Climate Change, Water Resources, and Rural Community Capacity to Adapt

Hockley Valley Resort, Orangeville, Ontario
Friday April 20, 2001

Workshop Session on

ADAPTING TO LOW WATER LEVELS IN THE UPPER CREDIT RIVER WATERSHED

Session Organized by the
Rural Water Management Group
Department of Geography, University of Guelph, Guelph, Ontario

Session Sponsored by the
Climate Change Action Fund, Natural Resources Canada

Session agenda

Friday April 20, 2001

8:15 -	8:30	Arrival
8:30 -	9:30	Presentations: overview of water management activities in the watershed: MOE, CVC, Town of Orangeville, Region of Peel
9:30 -	10:30	Breakout group discussion
10:30 -	10:45	Refreshment break
10:45 -	12:00	Breakout group discussion
12:00 -	1:00	Lunch
1:00 -	1:30	Presentation: Ontario Water Response
1:30 -	2:30	Breakout group discussion
2:30 -	2:45	Refreshment break
2:45 -	3:45	Breakout group discussion
3:45 -	4:00	Wrap-up

Workshop package

The workshop package contains all the information you'll need to prepare yourself for the workshop. The package consists of a copy of the Province of Ontario's draft drought response plan, *Ontario Water Response 2000*, and this reference document. This document includes sections on the following:

- **Information about the workshop**: session agenda, introduction, problem statement, workshop objectives, and key questions to be addressed during the workshop
- **The prospect of climate change**: impacts of drought on human and ecological water uses
- **Adapting to low water levels**: what is adaptation, how to adapt to low water levels, capacity to adapt?
- **Low water management in Ontario**: who does what?
- **Low water management in the Upper Credit River watershed**: who does what?, subwatershed 19 case study
- **Ontario Water Response 2000**: provincial low water level response plan

1.0 Introduction

The surface and ground waters of the upper Credit River watershed are a resource shared by many different economic sectors, from domestic water use and recreation, to agriculture and industry. Reliable access to clean water is a necessity for individuals and businesses in the watershed. However, as well as fulfilling human needs, water is necessary for many of the valued natural systems in the area. The streams, rivers, and groundwater of the watershed support cold-water fisheries and wetlands, along with upland habitats. A key challenge for future management of the watershed will be striking a balance between utilization of water resources for human purposes, and protection of natural systems. This challenge is magnified by existing and expected climate variability and change.

Low water levels in 1998/1999 brought concerns about insufficient water supply to the attention of residents of southern Ontario. In 1998, the Credit River watershed experienced the lowest total annual precipitation recorded in 38 years. Anticipated climate change is likely to cause changes in the temperature and hydrologic regimes of southern Ontario. In addition to changes in average climatic conditions (e.g., temperature, precipitation), increased climatic variability could lead to more frequent and severe extreme events (e.g., droughts, heat waves, and floods). A proactive approach to adapting to low water levels can alleviate future problems resulting from a combination of high demand for water and variable water supplies.

Local drought management

For the purposes of this workshop, *droughts* are "periods of time when natural or managed water systems do not provide enough water to meet established human and environmental uses because of natural shortfalls in precipitation or streamflow"[1]. *Low water levels* occur when drought conditions are approached.

Last year the Province of Ontario released a draft document entitled *Ontario Water Response 2000*[2]. The purpose of the document was to outline a response plan for drought management in Ontario. The plan relies heavily on the establishment of local Water Response Teams, composed of representatives from conservation authorities, watershed municipalities, agriculture, rural private industry and business, recreation, public interest groups, First Nations, and provincial ministries. The tasks of the Water Response Teams are to

- Identify local water supply needs and concerns
- Identify severity of low water crisis
- Implement water conservation, preservation and allocation strategies
- Evaluate effectiveness of local actions
- Provide advice to local and provincial decision-makers[2].

