

**A REVIEW OF THE  
CONSERVATION AUTHORITIES  
OF ONTARIO  
WATERSHED PLANS**



Ministry  
of the  
Environment

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Conservation Authorities of Ontario  
Watershed Plans**

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*".... Nature is hitting back. Not with the old weapons - floods, plagues and holocausts. We can neutralize them. She is fighting back with strange instruments called neuroses. She is deliberately inflicting mankind with the jitters ..... She is taking the world away from the intellectuals and giving it back to the apes."*

- Robert E. Sherwood,  
The Petrified Forest

## **Introduction**

In order to provide information for several programs being addressed (Beaches Management Strategy, Watershed Studies, Networks, Waste Assimilation, Agricultural Programs) in the River Systems Assessment Unit, a project to obtain and review the watershed plans developed by the Conservation Authorities of Ontario was undertaken. The review process was directed with the following objectives:

- (a) to determine local issues of concern to the individual Conservation Authority.
- (b) to determine regional concerns, if any.
- (c) to determine trends, if any, within the Province.
- (d) to determine province wide issues, if any.
- (e) to determine the Ministry's role in addressing expressed issues.
- (f) to determine implications on Ministry mandates and programs.

This report is divided into three sections. Part one defines the role and mandate of a Conservation Authority. The interactions with government agencies and legislation will also be discussed. Part two presents the analysis derived from objectives A through D above. Part three discusses items E and F; (effects on the Ministry).

## **Part One: Conservation Authority**

In order to properly talk about Conservation Authorities one must first define what an authority is. A Conservation Authority is an autonomous, locally governed organization which operates under the Conservation Authorities Act of the Province of Ontario. Funding is provided by the member municipalities through tax levies and the Province through the Ministry of Natural Resources.

The concept of a Conservation Authority was brought into existence in 1946 when the Province of Ontario passed the Conservation Authorities Act. This produced a forum by which local municipalities and the government of Ontario could work together in a program of natural resource conservation (water, land, plants, wildlife). The driving force behind the legislation was initiated in the 1930's and early 1940's by individuals and organizations who shared concerns about preserving the Province's natural resources and heritage. The Act was founded on three basic concepts which were simple but remain fundamentally the same today. These concepts are:

1. Local initiative
2. A municipal—provincial partnership
3. The watershed as a management unit

The Conservation Authorities Act establishes the legal mandate within which the authority may undertake specific activities. To achieve its objectives the Authority **is** empowered to undertake programs designed to further the conservation, restoration, development and management of the natural resources within the watershed. The mandate and powers of the Authority are described in several sections of the Conservation Authorities Act R.S.O. 1980. Selected sections of the Act are outlined below:

#### Section 20

"The objects of an authority are to establish and undertake, in the area over which it has jurisdiction, a program designed to further the conservation, restoration, development, and management of natural resources other than gas, oil, coal and minerals" R.S.O. 1970, C. 78, S.19.

#### Section 21

In order to accomplish the above objectives the act provides the authorities with the powers,

- "(a) to study and investigate the watershed and to determine a program whereby the natural resources of the watershed may be conserved, restored, developed and managed;
- (b) for any purpose necessary to any project under consideration or undertaken by the authority, to enter into and upon any land and survey and take levels of it and make such borings or sink such trial pits as the authority considers necessary;



- (c) to acquire by purchase, lease or otherwise and to expropriate any land that it may require, and, subject to the approval of the Lieutenant Governor in Council, to sell, lease or otherwise dispose of land so acquired;
- (d) to lease for a term of one year or less, without the approval of the Lieutenant Governor in Council, land acquired by the authority;
- (e) to purchase or acquire any personal property it may require and sell or otherwise deal therewith;
- (f) to enter into such agreements for the purchase of materials, employment of labour and such other purposes as may be necessary for the due carrying out of any project;
- (g) to enter into agreements with owners of private lands to facilitate the due carrying out of any project;
- (h) to determine the proportion of the total benefit afforded to all the participating municipalities that is afforded to each of them;
- (i) to erect works and structures and create reservoirs by the construction of dams or otherwise;
- (j) to control the flow of surface waters in order to prevent floods or pollution or to reduce the adverse effects thereof;
- (k) to alter the course of any river, canal, brook, stream or watercourse, and divert or alter, as well temporarily as permanently the course of any river, stream, road, street or way, or raise or sink its level in order to carry it over or under, on the level of or by the side of any work built or to be built by the authority, and to divert or alter the position of any water-pipe, sewer, drain or any telegraph, telephone or electric wire or pole;
- (l) to use lands that are owned or controlled by the authority for such purposes, not inconsistent with its objects, as it considers proper;
- (m) to use lands owned or controlled by the authority for park or other recreational purposes, and to erect, or permit to be erected, buildings, booths and facilities for such purposes and to make charges for admission thereto and the use thereof;
- (n) to collaborate and enter into agreements with ministries and agencies of

