

Adapting To Low Water Levels in the Upper Credit River Watershed

Workshop Summary

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Preface

In the water sector, the persistence of human impacts and associated costs of climate events point clearly to the need to identify strategies for coping with climate variability and change, and to develop an enhanced capacity to respond effectively (Hofmann *et al.*, 1998). Rural communities – especially those in the rural-urban fringe – are challenged by the need to balance human uses (e.g., rural industry, recreation, municipal water supply) and ecosystem protection (e.g., maintenance of base flow to support fisheries, protection of wetlands that depend on shallow groundwater aquifers). Key stakeholders comprising rural communities in the rural-urban fringe include municipal water managers, rural residents and industries, farmers, golf course operators, anglers, and conservation groups. Not only are these people and groups experiencing increasing conflict and competition over water, particularly groundwater (Kreutzwiser and de Loë, 1998), but also they must cope with capacity-related challenges. Two issues are particularly important:

- First, not much is known about the impacts of climate-induced water shortages on rural communities in Canada and the ecosystems upon which they depend (Climate Change Action Fund, 1998; Hofmann *et al.*, 1998).
- Second, in Ontario, recent reductions in provincial support for water management and land use planning (Kreutzwiser, 1998) have had serious implications for rural communities. For many rural communities, the capacity to mount effective climate change adaptation strategies is in question.

Our *Climate Change Action Fund* research project # A258 assessed the capacity of rural communities in the upper Credit River watershed in southern Ontario to adapt to climate-induced water shortages. The research effort was organized around three objectives:

1. Identify the actual and potential impacts of climate-induced variability on hydrologic systems in the upper Credit River watershed.
2. Identify adaptation responses and determine and assess factors that facilitate and constrain the ability of rural communities to balance human uses of water and ecosystem protection under increasing climate variability.
3. Recommend strategies to enhance the capacity of rural communities to adapt to climate-induced variability in hydrologic systems.

Four documents were created to summarize the findings of the research:

- *Potential Effects of Climate Change-Induced Low Water Levels on Rural Communities in the Upper Credit River Watershed* addresses Objective 1,
- *Climate Change, Water Resources, and Rural Community Capacity to Adapt: Workshop Session on Adapting to Low Water Levels in the Upper Credit River Watershed* is a reference document prepared as background information for participants of a workshop held in Orangeville in April 2001 to address objectives 2 and 3,
- This document, *Adapting to Low Water Levels in the Upper Credit River Watershed – Workshop Summary*, summarizes the findings of the workshop, and

- *Strengthening Rural Community Capacity for Adaptation to Low Water Levels* summarizes the findings of objectives 2 and 3, including a case study on subwatersheds 16/18 and 19 of the Credit River watershed.

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1.0 Introduction

Anticipated climate change may result in more frequent and severe low water conditions in Ontario. By identifying adaptation opportunities and constraints in advance of future droughts, rural communities can reduce water-related conflict and improve local water management decision-making. On Friday April 20, 2001, the Rural Water Management Group, Department of Geography, University of Guelph, hosted a workshop at the Hockley Valley Resort in Orangeville, Ontario, the purpose of which was to bring together key stakeholders in the upper Credit River watershed to:

- Document existing attempts to adapt to low water levels in the watershed,
- Evaluate the applicability and practicality of selected climate adaptation measures for use by rural communities and their partners, and
- Identify opportunities to collaboratively enhance the capacity of rural communities and their partners to balance water supply and ecosystem protection.

Effective responses to low water levels and drought will depend, in part, on the ability of community stakeholders to communicate and collaborate in the management of local water resources to the mutual benefit of all water users, at a time when water conflicts will be most prominent. The workshop provided stakeholders with an opportunity to lay the groundwork for improved decision-making during the next water shortage. Nineteen people attended the workshop, representing provincial ministries, local municipalities, Credit Valley Conservation, and a variety of local public interest groups and economic sectors. A full participant list is included in Appendix A.

Key questions

The following are a number of key questions and issues that were addressed during the workshop:

1. What drought management measures are in use in the upper Credit River area, and why have those particular measures been chosen?
2. How well have the chosen measures helped to reduce water conflicts between human water uses, and between human and environmental water uses?
3. What other drought management measures are appropriate for use in the upper Credit River area?
4. What is needed for the community to make a particular drought management measure successful?
5. What are appropriate roles, responsibilities, and contributions for each stakeholder group during drought conditions?
6. What is needed for the community to make local drought management successful?