While the plan's emphasis on local decision-making is appropriate, this presumes that all watershed communities, including rural communities, have the capability to undertake the above-mentioned tasks, and that representatives from all sectors are able to

communicate about, select, and implement water conservation tools and approaches. This may or may not be an appropriate assumption, depending on circumstances in the watershed.

Problem statement

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.

Workshop objectives

The purpose of this workshop is 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. This workshop will provide stakeholders with an opportunity to lay the groundwork for improved decision-making during the next water shortage.

Key questions

The following are a number of key questions and issues to be addressed during the workshop:

1. Why have particular drought management activities been chosen in the communities of the upper Credit River watershed?
2. How well have the chosen options reduced water conflicts among human water users, and between human and ecological water uses?
3. What other options are appropriate for adapting to low water levels in these areas?
4. What is needed for the community to adopt new adaptation activities (i.e., how do we improve capacity to adapt)?
5. What can each stakeholder group in the community contribute to the activities of the local Water Response Teams?
6. What are appropriate roles and responsibilities for local Water Response Teams?
7. How can cooperation and communication among local stakeholders be improved?
8. What resources are needed for local Water Response Teams to function smoothly?

2.0 The prospect of climate change

In both the scientific and the policy communities there is now general agreement that the climate is changing, and that these changes will represent both challenges and opportunities. Computer models have been used to create scenarios of possible future climatic conditions. While different models produce different results, and the same model may produce a variety of different future scenarios, current work suggests changes in the temperature and hydrologic regimes of southern Ontario as a result of increasing atmospheric carbon dioxide. For example, a recent study suggests that climate change could result in higher temperatures and evapotranspiration, and lower precipitation, runoff, net basin supply, and soil moisture in the Great Lakes-St. Lawrence Basin[3].

Changes in rain and snow patterns, higher temperatures and evaporation, and less runoff could result in more frequent or severe droughts in the Credit River watershed. At present, dry periods lasting a minimum of 7 days occur at least once a month during the growing season in Ontario, while droughts lasting over 4 weeks occur once every 3 years[4]. In recent decades, droughts have occurred in Ontario in 1973, 1978, 1983, 1988, and 1989[5]. In 1997 and 1998, annual rainfall in the Credit River watershed approached 30 year lows[6]. An increase in the number and severity of droughts due to climate change will have implications for the nature and management of human and ecological systems in the upper Credit (Table 1). For instance, low water levels could result in poor water quality and reduced water supplies for rural and urban domestic use, as well as commercial, industrial, and agricultural water uses. Drought may also impact the environment by changing the distribution of habitat and wildlife populations, and encouraging the invasion of exotic species.

If water supplies become more variable, water use conflicts, both between competing human uses, and between human and ecological uses, could become more common and contentious. Conflict among water users will hinder the ability of watershed stakeholders to respond effectively to drought. In order to avoid future water use conflicts, as a result of existing or future climatic conditions, communities in the Upper Credit watershed can reduce their vulnerability to drought by proactively strengthening their ability to adapt to low water conditions.

