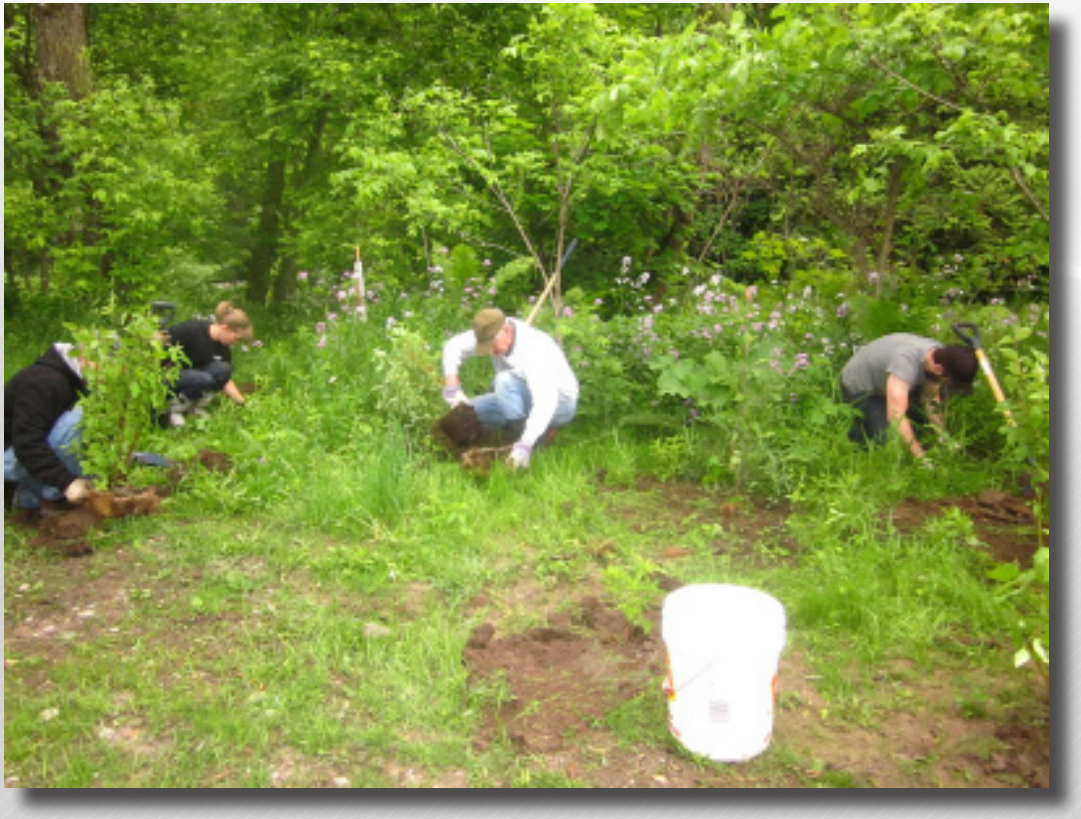
The Guelph Wellington Food Charter invites stakeholders to become signatories of a charter that supports the following principles:

- Health through recognizing the relationship of health to food, and neighbourhoods that have food within walking and biking distances;
- Education for food skills, farmer training, food curriculum and gardening in schools, and public education on food, health, and the environment;
- Sustainable Economic Development through local food prioritization in growing, processing, and consuming, promotion of the Guelph Wellington region, and innovation in the food system;
- Environment by preserving farmland, watersheds, and wildlife, and food production that is environmentally healthy;
- Culture through respect for food diversity, and strengthening links between rural and urban;
- Social Justice by ensuring food access for all and committing to a fair wage, safety, and respect for food producers, and helping new farmers access land.

These components are adapted from: www.guelphwellingtonlocalfood.ca/guelph-wellington-food-charter

Ecology and Water

Climate change has the potential to heavily influence ecosystems, and predictive models suggest that Ontario will be transformed. Predicted changes include the migration of southern vegetation and wildlife species northward, and the replacement or diminishment of some native species from Ontario. It is anticipated that there will be additional severe weather such as increased flooding, hot weather events, and drought. There are specific ways that municipalities can support ecosystems, including tree planting, conservation work, and ecological restoration projects.



Questions

- What ecological resources exist in your community? How can they be encouraged to thrive? Is there an ecological restoration or enhancement plan in place?

> The Ecological Restoration occurs when humans intervene in a landscape to renew or restore habitats or ecological zones that are damaged, degraded, or in danger of disappearing.

- Does your municipality have a plan for tree planting? How is tree planting supported?