government, municipal councils and local boards and other organizations;

- (o) to plant and produce trees on Crown lands with the consent of the Minister, and on other lands with the consent of the owner, for any purpose;
- (p) to cause research to be done;
- (q) generally to do all such acts as are necessary for the due carrying out of any project." R.S.O. 1970, c. 78, S. 20; 1971, C.64, S.4; 1972, C. 1, 3.2;1972, C.4, 5.12.

## Section 28

- "(1) Subject to the approval of the Lieutenant Governor in Council, an authority may make regulations applicable in the area under its jurisdiction,
- (a) restricting and regulating the use of water in or from rivers, streams, inland lakes, ponds, swamps, and natural or artificially constructed depressions in rivers or streams;
  - (b) prohibiting or regulating or requiring the permission of the authority for the straightening, changing, diverting, or interfering in any way with the existing channel of a river, creek, stream or watercourse;
  - (c) regulating the location of ponds used as a source of water for irrigation;
  - (d) providing for the appointment of officers to enforce any regulation made under this section or section 29;
  - (e) prohibiting or regulating or requiring the permission of the authority for the construction of any building or structure in or on a pond or swamp or in any area susceptible to flooding during a regional storm, and defining regional storms for the purposes of such regulations.
  - (f) prohibiting or regulating or requiring the permission of the authority for the placing or dumping of fill of any kind in any defined part of the area over which the authority has jurisdiction in which in the opinion of the authority the control of flooding or pollution or the conservation of land may be affected by the placing or dumping of fill." R.S.O. 1970, C.78, S.27 (1);1971, C.64, 3.5 (1);1973, C.98, S.8 (1-3).

## Section 29

- "(1) Subject to the approval of the Lieutenant Governor in Council, an authority may make regulations applicable to lands owned by the authority;
- (a) regulating and governing the use by the public of the lands and the works, vehicles, boats, services and things of the authority;
  - (b) providing for the protection and preservation from damage of the property of the authority;
  - (c) prescribing fees for the occupation and use of lands and works, vehicles, boats, recreational facilities and services;
  - (d) prescribing permits designating privileges in connection with use of the lands or any part thereof and prescribing fees for such permits;
  - (e) regulating and governing vehicular and pedestrian traffic and prohibiting the use of any class of vehicle or classes of vehicles;
  - (f) prohibiting or regulating and governing the erection, posting up or other display of notices, signs, sign boards and other advertising devices;
  - (g) prescribing terms and conditions under which horses, dogs and other animals may be allowed on the lands or any part thereof;
  - (h) subject to the Forest Fires Prevention Act and the regulations made thereunder, prohibiting or regulating and governing the use, setting and extinguishment of fires."

## Section 30

- "(1) Subject to the approval of the Minister, an authority shall make regulations,
- (a) providing for the calling of meetings of the authority and prescribing the procedure at such meetings;
  - (b) prescribing the powers and duties of the secretary—treasurer;

- (c) designating and empowering officers to sign contracts, agreements and other documents on behalf of the authority;
- (d) delegating all or any of its powers to the executive committee except,
  - (i) the termination of the services of the secretary - treasurer,
  - (ii) the power to raise money
  - (iii) the power to enter into contracts or agreements other than such contracts or agreements as are necessarily incidental to the works approved by the authority."