Table 1: Selected impacts of drought on human and ecological water uses

Use Sector	Uses of Water	Impacts of Drought
Municipal	• Drinking water • Waste disposal and dilution • Industrial, commercial, institutional water supply • Recreation • Fire fighting • Watering lawns and gardens	• Higher demand for water coupled with reduced supply from surface and ground water sources • Higher pumping rates may result in interference with other wells • Increased costs due to need to develop new wells • Lack of pumping and/or storage capacity to meet demand for water • Increased wastewater treatment costs as water quality decreases • Increased conflict with other water uses
Rural domestic	• Drinking water • Washing and cleaning • Watering gardens	• Insufficient water supply • Increased costs to deepen shallow wells • Increased conflict with other water uses
Agriculture	• Irrigation • Washing and cleaning • Livestock watering, cooling • Waste disposal • Spraying of chemicals	• Increased demand for irrigation, livestock watering, and cooling, coupled with reduced supplies • Lower production, higher animal stress • Increased soil erosion • Increased conflict with other water uses
Industrial & commercial	• Cooling, processing • Waste disposal, cleaning • Water bottling • Fish hatcheries • Aggregate processing	• Reduced supplies • Increased demand for water (e.g., fish hatcheries) • Loss of profits • Increased conflict with other water uses
Recreation and tourism	• Beach/swimming • Canoeing and boating • Fishing and hunting • Hiking, nature watching • Golfing • Skiing, snow-mobiling • Aesthetic	• Poor water quality from higher temperatures and less dilution may restrict activities • Lower water levels impede navigation of rivers and streams • Temporary changes in distribution of habitat and fish and wildlife populations • Loss of profits for related industries (e.g., ski hills, outfitters, etc.) • Increased demand for water (e.g., golf course irrigation) • Increased conflict with other water uses
Ecological	• Terrestrial ecosystems • Wetlands • Aquatic ecosystems • Fisheries • Wildlife	• Invasion of exotic species (e.g., purple loosestrife) • Temporary changes in distribution of habitat and fish and wildlife populations • Increased competition and conflict with human water uses (e.g., development of wetlands in dry years) • Warming of surface waters affecting thermal habitat (e.g., cold-water to warm-water), reduced spawning success • Impeded migration of fish and wildlife • Poor water quality resulting from higher temperatures, less dilution • Permanent streams becoming intermittent, lower water levels result in loss of habitat

3.0 What is adaptation?

Increasingly, water managers and users are asking the question "how will we adapt to drier conditions"? To adapt to low water conditions is to make changes that will maintain or improve the ability of a system (e.g., municipal water supply, agriculture) to continue to serve its functions (e.g., domestic water supply, production of food)[7]. Historically, water users have adapted to climate. The tools of adaptation, presented in the following section, are by-and-large conventional practices already in use in water management. However, despite having adapted somewhat to existing climatic variability, droughts still cause damage and costs are incurred among virtually every sector that uses water. For instance, the 1988 drought in Ontario resulted in crop insurance payouts of $55.7 million, $12 million in relief for cattle farmers, municipal water use restrictions on nonessential uses (e.g., lawn watering), the second worst forest fire season since 1917, an increase in dredging, and reduced hydroelectricity generation[4,8].

By becoming better adapted to current climatic variability, communities can reduce their vulnerability to climate change-induced drought, and to water shortages brought on by development and population growth, and lessen the potential for water-related conflict.

Adapting to low water levels

There are a number of different tools available for adapting water management to more frequent or severe dry periods (Box 1). Adaptation measures can be institutional (e.g., by-laws), technological, structural (e.g., reservoirs), or behavioral in nature; they can be adopted by private and public agencies, at local, regional, provincial, national, or international levels. The appropriateness of a given tool varies with the specific situation and locality[9].

Successful adaptation activities have some common characteristics:

- *Anticipatory*: the action is undertaken in anticipation of future droughts, not in reaction to existing low water levels,
- *Flexible*: the action will maintain or improve the functioning of a system under many different water level conditions,
- "*No regrets*": undertaking an action is justified under existing hydrological conditions, as well as anticipated future conditions,
- *Implementable*: the legal, institutional, technical, human, financial, social, and political resources and support exist to implement the action,
- *Responsive* to many of a community's social, economic, and environmental goals and objectives.