> Tree planting helps to retain soil and to moderate the microclimate.

- Does your municipality have strategies or plans to protect source water? How do ecological restoration and tree planting relate to protecting water resources? How does agricultural run-off and irrigation influence the water systems in your region? Is the municipality able to protect water?

> Source water protection considers approaches to preventing lake, river, and aquifer water from contamination or overuse.

Actions to Consider

- Environmental partnerships can achieve common environmental and ecological goals. Who is working on conservation, restoration, water protection, tree planting, or environmental education in your region? How can the municipality support their work?

- Plant trees to moderate the climate, capture carbon, protect from flooding, decrease soil loss, act as windbreaks, and look beautiful. Encourage and subsidize agricultural hedgerows and windbreaks to increase agricultural yields, while providing corridors for wildlife.

- Encourage biodiversity in a variety of ecosystems by protecting existing natural areas, and engaging in ecological restoration. Increased biodiversity creates increased resilience of ecosystems. Know what species are invasive and support conservation and other organizations in their efforts to protect and enhance local ecosystems.

- Pay special attention to water including rivers, lakes, streams, and aquifers. Riparian zones - where land meets rivers or streams - can be planted specifically to increase water quality, keep cool water temperatures, protect aquatic habitat, and control floods.

Case Study: Green Legacy

In 2004 the County of Wellington was hosting its 150th anniversary and wanted to celebrate. The idea of planting 150 trees was brought up to council and was expanded to 150,000 trees, which required the creation of the Green Legacy. Through on-going county support, the Green Legacy maintains and expands its programs and has engaged thousands of students and other community members in an extremely successful tree nursery and tree-planting program. Every year, the Green Legacy plants over 150,000 trees. Well over a million trees have been planted to date.

The Green Legacy provides trees to residents of Wellington County for planting within County borders. It also grows and plants trees with the assistance of over 6,000 students per year from throughout the county and from Guelph, who learn about environmental stewardship.

The Green Legacy is almost entirely funded by the county. With a small staff and many dedicated volunteers involved in the Green Legacy, Wellington County is increasing its ability to adapt to climate change through protecting and improving farm yields. The foresight of the original council is paying off – the Green Legacy is having a lasting impact and is receiving attention from every level of government, as well as from the United Nations' international Billion Tree Campaign that recognized the Green Legacy's contribution to the environment. Within the Grand River Conservation Authority area (of which Wellington is a part), 85 per cent of trees planted are within the County of Wellington, where a culture of tree planting has been initiated and maintained.

For more information, please visit: wellington.ca/en/discover/greenlegacyprogramme.asp

Case Study: Trees for Mapleton

Trees for Mapleton increases awareness of the economic value of trees to farm income, through farmer education and tree planting programs. Located within Wellington County, Trees for Mapleton Township is dedicated to a vision of 20 – 25 per cent tree cover, where every farm field is wrapped with a windbreak, living snow fences protect all the roads, every stream is buffered by trees, and all the hardwood forests are linked up and wrapped with spruce windbreaks.

In 2011, beans sold for $13/bushel. The average yield in Mapleton is 40 bushels/acre. Trees for Mapleton's research shows that a windbreak protecting a field can increase yield by 20 per cent. This would mean 8 extra bushels/acre or approximately $100/acre advantage. When planted around homes or barns, windbreaks also increase energy efficiency by up to 25 per cent. This could mean substantial savings or added profit; an average farm can increase income by $25,000 – $30,000 annually. Trees for Mapleton provides free trees and free planting within Mapleton Township for these purposes.

The ties with the Green Legacy are notable. A full 40 per cent of the trees being planted through the Green Legacy go to Mapleton Township, which has planted close to 400,000 trees in the past 10 years, including 300 km of windbreaks. Trees for Mapleton is volunteer driven, with many partners including two conservation authorities, the municipality, and the county. However, for the past three years, Trees for Mapleton has had funding through the Ontario Trillium Foundation that has supported a farm forester to be available for the farming community. Through this support, Trees for Mapleton also delivers farmer education, runs workshops and bus tours, and brings speakers to Mapleton Township to increase the local knowledge and build support for tree planting.