In carrying out its many programs under the terms set out in the Act, as outlined above, a Conservation Authority deals with several ministries and a multitude of pieces of legislation. There exists a potential for interaction with as many as eight provincial and local agencies and 23 pieces of legislation. Table 1 provides a summary of these interactions. This table illustrates how the Ministry interacts with the Conservation Authorities and also indicates the paths for inter-ministerial co-operation.

A review of table I in conjunction with the excerpts from the Conservation Authorities Act reveals how complex the interactions between agencies really is. There are many grey areas where mandates overlap, thus the potential for lead agency conflicts is quite high.

The Ministry of Natural Resources, Conservation Authorities Branch, is the lead government agency which administers the Act. Under the terms of the Act the Conservation Authorities acquire most of their operating funds through the granting program set up within MNR.

Historically, each authority has been working independently within the framework of the Act. Some authorities had developed very clear plans with long range planning horizons. Others worked on a year to year basis with current projects being relevant only to the current year's problems. The prime objective of the Conservation Authorities watershed plans has been and still is, protection of life and property from damage due to flooding. As flood control programs, both structural and non structural (forecasting, zoning, etc.), came into existence the authorities began to alter their program directions towards other, less publicly obvious, watershed problems. It became clear to MNR that the authorities required clear, long-range plans in order to provide for sound integrated natural resource management within the watersheds. Towards achieving this goal, in 1982 the Minister of

**Table 1:** Interactions of Conservation Authorities with Other Agencies and Legislations

Agency	Acts Administered	Functions of Act	Other Agency Involvement	Approvals Required
Conservation Authority	Conservation Authorities Act	<ul style="list-style-type: none"> <li>- to establish and undertake within a watershed boundary a program designed to further the conservation, restoration development and management of renewable natural resources.</li> <li>- primarily concerned with water quality management and erosion</li> <li>- also involved in water related land management</li> </ul>	<ul style="list-style-type: none"> <li>- commenting agency for municipal and county planning</li> <li>- commenting agency under Drainage Act</li> <li>- liaise with MNR, MOE, OMAF, Trent Severn Waterway</li> </ul>	<ul style="list-style-type: none"> <li>- upon enactment of regulations, permits required for filling, construction in, or alterations to waterways or floodplains</li> </ul>
Ministry of Municipal Affairs and Housing	Planning Act	<ul style="list-style-type: none"> <li>- chief legislative mechanism for governing and providing for municipal land-use planning.</li> <li>- provides planning advice</li> </ul>	<ul style="list-style-type: none"> <li>- local municipalities</li> <li>- counties or regions</li> <li>- C.A., M.N.R., M.O.E., others as commenting agencies.</li> </ul>	<ul style="list-style-type: none"> <li>- MMAH approves the establishment of planning areas for official plans</li> <li>- approve plans of sub-divisions and condominiums unless delegated to another agency.</li> </ul>
County/ Region	Planning Act	<ul style="list-style-type: none"> <li>- county or region adopts official plans and secondary plans</li> <li>- provision for Land Division Committee to see county plans upheld</li> </ul>	<ul style="list-style-type: none"> <li>- MMAH as commenting agency</li> </ul>	<ul style="list-style-type: none"> <li>- OMB approval required to adopt official plans if objections raised.</li> <li>- OMB approval required for Land</li> </ul>
Local Municipalities	Planning Act  Building Code Act	<ul style="list-style-type: none"> <li>- zoning by-law adopted by local municipalities</li> <li>- committees of adjustment</li> <li>- local official plans</li> <li>- gives authority to municipality for the enforcement of the Ontario Building Code through a permit system.</li> </ul>	<ul style="list-style-type: none"> <li>- administered by local municipalities for the Ministry of Consumer and Commercial Relations.</li> </ul>	<ul style="list-style-type: none"> <li>- subject to OMB approval.</li> <li>- building permits</li> </ul>