Box 1: Selected activities for adapting to climate change-induced water shortages[10,11,12,13]

Planning

- Long term planning (e.g., for land use, water supply, infrastructure) incorporating the possibility of climate change
- Watershed planning and management
- Assess vulnerability to climate change
- Inventory adaptation options

Demand management

- Voluntary/mandatory water conservation
- Water use metering
- Pricing structures
- Water conservation standards (e.g., for appliances)

Supply management

- Drought contingency planning, disaster relief
- Changing operations protocols to increase efficiency (e.g., reservoir releases)
- Interbasin transfers
- Managing water allocation
- Development of new or modification of existing infrastructure and water sources
- Conflict resolution
- Artificial recharge of groundwater
- Conjunctive groundwater-surface water use
- Leak detection/repair
- Pollution control programs

Data management

- Existing and new data collection (e.g., water levels, supplies, use)
- Forecasting future demand and supply
- Research

Public information

- Development of literature and training/education initiatives for the general public and other water users (e.g., industry, agriculture, etc.)

4.0 Can we adapt?

Once a community has decided upon appropriate measures to take to adapt to low water conditions, the measures must be implemented. There are many factors affecting the ability of a community to carry out adaptation activities (Box 2). Some factors pertain to the ability of specific organizations within the community to develop and deliver programs and services, and to make effective use of their resources (in general, and with respect to water and disaster management). Other factors relate to the activities and perceptions of a variety of community stakeholders, including public interest groups and private industry.

Whereas some confidence may be warranted in the case of large urban communities, the ability of small rural communities in Ontario to manage their water resources effectively is not certain.

Box 2: Factors affecting the capacity of communities to adapt to climate change-induced low water levels

How do institutional arrangements affect capacity?

- The roles and responsibilities of federal, provincial, and local agencies (i.e., municipalities, conservation authorities, non-governmental organizations) must be clear, consistent, and comprehensive
- Appropriate adaptation activities (see Box 1) must be available to decision-making and implementing agencies according to their roles and responsibilities
- Rural communities need commitment and support (e.g., financial, political, technical) from federal and provincial agencies to implement adaptation activities

How does the nature of the watershed community affect capacity?

- Stakeholder perceptions and awareness regarding climate change, impacts on human and ecological systems, and the legitimacy of institutions, all affect a community's capacity to adapt
- Communication and coordination (e.g., sharing information, coordinating activities, providing leadership) among all economic sectors and agencies is necessary
- Public involvement in water management decision making and implementation of activities will help to ensure compliance with adaptation activities

How do a community's resources affect capacity?

- Sufficient and secure financial resources are needed to decide upon and implement adaptation activities
- Communities need enough staff with the appropriate training and technical expertise to implement activities
- Selection and implementation of adaptation tools requires information (e.g., about water resources and impacts) and technical resources that are accessible and of appropriate quality

5.0 Low water management in Ontario: who does what?

Ontario's rural communities manage water within a complex set of institutional arrangements. A variety of senior government bodies (Box 3), local agencies (Box 4), and public interest groups (Box 5) play roles in the management of water quantity.

Box 3: Senior government agencies' roles in water quantity management

Ontario Ministry of the Environment

- *Ontario Water Resources Act*: legislative authority for the Permit to Take Water Program (PTTW program) (permits for withdrawals > 50,000 L/day), well construction permits, water conflict resolution
- Water monitoring and mapping: past mapping and monitoring activities, new Provincial Groundwater Monitoring Program in partnership with conservation authorities
- Provincial Water Protection Fund (1998-2001): provides funding for municipal water and sewage infrastructure, and environmental studies (e.g., groundwater management plans)

Ontario Ministry of Natural Resources

- *Lakes and Rivers Improvement Act*: legislative authority to grant approvals for, and regulate construction and operation, of water works
- *Public Lands Act*: authorizes construction and operation of dams, power generation projects
- Management of fish populations (*Strategic Plan for Ontario Fisheries*)
- Land Information Ontario: initiative to integrate land information in Ontario (including data on soils, municipal drains, tile drains, water well records, groundwater monitoring, climate) spearheaded by OMNR

Ontario Ministry of Agriculture, Food and Rural Affairs

- Ontario Whole Farm Relief Program: provides financial assistance for farmers who have suffered financial losses due to declining prices, yield losses (e.g., from drought), or increased expenses
- Healthy Futures for Ontario Agriculture: pilot project in Norfolk County to encourage pond creation for water storage