Workshop format

In advance of the workshop, prospective participants received a workshop package including the reference document *Climate Change, Water Resources, and Rural Community Capacity to Adapt: Workshop Session on Adapting to Low Water Levels in the Upper Credit River Watershed*, and a copy of the provincial drought response plan *Ontario Water Response 2000*. The purpose of the workshop package was to provide participants with background information on:

- the format and objectives of the workshop,
- the potential impacts of climate change-induced drought on upper Credit River communities,
- tools for adapting to low water levels,
- the roles and responsibilities of local and provincial agencies for water quantity management,
- the drought management activities of local agencies in the upper Credit River watershed (Figure 1), and
- a scenario for local drought response (i.e., the Ontario Water Response 2000).

The workshop commenced with presentations by the Ontario Ministry of the Environment, on the provincial Permit to Take Water Program, by Credit Valley Conservation and the Town of Orangeville, on their drought management activities, and by a member of the Rural Water Management Group, on the drought management activities of the Region of Peel, which was unable to send a presenter to the workshop. After the presentations, participants were divided into 3 breakout discussion groups, ensuring that each group had representation from as many different stakeholder groups as possible. Each group was facilitated by a representative from the Rural Water Management Group. In the morning, the groups addressed key questions 1-4. In the afternoon, after a presentation by the Ontario Ministry of Natural Resources on the Ontario Water Response plan, the groups addressed key questions 5 and 6.

2.0 Workshop findings

Key question #1

What drought management measures are in use in the upper Credit River area, and why have those particular measures been chosen?

The workshop reference document outlined the general activities of senior government agencies and local agencies in water quantity management, as well as the specific drought management activities of the Town of Orangeville, the Region of Peel, and Credit Valley Conservation. During the morning breakout group discussion, workshop participants were presented with a list similar to Table 1, and were asked to identify additional low water level management activities ongoing in the Credit River watershed.