For more information, please visit: wellington.ca/en/discover/treesformapleton.asp

Transportation

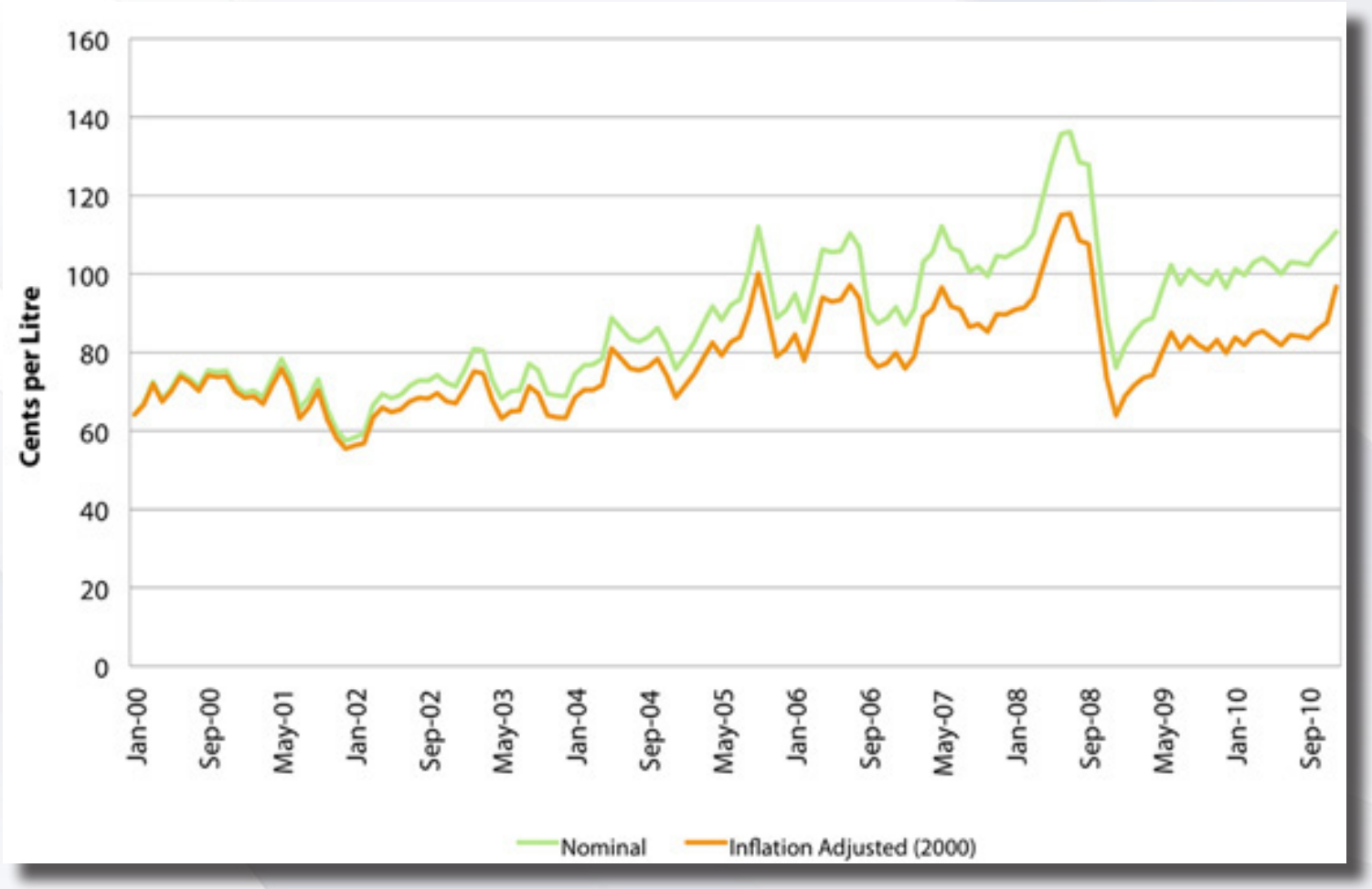
Increasing oil prices link directly to the price of fuel for personal and public transportation. For most rural Ontarians, having access to a personal vehicle or shared transportation is crucial for livelihoods, leisure, social life, and necessities like grocery shopping or obtaining healthcare.

Already there are rural residents who cannot use a personal vehicle for physical, financial, or pragmatic reasons. The increasing cost of fuel will only increase this number of rural residents without access to transportation.

Did you know?

The average price of regular unleaded gasoline in Ontario has more than doubled in the last 15 years, from 58 cents per litre in 1996 to more than 120 cents per litre in 2011. In the future, increases could occur at a similar or faster rate. [16]

Crude oil prices from 2000 to 2010
Reported by Canada's National Energy Board[17]



Actions to Consider

- Use land use planning tools and concepts to create compact, walkable, complete communities that allow for a reduction in transportation needs.
- Provide opportunities for active transportation through such measures as paving shoulders for cyclists or providing trails or sidewalks for walking.
- Consider opportunities to provide public transportation directly or in partnership with another organization or levels of government.
- Pursue appropriate public transportation delivery at the municipal level through discussions with the province as well as upper and lower tier municipalities.
- Continue the protection of rail right-of-ways in order to ensure that transportation options remain available.
- Transportation Demand Management (TDM) is a system that measures and aims to change how, when, and why people travel. Consider options for Transportation Demand Management mechanisms.