Department of Fisheries and Oceans Canada

- *Fisheries Act*: provides for the protection of fish habitat, implementation agreements with conservation authorities
- Great Lakes Water-Level Emergency Response Program: provides financial assistance to Great Lakes marinas for dredging activities

Department of Transportation

- *Navigable Water Protection Act*: prohibits construction and dumping of wastes interfering with navigation

Environment Canada

- *Canada Water Act*: authorizes agreements with provinces for flood and erosion control
- *International Rivers Improvement Act*: protects flows of rivers that cross international boundaries

Box 4: Local agencies' roles in water quantity management

Conservation Authorities

- *Conservation Authorities Act*: outlines CA responsibilities for construction and operation of flood control structures (e.g., dams), regulation of flood plain development
- Provincial groundwater monitoring network (begins 2001), surface water monitoring
- Fisheries management agreements with DFO to implement the *Fisheries Act*
- Municipal plan review

Municipalities

- *Municipal Act*: outlines municipalities' authorities for the construction and operation of drains, dams, and flood control works
- *Public Utilities Act*: outlines municipalities' authorities for operation of water supply works
- Municipal planning: land use planning, water resources management, stormwater management, etc.

Box 5: The role of the public in water quantity management

Interest groups

- A variety of public interest groups, including industry and commodity groups, and environmental and social groups, play a role in water quantity management. For instance, angling organizations may monitor water temperatures and fish populations, while environmental groups may inform the public about water conservation. Interest groups also have the ability to influence decisions made by their members, by other groups, and by government agencies.

General public

- Individual members of the public affect water quantity management through their own water use habits, their perspectives on water management, and their involvement in local decision-making.

6.0 Case study: subwatershed 19

This case study provides examples of responses to low water conditions in subwatershed 19 of the Credit River valley. Evaluation of the case study will provide opportunities for identification of rural communities' strengths and weaknesses in drought management, and will highlight what is needed to improve their capacity to adapt to climate change-induced low water conditions.

Location

Subwatershed 19 covers the Town of Orangeville, including parts of Dufferin County and the Region of Peel (Figure 1). Monora Creek and two unnamed tributaries flow into Island Lake (the Orangeville Reservoir); outflow from Island Lake, Mill Creek, and the Caledon tributaries forms the main branch of the Credit River as it flows south to Melville Dam[14]. Groundwater discharges contribute significantly to the baseflow of Monora Creek, Mill Creek, and the Caledon tributaries, while outflow from the Orangeville Sewage Treatment Plant contributes to the flow of the Credit River[14]. Some sections of the Credit's tributaries support relatively healthy cold-water fish communities, while Island Lake supports a warm-water aquatic community. Environmentally significant wetlands in the subwatershed include Rosehill Swamp, areas around Island Lake, and the Melville Marshes[14].

Issues

Local concerns about water quantity management in the watershed at large were solicited in 1999 when CVC hosted a meeting, in partnership with Peel and Halton regions, to which all known PTTW holders in the watershed were invited[16]. Thirty water users from all economic sectors, except water bottling, attended the workshop. Discussion at the workshop revealed a number of concerns about the present condition of the Credit River watershed, and possible future conditions. Water quantity concerns outlined by permit holders included recent low water conditions, increased consumption of water, the lack of a water budget and groundwater data, and concerns about priorities for water use, and means for ensuring future water supply[15]. Concerns regarding the implications of increased incidence of drought and global climate change on water resources in the watershed were also expressed[15]. Issues relating to balancing human and ecological management goals, in particular as they pertain to development, gravel extraction, and water management, were highlighted [15].