Agency	Acts Administered	Functions of Act	Other Agency Involvement	Approvals Required
Ministry of Natural Resources	Public Lands Act	- provides for the regulation, administration, management and use of Crownlands.		
	Game and Fish Act, Wilderness Areas Act, Provincial Parks Act, Parks Assistance Act	- legislative mandate over the management of wildlife habitat, wildlife, and flora. - legislative mandate over the establishment and management of provincial parks, wilderness areas.		
	Forestry Act, Crown Timber Act, Trees Act, Woodlands Improvement Act	- to furnish trees to individuals and municipalities, and to manage crown forest lands and regulate the preservation of trees on private forest reserves.		
	Pits and Quarries Control Act	- provides for the review, regulation and approval of pits and quarries operations for townships designated under the Act. - provides for exemption of certain townships under the Act.		- license required for all pits and quarries operations.
	Beds of Navigable Waters Act	- to provide the background by which a water course or waterbody is deemed navigable (public ownership) or not navigable (private ownership)		
	Lakes and Rivers Improvement Act	- to protect navigable waters for public use. - to provide for the use of waters of the lakes and rivers of Ontario and to regulate improvements in them. - provides for public and riparian rights, use, management and perpetuation of fish, wildlife and other natural resources; preservation of natural amenities, ensuring suitability of improvements.	- MOE where approval required under Ontario Water Resources Act. - other agencies as applicable	- approval by District offices. - required for all works in the water which will hold back, forward or divert water on waters under provincial jurisdiction.

Agency	Acts Administered	Functions of Act	Other Agency Involvement	Approvals Required
Ministry of Environment	Canada Fisheries Act	<ul style="list-style-type: none"> <li>- conserve and preserve fisheries</li> <li>- regulates the deposit of deleterious substances in water or where the substance will reach the water and negatively affect fisheries.</li> <li>- major thrust is fish habitat protection.</li> </ul>	<ul style="list-style-type: none"> <li>- Federal Department of Fisheries and Oceans.</li> <li>- Federal Department of Environment.</li> </ul>	<ul style="list-style-type: none"> <li>- regulations define substances covered under the Act, and sets acceptable limits.</li> </ul>
	Environmental Protection Act	<ul style="list-style-type: none"> <li>- to provide for the protection and conservation of the natural environment.</li> <li>- deals primarily with pollution by contaminants as defined in the regulations.</li> </ul>		<ul style="list-style-type: none"> <li>- approvals required for septic tanks.</li> <li>- various approvals required under the Act depending upon nature of discharge.</li> </ul>
	Environmental Assessment Act	<ul style="list-style-type: none"> <li>- the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation, and wise management in Ontario of the environment</li> <li>- review and approve environmental assessments of water and land management undertakings which may have significant effects on the environment</li> <li>- currently applies to all public agencies unless exempted by regulations.</li> </ul>	<ul style="list-style-type: none"> <li>- binds the Crown</li> </ul>	<ul style="list-style-type: none"> <li>- approvals required under this Act before any other approvals under provincial or municipal statute or by-laws will be granted.</li> </ul>
	Pesticides Act	<ul style="list-style-type: none"> <li>- purpose is to control the use of chemicals for the destruction of plant and animal pests and to investigate the impact of pest control and pesticides on human health and the environment.</li> </ul>		<ul style="list-style-type: none"> <li>- licensing and permit system to control sale and use of pesticides</li> <li>- exemptions for use by farmers on their own, or neighbours land.</li> </ul>
	Ontario Water Resources Act	<ul style="list-style-type: none"> <li>- main legislative instrument for regulating water quality.</li> <li>- main concern is with municipal and industrial sewage and water supply systems.</li> </ul>		<ul style="list-style-type: none"> <li>- water or sewer works must be approved by the Environmental Approvals Branch.</li> </ul>

Agency	Acts Administered	Functions of Act	Other Agency Involvement	Approvals Required
Ministry of Agriculture and Food	Agricultural Tile Drainage Installation Act	- provides for licensing contractors, operators and their machines engaged in the installation of field tile or under-drainage of farms.		- licensing
	Drainage Act	- provides for authorization of agreement, petition and requisition drains, and sets out financial arrangements for their construction, maintenance and minor improvements.	- circulation of applications, engineers reports etc. to C.A.,MOE, MNR if required. - municipalities undertake construction.	- no prior environmental or cost-benefit approvals required. - not covered under the EnvironmentalAssessment Act.
	Tile Drainage Act	- assistance in construction of on-farm tile drainage	- local municipalities	
Trent-Severn Waterway	Navigable Waters Protection Act	- prohibits throwing or depositing any substance in a navigable waterway, including erection and placing of works which may cause impairments to navigation - pertains to waters under federal jurisdiction.	- administered by T.S.W. for Transport Canada. - applications circulated to Environmental Protection Service, Transport Canada, MNR, MOE	- any dredging or filling along the Trent canal requires approval. - no dredging or filling at all June 1-Sept.30