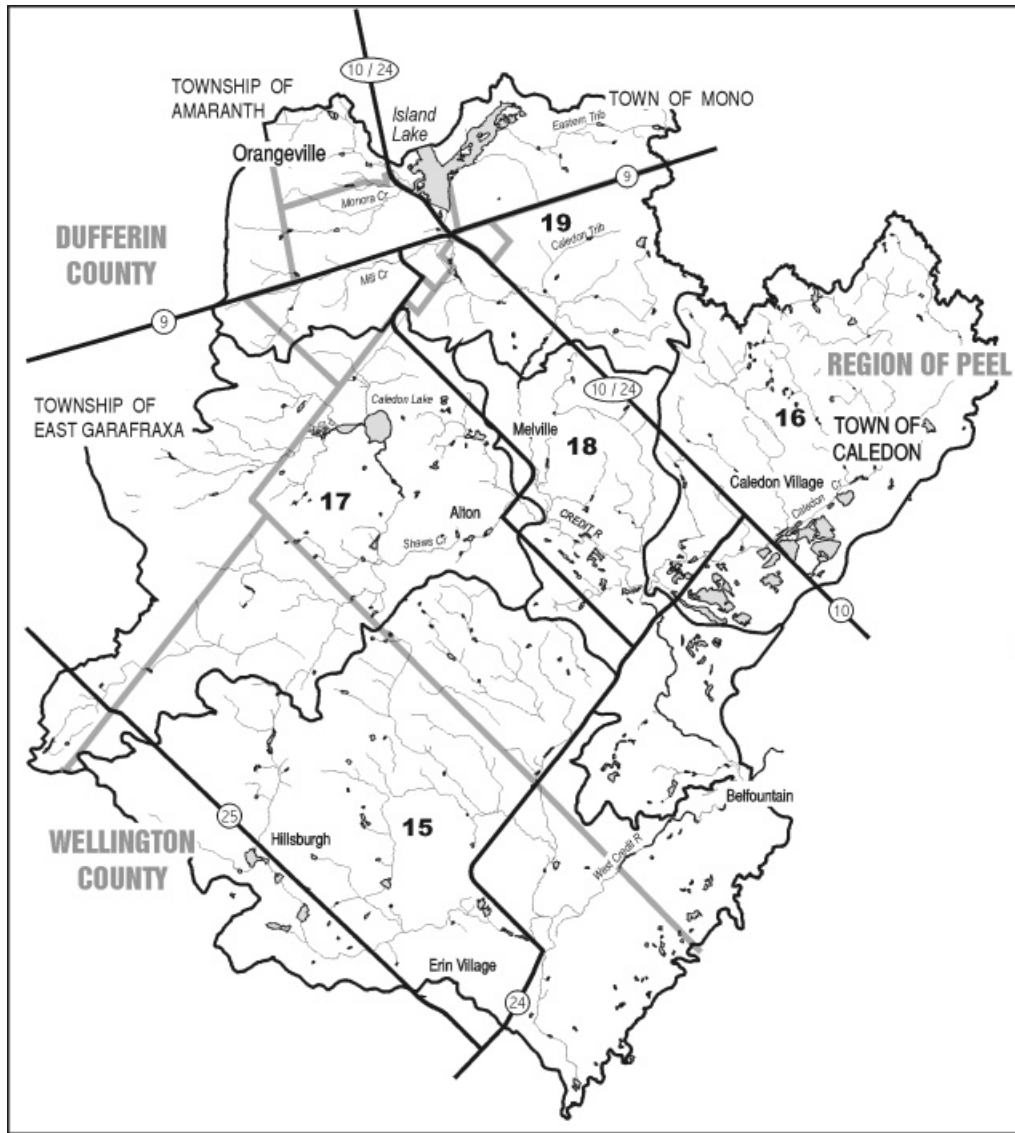


Figure 1: The upper Credit River watershed

Table 1: Low water level management activities in the upper Credit River watershed

Planning	<ul style="list-style-type: none"> • Long term planning incorporating possibility of climate change: water budget (CVC with support from municipalities) • Watershed planning and management (CVC with support from municipalities) • Managing growth and development: official plan policies and development controls (municipalities), plan review (CVC) • Drought contingency planning: Ontario Water Response 2000 (province)
Demand management	<ul style="list-style-type: none"> • Water conservation: voluntary calls for conservation, lawn and garden watering bylaws, appliance retrofitting and water conservation kits (municipalities) • Water use metering (municipalities) • Pricing structures: pricing by volume (municipalities) • Conflict resolution (OMOE)
Supply management	<ul style="list-style-type: none"> • Changing operations: modify reservoir releases (CVC), ban water hauling from groundwater supplies (Region of Peel), modify well pumping rates (Town of Orangeville) • Interbasin transfers: interconnecting water supplies in different basins (Region of Peel) • Managing water allocation: Permit to Take Water Program (OMOE) • Infrastructure and water sources: class EA to develop new sources (Town of Orangeville), drilling new wells (Region of Peel) • Leak detection/repair: water efficiency studies (municipalities) • Pollution control programs: wellhead protection programs (municipalities)
Data management	<ul style="list-style-type: none"> • Data collection: monitoring water quality and quantity (CVC, municipalities, OMOE), monitoring water use (municipalities, OMOE, major water users) • Research: provincial water protection fund studies, other studies (municipalities, CVC)
Public involvement	<ul style="list-style-type: none"> • Dissemination of information on water use and conservation (municipalities, CVC) • Public involvement (municipalities, CVC)

Workshop participants identified a number of activities, not already found in Table 1, ongoing in the upper Credit River watershed. Suggestions from the groups centered on the activities of public interest groups and private industry, including:

- Planning: the development of Environmental Farm Plans in the agricultural community, and stewardship plans for natural resources (e.g., wetlands, fisheries).
- Supply management: the use of new technologies, such as industrial water recycling and irrigation technologies (e.g., golf courses), improved water quality treatment at Orangeville Sewage Treatment Plant, new instrumentation at Orangeville Reservoir, habitat restoration by local interest groups (e.g., riparian plantings), and supplementing natural flows.

The group discussions highlighted the importance of the roles of local interest groups (e.g., Trout Unlimited, Izaak Walton Fly Fishers' Club) and private individuals in water quantity management.

Key question #2

How well have the chosen measures helped to reduce water conflicts between human water uses, and between human and environmental water uses?

In order to address the perceived effectiveness of drought management activities at reducing conflict, workshop participants were asked to “vote” for activities they felt were most effective at reducing conflict. Each participant was given six “votes”, three to address human vs. human conflict, and three to address human vs. environment conflict. Participants were asked to vote for the measure(s) that were most effective at reducing conflict, and were allowed to split their votes among 3 different activities, or to vote for a particular activity more than once. Groups voted on the lists of activities developed within their own breakout group, including the initial list provided to each group (Table 1), and the group's modifications from key question #1.

Overall, workshop participants favoured planning activities for reducing both human vs. human conflict, and human vs. environment conflict (Table 2). Particularly popular were watershed and subwatershed planning, municipal official plans and policies, and stewardship planning. Demand management, supply management, and public involvement activities were ranked almost equally for reducing human/human conflict. After planning, supply management and data management activities were perceived to be the most successful at reducing human/environment conflict. Activities receiving the most support included habitat restoration, monitoring, data sharing, and enhanced public involvement in studies and decision making.