Concerns specific to subwatershed 19 relate to interactions between groundwater and surface water systems. Excessive groundwater withdrawals can impact stream baseflow, fish habitat, and wetlands. In the past, municipal water takings have impacted the flow of Mill Creek[14]. Other areas sensitive to groundwater withdrawals include Monora Creek, the Caledon tributaries, and part of the Credit River[14]. Fish communities within and south of the Town of Orangeville, and those near intensive agricultural operations, are already under stress[14]. Concerns relating to the protection of recharge areas, drinking water sources, wildlife and wetlands, and balancing environmental needs with development, were expressed at an open house for the subwatershed 19 study[14].

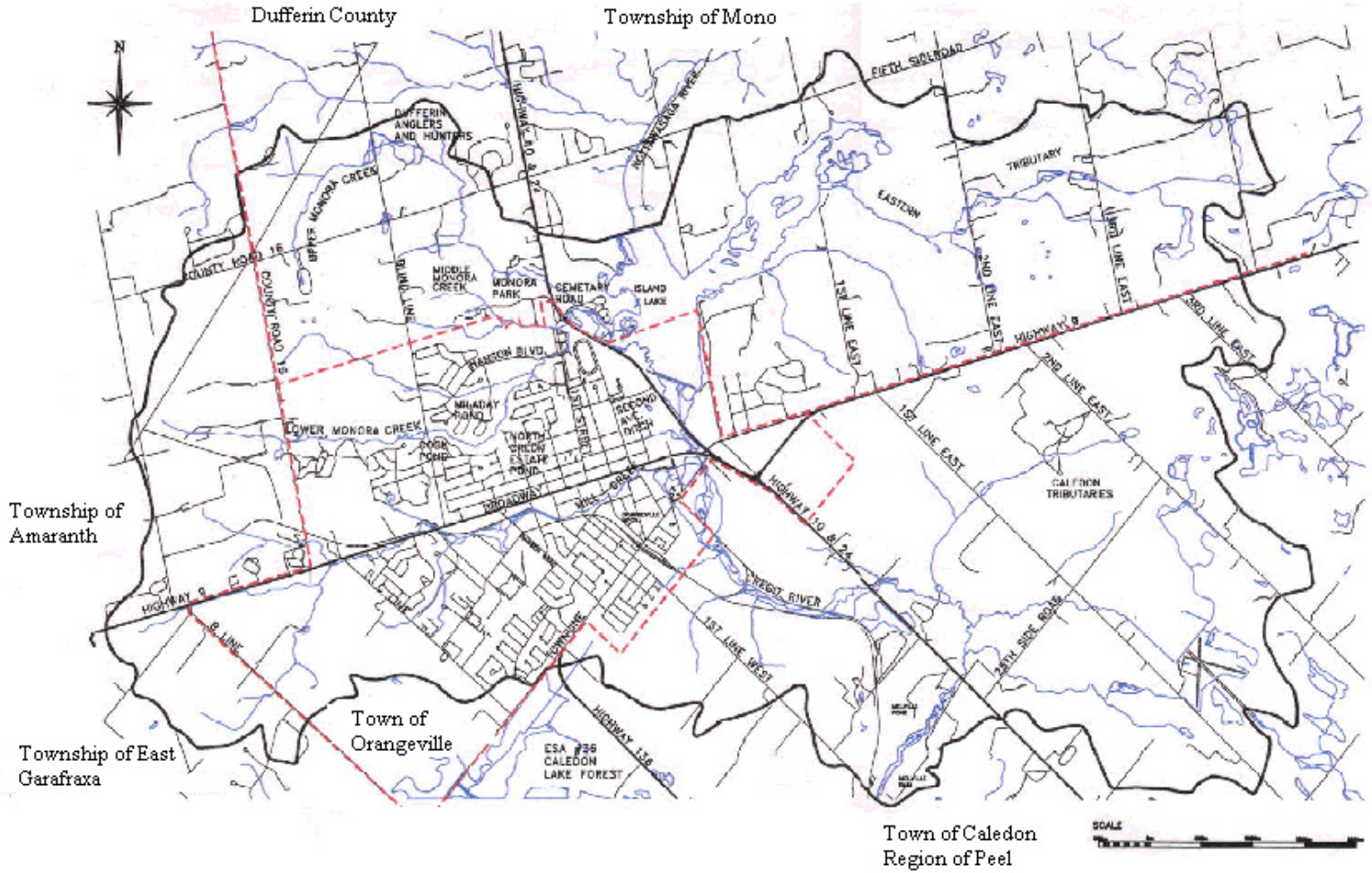

Figure 1: Subwatershed 19 of the Credit River watershed

Adaptation activities

Boxes 3, 4, and 5 outline the general activities of a number of different organizations involved in water management in Ontario. The following material provides more detail regarding the specific activities of local agencies (including municipalities, Credit Valley Conservation, and non-governmental organizations) in subwatershed 19 of the Credit River watershed.

Credit Valley Conservation (CVC) has a number of programs, some already in place, and some undergoing development, aimed at managing water quantity. Key programs include:

- management of flood plain development
- management of Orangeville Reservoir levels
- subwatershed planning
- habitat protection and restoration
- surface and groundwater monitoring
- a water quality strategy
- development of a water budget[16]

In order to inform the public about water quantity issues in the watershed, CVC launched a media blitz following the dry conditions of 1998 and 1999. It released a document entitled *Water Report*, which reviewed recent low water levels and water taking pressures in the watershed, and called for the development of comprehensive provincial legislation and policies to manage water allocation, and a moratorium on the issuance of water taking permits in the Credit River watershed[17]. CVC circulated the report to watershed municipalities and other conservation authorities, and wrote letters to the Ontario Premier, the Ministers of Environment, Natural Resources, and Agriculture, Food and Rural Affairs, and watershed MPPs. Representatives from the conservation authority met with Minister of the Environment Tony Clement to discuss their concerns.