**TABLE II:** Possible Interrelationships Between Major Activities Identified In Watershed Plans.

	Flood Control	Flood Damage Reduction	Flood Warning	Flood Forecasting	Hazard land Management	Water Quality Control	Rural Drainage	Urban Stormwater	Groundwater Management	Low Flow Augmentation	Erosion Control	Alterations To Waterways	Wetland Management	Headwater Management	Fish Habitat Management	Wildlife Habitat	Navigation	Hydro Power Generation	Water Supply	Sewage And Waste Disposal	Agriculture And Soil Loss	Forest And Crown Land	Minerals And Aggregates	Environmental Education	Outdoor Recreation	Tourism
Flood Control																										
Flood Damage Reduction	x																									
Flood Warning	x	x																								
Flood Forecasting	x	x	x																							
Hazard land Management	x	x	x	x																						
Water Quality Control	x																									
Rural Drainage	x	x	x		x	x																				
Urban Stormwater Management	x	x	x	x	x	x																				
Groundwater Management							x	x																		
Low Flow Augmentation	x					x	x	x	x																	
Erosion Control	x				x	x	x	x																		
Alterations To Waterways	x	x			x	x	x	x		x	x															
Wetland Management	x	x					x		x	x	x	x														
Headwater Management	x	x				x	x		x	x	x	x	x													
Fish Habitat Management	x					x				x	x	x	x	x												
Wildlife Habitat Management					x								x	x												
Navigation	x				x	x				x		x			x											
Hydro Power Generation	x	x	x	x	x					x					x		x									
Water Supply	x					x	x		x	x			x				x									
Sewage And Waste Disposal					x	x		x	x																	
Agriculture And Soil Loss	x	x			x	x	x		x	x	x	x	x	x	x											
Forest And Crown Land	x	x			x		x		x	x	x	x	x	x	x	x										
Minerals And Aggregates	x	x			x	x			x		x	x	x	x	x											
Environmental Education	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x				
Outdoor Recreation	x	x			x					x			x		x	x	x	x						x		
Tourism	x	x			x								x		x	x	x								x	
Resource Management					x				x			x	x	x	x	x			x		x	x	x	x	x	x

Natural Resources directed the Conservation Authorities to prepare and submit an integrated watershed management plan by June of 1983. The plan was to have a minimum 5 year planning horizon. The preparation of such a document proved to be an arduous task for the vast majority of the authorities, thus most of the plans were submitted as interim plans and many are still in the finalization process.

The remainder of this report will present the results of the review of these watershed plans.

## **Part Two: Plan Review**

In the initial contact with the Conservation Authorities copies of the watershed plan and a current annual report were requested. Response to the request was excellent with 34 of the 38 authorities providing information. This section of the report identifies; a) local issues of concern to the individual Conservation Authorities; b) regional concerns, if any; c) Provincial trends, if any; d) province wide issues, if any. This review will be provided for both the submitted plans and the annual reports. This duality in the review will provide insight into the long range plans, the current situation, and future directions.

The watershed plans ranged in size and detail from concise 100 page documents to massive 2000 page detailed planning documents. The task of reviewing these documents and providing a uniform basis for comparison was not easy due to the variation in detail provided in the plans. To provide for a uniform comparison, six areas of activity were identified; these being; flood control, urban drainage, rural drainage, erosion and sedimentation, water quality, and other.

Flood control looked at structural activities such as construction of floodways, channelization, reservoir and dam construction, flood proofing and non—structural activities such as operating policies, forecasting, zoning, regulation and enforcement.

Urban drainage considered activities associated with storm water runoff from both developed and developing urban areas. Water quantity as well as quality were considered.