TDM can include such ideas as online service delivery, working from home, or other measures that reduce the need to travel. It can also include active transportation (walking or cycling), which provide a sustainable alternative to motorized travel. For more information refer to: www.tc.gc.ca/eng/programs/environment-utsp-tdmintro-1039.htm

• Electric cars – As fuels prices continue to rise, electric cars are increasingly being seen as a viable transportation option. The Ontario government has implemented initiatives to promote the use of electric vehicles including tax breaks and giving drivers access to the province's high occupancy vehicle (HOV) lanes, even with only one person in the vehicle.

The Ontario government has an ambitious electric vehicle vision to have one out of every 20 vehicles driven in Ontario be electrically powered by 2020.[17] To support this vision, Ontario has announced a number of measures to help individuals, businesses, and organizations choose clean and efficient vehicles, and to expand the battery electric vehicle (EV) market for manufacturers. For more information regarding this initiative refer to the Ministry of Transportation's website: www.mto.gov.on.ca/english/dandv/vehicle/electric/

Case Study: Bancroft Community Transit: Bancroft, Ontario

Bancroft Community Transit is a non-profit transportation service operated by volunteers in Bancroft, Ontario. Drivers are reimbursed for their mileage and riders or sponsoring agencies pay based on trip distance. The program is supported by the United Way, the Ontario Trillium Foundation, and the County of Hastings Social Services.

The service offers door-to-door transportation based on passenger bookings, which must be made at least 24 hours ahead of time. These appointments are made by an online form, by email, or by telephone.

This service is not general-use, as there are certain limitations on users and trip purpose. For instance, due to the existence of senior services, Bancroft Community Transit is not available to those over the age of 55. It is also available only to those who are registered as needing transportation assistance.

The Bancroft Community Transit service is only available for:

- legal appointments
- counselling appointments
- medical appointments
- day care
- work placements
- necessities of life

For more information, see: www.bancroftcommunitytransit.com/index.html

Case Study: Connect2Wiltshire: Wiltshire, United Kingdom

An established flexible transportation systems is the Connect2Wiltshire system operating in Wiltshire, United Kingdom. Connect2Wiltshire was initiated in 1998 by local government with the original name Wigglybus and operates a range of services across the dispersed rural areas of Wiltshire. The service has been succinctly described as "a conventional hourly circular route bus service with a booking service and defined drop-off provision. The bus operates along a pre-defined route but 'wiggles' off to pick up passengers that have booked. All pick-up and drop-offs must be within the defined operating area." [18]

The Connect2Wiltshire system is divided into zones, each with their own timetables, fares, and reservation requirements. For instance, the amount of time that a user must call ahead or go online to book a pick-up will vary by zone ranging from 20 minutes to 24 hours ahead of time.

According to the Department for Transport,[19] the aims of the service are to:

- provide an attractive transport alternative for those who already own a car;
- support social inclusion in rural areas for those without a car;
- prevent unsustainable and environmentally damaging patterns of travel in rural areas, especially faster than average traffic growth; and
- support local economic and social activity and regeneration in the countryside.

Taxi Voucher or Subsidized Taxi Service

There are two primary models for delivering public transportation through the use of private taxis.

- The taxi voucher option provides vouchers to groups deemed to be in need of transportation to exchange for taxi service.[4] An example of such a program can be found in the City of Olathe's Taxi Coupon Voucher Program in Kansas. This program offers vouchers to older adults, those with physical mobility limitations, and low-income individuals to be used for rides with private taxi companies. The program also divides trips into different trip purposes (employment, medical, groceries), each with varying costs, which riders must contribute ranging from $1.00 to $3.00 per voucher. The vouchers may then be claimed by the taxi companies for reimbursement by the city.

- An alternative to taxi vouchers is subsidizing the taxi service itself rather than the riders. Under this option, agencies seek tenders for private taxi companies to provide transportation services. The agency then provides some degree of funding to the private taxi service to reduce rates and/or provide services to areas they would not otherwise. An example of this model can be found in the Highland Council of Scotland where a range of private taxi operators exist with public subsidies to provide services within the context of a small and dispersed population.[20]

Conclusion

There is no doubt that communities worldwide will continue to stretch their ability to adapt to the changing world around us. Climate change and rising energy prices, along with economic uncertainty create an environment ripe for considerations of planning for and building resilience capabilities.