Table 2: Perceived effectiveness of drought management activities at reducing water-related conflict

Drought management activity	Human vs. human conflict	Human vs. environment conflict
Planning	18	21
Demand management	9	1
Supply management	8	12
Data management	6	13
Public involvement	10	5

Key question #3

What other drought management measures are appropriate for use in the upper Credit River area?

During collection of information for key question #1, workshop participants were asked to record on a worksheet additional drought management measures, that they were not aware of in practice in the watershed, that may be appropriate for use in the upper Credit River watershed. A wide variety of suggestions were made, including:

- Planning: promoting xeriscaping, enhancing coordination among stakeholders, stricter development controls, drought contingency planning
- Demand management: banning water hauling, stricter water conservation bylaws for residential and agricultural water users, bylaws restricting pesticide spraying, promoting new technologies, appliance replacement programs
- Supply management: encouraging use of cisterns and seasonal storage, enhancing groundwater recharge, more habitat enhancement
- Data management: enhancing sharing of information
- Public involvement: enhancing public awareness regarding water conservation, promoting awareness of the provincial PTTW program among the agricultural community

Two of the most often mentioned measures were enhancing public awareness of water conservation, and limiting development. A number of participants also identified projects underway in other jurisdictions. For example, in the Big Creek watershed, watershed management studies are being coordinated with a drought management plan developed by a conservation authority, and a pilot local water response team (based on the provincial Ontario Water Response plan).

Key question #4

What is needed for the community to make a particular drought management measure successful?

Each breakout group was asked to identify opportunities and constraints on the adoption of a drought management activity highly ranked by the group for reducing conflict. The three selected activities were watershed planning, development controls, and water use metering/pricing by volume. Capacity-related needs unique to each activity are shown in Tables 3-5. Common capacity-related needs that all groups identified were the need to clarify the roles and responsibilities of all key players in water management, to raise public awareness regarding water supply issues, to have public input in decision-making, and to have adequate human, financial, and information resources to support implementation. Concerns were raised regarding the need to identify and eliminate conflicting policies and programs.

Table 3: Capacity-related needs for watershed planning

Category	Capacity-related need
Roles, responsibilities, and authorities	<ul style="list-style-type: none">• Need to clarify roles and responsibilities• Watershed planning should be a precondition for development• Need authority to enforce implementation of recommendations
Commitment and support	<ul style="list-style-type: none">• Need political leadership for implementation• Need support from all levels for watershed planning
Perceptions and awareness	<ul style="list-style-type: none">• Need to build awareness of watershed planning process to increase compliance with recommendations• Need to clarify regulatory process for permitted users• Need to clarify choices and alternatives
Public involvement	<ul style="list-style-type: none">• Need public input to define values underlying decision making
Financial, human, and information resources	<ul style="list-style-type: none">• Need to identify and gather required data, and future impacts of drought• Need to identify technological limitations• May need funds for landowner compensation re: retroactive implementation measures

Table 4: Capacity-related needs for development controls

Category	Capacity-related need
Roles, responsibilities, and authorities	<ul style="list-style-type: none"> • Need to clarify roles and responsibilities of all agencies working in water management • Need provincial framework for development controls that allows for local input • Need to ensure that official plan policies are complementary, not conflicting
Perceptions and awareness	<ul style="list-style-type: none"> • Need to raise public awareness regarding water resource issues, and the impacts of development on water resources, in order to raise support for development controls
Communication and coordination	<ul style="list-style-type: none"> • Need to enhance coordination among water managers
Public involvement	<ul style="list-style-type: none"> • Need public input in selection of development control measures, identification of societal needs and values
Financial, human, and information resources	<ul style="list-style-type: none"> • Need to identify actual impacts of development on water resources • Need to share resources among municipalities and other planning agencies (e.g., CAs) • Need trained, resourced municipal staff • Need background research and data to support selection of development control measures • May need funding for landowner compensation