Credit River *watershed municipalities* are becoming more and more involved in water management. In addition to the day-to-day management of water supply and sewage systems, many municipalities are conducting research and developing comprehensive management plans. A number of watershed municipalities are receiving funding under the Provincial Water Protection Fund for groundwater management studies, including the towns of Mono, Erin, and Orangeville, and the townships of East Garafraxa and Amaranth[18]. Each of these studies includes determinations of the quantity of groundwater resources, and the nature of groundwater-surface water interactions[18].

Recent increases in municipal responsibilities relating to water and wastewater management have resulted in concerns about capacity and accountability[19]. Rural communities, with dispersed populations often reliant on private water supplies, and, typically, fewer resources, may find low water management particularly challenging.

The *Town of Orangeville* operates and maintains the Town's water supply infrastructure. Other activities that contribute to adaptation to climate change-induced low water levels include:

- Planning
    - Financial support of CVC subwatershed and watershed planning
- Demand management
    - Non-residential users metered and pay by volume, residential users mostly not metered and pay flat rate, new residential development required to have meters[20]
    - Summer 1999 call for voluntary water use restrictions
    - By-law 22-99: lawn and garden watering restrictions, July 1999 182 warnings and 4 tickets
    - Water Efficiency Plan (done 1998): public education, water audits of customers, appliance retrofitting/replacement, outdoor water use program, water meter testing, landscaping by-law for new construction[20], to be implemented over 10 years[22] (existing supply capacity to be reached in 2012[20])
- Supply management
    - Class Environmental Assessment to identify new water sources: focus on water conservation, existing wells in short term[21]
    - Water Efficiency Plan: leak detection/repair
    - Department of Public Works Emergency Procedures Manual describes departmental responsibilities and communications protocols in the event of an emergency
- Data management
    - Monitoring of groundwater quality and quantity
    - Monitoring of impacts of municipal withdrawals on surface waters and fish habitat[22]
    - Annual water monitoring and well summary reports to OMOE regarding impacts of pumping on surface and ground waters and fisheries habitat (condition of PTTWs)[22]
    - Wellhead Protection Program includes a groundwater model to predict impacts of pumping on surface waters, sharing data with nearby municipalities
- Public information
    - Water Care program: distribution of literature regarding water efficient landscaping, lawn care, and the Town's water supply
    - Distribution of water saving kits[20]
    - Quarterly waterworks reports (required by provincial regulation)