In the political system of Canada and Ontario, municipalities play a key role in working within their powers to consider the future, as well as plan and prepare for different scenarios. A realistic response from decision-makers, and a desire to work with constituents and community groups can make an enormous difference to each community's ability to react and respond to change.

Change is always on the horizon, and there is a role for each of us, in our professional and personal roles, to consider the future and to take the steps necessary to create the future we desire.

"The future is uncertain... but this uncertainty is at the very heart of human creativity."

Ilya Prigogine

Belgian-US (Russian-born) chemist & physicist (1917 -)

Resources

Background:

[1] Rudd, T. (2008). Peak Oil: Timing, Alternatives and Impacts. Paper submitted to University of Guelph.

[2] Natural Resources Canada (2008). From Impacts to Adaptation: Canada in a Changing Climate 2007 – Synthesis. Ottawa: Natural Resources Canada.

[3] Newman, P., Beatley ,T. & Boyer, H.(2009). Resilient Cities: Responding to Peak Oil and Climate Change. Washington Island Press.

[4] Magis, K. (2010). "Community Resilience: An Indicator of Social Sustainability". Society and Natural Resources, 23, 401-416.

[5] Rubin, J. (2009). Why your world is about to get a whole lot smaller. USA: Random House.

Awareness:

[6]Caldwell et al, (2011). A Survey of Community Understanding & Responsiveness To the Twin-Challenges of Climate Change and Rising Energy Prices (Peak Oil): Perspectives of Municipal Leaders in Ontario. Retrieved from: http://www.waynecaldwell.ca/Projects/regionalresiliency.html

Partnerships and Collaboration:

[7] Center for Restorative Justice & Peacemaking (2005). The Circle Process: A Path for Restorative Dialogue, viewable at: www.cehd.umn.edu/ssw/rjp/resources/rj_dialogue_resources/Peacemaking_Healing_Circles/The_Circle_Process.pdf

[8] United Nations Department of Economic and Social Affairs Population Division, (2011). Population Distribution, Urbanization, Internal Migration and Development: An International Perspective. United Nations Publication.

[9] Farmers Feed Cities Mission Statement, viewable at www.farmersfeedcities.com/ABOUTUS/WhatisFarmersFeedCities.aspx

Service Delivery:

[10] Health, Prosperity and Sustainability: The case for Green Infrastructure in Ontario, viewable at: http://goo.gl/ytzq5

Population and Employment:

[11] The Canadian CED Network: Strengthening Canada's Communities (2012). Retrieved from: ccednet-rdec.ca/en

Livelihoods and Lifestyles:

[12] The Transition Companion: Making your community more resilient in uncertain times (2011). Totnes, Devon, U.K. Green Books. ISBN: 978-1-60358-392-3.

Agriculture:

[13] Hopkins (2008), The Transition Handbook. Viewable at: http://www.cs.toronto.edu/~sme/CSC2600/transition-handbook.pdf

[14] David Holmgren (n.d.), Essence of Permaculture. Free e-book available at http://www.holmgren.com.au/

Food:

[15] Canadian Food Inspection Agency (2010). Imported food sector regulatory proposal questions & answers. Retrieved from: http://www.inspection.gc.ca/english/fssa/imp/lic/queste.shtml

Transportation:

[16] Statscan (2011). "Energy Statistics Handbook: Third Quarter 2010." Statistics Canada. Retrieved from: http://www.statcan.gc.ca/pub/57-601-x/57-601-x2010003-eng.pdf

[17] National Energy Board of Canada (2010). Viewable at: http://www.neb-one.gc.ca

[18] Enoch, M., Ison, S., Laws, R., & Zhang, L. (2006). Evaluation Study of Demand Responsive Transport Services in Wiltshire. Leicestershire, UK: Loughborough University.

[19] DfT (2010, June 02). Case Study: Wiltshire Wigglybus. Department for Transport Retrieved February 28, 2012, from http://www.dft.gov.uk/itstoolkit/CaseStudies/wiltshire-wigglybus.htm

[20] CTAA (2008, January). Resources on Transportation Voucher Programs. Community Transportation Association Joblinks Employment Transportation Initiative Retrieved February 28, 2012, from: http://web1.ctaa.org/webmodules/webarticles/articlefiles/Voucher_Resources_Aug_08.pdf