Table 5: Capacity-related needs for water use metering and pricing by volume

Category	Capacity-related need
Roles, responsibilities, and authorities	<ul style="list-style-type: none"> • Roles and responsibilities should reflect that metering/pricing is only one component of an integrated water management plan • Need to have authority to influence both rural and urban water users, and both small water users, and large water users (i.e., those with PTTWs) • Need provincial framework identifying preconditions (e.g., metering) for financial assistance
Commitment and support	<ul style="list-style-type: none"> • Need political support of municipal councils
Perceptions and awareness	<ul style="list-style-type: none"> • Need to enhance public awareness (and industry and land owner awareness) regarding the full cost of providing adequate supplies of clean water, to develop public support for metering and paying by volume
Communication and coordination	<ul style="list-style-type: none"> • Need to make water resource data accessible to all stakeholders
Public involvement	<ul style="list-style-type: none"> • Need a mechanism for public feedback, and a mechanism for reporting to the public (transparency) • Need conflict resolution mechanism to address concerns of large water users
Financial, human, and information resources	<ul style="list-style-type: none"> • Need to institute full cost pricing, so that revenues can be used to support other water management activities • Need funding to overcome initial cost of installing meters • Need to gather data to demonstrate success of program

Key question #5

What are appropriate roles, responsibilities, and contributions for each stakeholder group during drought conditions?

The breakout groups were directed to try and build a consensus regarding the activities of various stakeholder groups during drought conditions. The stakeholder groups considered were provincial agencies (i.e., OMOE, OMNR, OMAFRA, other), conservation authority, municipalities, local public interest groups, local industry and professional associations, and individual watershed residents. Groups were asked to allocate a number of generic water management functions among the stakeholder groups:

- Data collection: e.g., definition of water resources, identification of contaminant sources, characterization of watershed resources
- Monitoring: e.g., hydrometric stations, reporting on water use

- Planning: e.g., creation of Official Plans, subwatershed plans, drought contingency planning
- Regulation: e.g., deciding what the rules are (e.g., for water allocation)
- Enforcement: e.g., inspections, prosecution
- Public information: e.g., awareness programs, groundwater days
- Other activities

As an example of the sort of vision for drought management the groups' developed, Table 6 summarizes the consensus developed by one group. Two strong themes that emerged from the groups' discussions were that contributions to each function should be made by many stakeholder groups, and that the appropriate roles for a given stakeholder group (e.g., conservation authority) should vary according to local conditions and resources. For instance, all stakeholder groups could be involved in monitoring, with each group responsible for collecting data at a different scale. The group that developed Table 6 also felt that all agencies should be involved in the development and distribution of public information and promotion of coordination. Each stakeholder group should be responsible for interactions with their own "client group". For instance, OMAFRA should be responsible for providing information to the agricultural community, while the Aggregate Producers Association of Ontario should assist aggregate producers.

Key question #6

What is needed for the community to make local drought management successful?

The workshop participants, as an entire group, were asked to identify the capacity-related needs of a particular agency, municipalities, to fulfill their role in local drought management. Key comments included:

- Clearer identification of municipal roles and responsibilities for water management, and those of other agencies, would allow for more effective use of resources and delivery of services.
- Municipalities in different areas may have different roles due to variable resources and abilities.
- Need to enhance coordination and cooperation with other agencies involved in water management. As many agencies as possible should have input at the planning stage, while responsibilities at the implementation stage could be more specific.
- Financial resources will be key, especially in rural areas not as affluent as the upper Credit River watershed.
- In order to "do more with less", sharing of information and staff resources among local agencies should be encouraged.

Table 6: Stakeholder group contributions to local drought management

Agency	Data collection	Monitoring	Planning	Regulation	Enforcement	Public information	Communication & coordination
Provincial agencies <ul style="list-style-type: none"> • OMOE • OMNR • OMAFRA • Other 	Provide raw data and technical support.	Provide support: establish data collection protocols and standards.	Support role: underlying research and development of science & technology.	Provide framework for consistency. Provide leadership and coordination.	Provide authority and tools to local agencies through legislation.	Development and dissemination of information.	Involved
Conservation authority	Lead agency	Monitoring of natural systems.	Lead agency for planning for natural systems.	Provide support and information to municipalities.		Development and dissemination of information.	Involved
Municipalities	Provide raw data and information on local values.	Monitoring of human systems.	Lead agency for planning for built environment.	Lead agency for local regulation.	Lead agency for local enforcement.	Development and dissemination of information.	Involved
Local public interest groups	Provide local knowledge.	Provide local knowledge.	Participation			Development and dissemination of information.	Involved
Local industry and professional associations <ul style="list-style-type: none"> • Agriculture • Aggregates • Golf courses • Etc. 	Provide local knowledge	Self-monitoring of activities and impacts.	Participation			Development and dissemination of information.	Involved
Individual residents		Provide local knowledge, voluntary monitoring programs.	Participation		Whistle-blowers		

Appendix A

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