The *Region of Peel* operates and maintains communal water supply infrastructure for the villages of Caledon and Alton. The Region has implemented a number of programs and activities that contribute to adaptation to climate change-induced low water levels, including:

- Planning
    - Have projected water consumption to 2031
    - Financial support of CVC subwatershed and watershed planning
- Demand management
    - Distribution of water conservation kits
    - Water efficiency study
    - Call for voluntary water use restrictions (July 1999)
    - By-law allowing mandatory restrictions on water use for fountain jets, garden hoses, sprinklers, and air conditioners
- Supply management
    - Construction of water filling station at water tank in Snelgrove for water haulers[23]
    - In dry periods ban water haulers from groundwater supplies, move them to lake supplies
    - Interconnections between water supply systems (e.g., Village of Caledon and Mono Mills)
    - Interbasin transfers: connection of Mono Mills (in Humber River watershed) to Village of Caledon (in Credit River watershed) water supply
    - Development of new sources (e.g., new wells in near future for Caledon Village and Mono Mills)
    - Department of Public Works Emergency Procedures Manual describes departmental responsibilities and communications protocols in the event of an emergency
- Data management
    - Groundwater level and quality monitoring
    - State of the Environment Water Report, annual Water Quality Reports
    - Groundwater quantification studies
    - Groundwater flow models
- Public information
    - Annual water quality reports[24]
    - Website provides information on programs to public[26]
    - Distribution of pamphlets on water conservation[25], and water conservation kits
    - Public works staff do open houses, presentation, fairs, and school visits[26]
    - Children's Groundwater Festival[26]
    - Water savings news releases

In addition to their agreement with the federal Department of Fisheries and Oceans to protect fish habitat, CVC works with local *non-governmental organizations* to protect and rehabilitate fish habitat. For example, CVC has joined together with the Greg Clark Chapter of Trout Unlimited Canada in a 3-year project to rehabilitate streams in the Upper Credit[27]. The focus of the first field season of the project (2000) was the Sauriol property in the upper watershed (north of highway 24). Activities intended to create brook trout habitat and lower water temperatures include tree transplantation, channel clearing, and creation of sediment traps, springs and riffle structures[27].

Other *local interest groups*, such as the Izaak Walton Fly Fishers' Club, the Coalition of Concerned Citizens of Caledon, and agricultural and other industry groups, have expressed concerns regarding the quality and quantity of water in the Credit River watershed.

7.0 Ontario Water Response 2000

Last year the Province of Ontario released a draft document entitled *Ontario Water Response 2000*[2]. The purpose of the document was to outline a response plan for drought management in Ontario. The plan relies heavily on the establishment of local Water Response Teams. A brief summary is provided below. For a more complete description of the Province of Ontario's drought response plan, please consult the copy of *Ontario Water Response 2000* included in the workshop package.

Water Response Teams

Water Response Teams are to be convened by the local conservation authority, and are to include representatives from:

- Provincial government
- Municipal government
- Conservation authority staff
- Agriculture
- Rural private industry and business
- Recreation
- Resource management interests
- First Nations[2]

The Water Response 2000 document states that "There is no distinction in decision-making power or responsibility among members of the WRT. Each representative should have equal opportunity for input and share in the responsibility"[2].

The goals of the Water Response Teams are to:

- Identify local water supply needs and concerns
- Identify severity of low water crisis
- Implement water conservation, preservation and allocation strategies
- Evaluate effectiveness of local actions
- Provide advice to local and provincial decision-makers[2]

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