Rural drainage addressed activities aimed at drainage arising from both agricultural and non—agricultural, non—urban areas of the watershed.

Erosion and sedimentation encompassed a wide range of activities. These covered agricultural soil loss, urban soil loss, natural and man induced streambank erosion, shoreline erosion, and wind erosion.

Water quality was inherent in the above three categories. Topics considered in this section include municipal, industrial and agricultural waste discharges, MOE water quality network information, abatement strategies, water use conflicts, etc. This proved to be the most diverse subject area.

The "other" category included areas such as swimming beaches, public information programs, reforestation programs, heritage land preservation, etc.

It should be noted that the divisions between these categories are not clear cut and that any particular project or activity might fall within any or all of the six categories. Table II provides an illustration of the possible interrelationships between the major activities identified in the watershed plans. Table III is a list of the Conservation Authorities and a number code which will be used throughout the remainder of this report when referring to specific authorities. This table also includes some summary statistics on each authority.

## **2.1 Watershed Plans**

### **2.1.1 Local issues of concern**

Section four provides a cursory review of each of the watershed plans and annual reports. Details have been deliberately omitted as they can be obtained by scanning the individual reports of interest.

It is immediately obvious that each authority has its own particular issue of concern, otherwise there would be no need for a watershed plan. The reader is referred to section four for details on each authority.

Table IV presents the key issue identified by each authority. Certain authorities have identified a series of key issues of almost equal importance. These supplemental issues along with the most pressing concerns from Table IV will be discussed below.

The breakdown of Table IV is as follows: 28 percent identified water quality as their key issue, 27 percent identified erosion and sedimentation, 24 percent of the authorities still have flood control as their prime objective, 12 percent are concerned over rural drainage and 9 percent cited agricultural runoff problems as the item of prime concern.

**Table III:** Conservation Authorities and Number Code Used Throughout  
Remainder of Review

Conservation Authority	Code No.	Area (Km <sup>2</sup> )	# Municipalities	# Members	Established	Formerly
Ausable - Bayfield	1	2450	32	35	1946	
Catarauqui Region	2	3331	26	34	1964	
Catfish Creek	3	490	7	10	1950	
Central Lake Ontario	4	627	1	14	1958	
Credit Valley	5	1070	8	22	1954	
Crowe Valley	6	2007	13	16	1958	
Essex Region	7	1673	23	31	1973	
Ganaraska Region	8	935	8	14	1946	
Grand River	9	6804	42	45	1966	Grand Valley, Grand River Commission
Grey-Sauble	10	3146	24	1128	1985	North Grey, Sauble Valley
Halton Region	11	1044	4	19	1963	16 Mile Creek, 12 Mile Creek
Hamilton Region	12	590	2	19	1966	Spencer Creek
Kawartha Region	13	2564	18	25	1979	
Kettle Creek	14	515	9	13	1965	
Lakehead Region	15	2538	9	15	1963	Neebing Valley
Long Point Region	16	2782	7	17	1971	Big Creek, Otter Creek
Lower Thames Valley	17	8257	36	40	1961	
Lower Trent Region	18	2121	17	21	1968	
Maitland Valley	19	2989	32	35	1951	
Mattagami Region	20	10930	1	8	1961	
Metropolitan Toronto & Region	21	3802	6	53	1957	Etobicoke, Mimico, Humber, Don, Rouge, Duffin, Highland, Peticcoat
Mississippi River	22	4450	22	30	1968	
Moira River	23	2875	17	21	1947	
Napanee Region	24	1961	17	20	1947	
Niagara Peninsula	25	2424	3	34	1959	

Table III: Conservation Authorities and Number Code Used Throughout Remainder of Review

Conservation Authority	Code Number	Area (Km <sup>2</sup> )	# Municipalities	# Members	Established	Formerly
Nickel District	26	7547	2	16	1973	Junction Creek, Whitson Valley
North Bay—Mattawa	27	2807	10	15	1972	
Nottawasaga Valley	28	3134	28	32	1960	
Otonabee Region	29	1892	15	20	1959	Otonabee Valley
Prince Edward Region	30	1010	10	13	1965	
Raisin Region	31	1481	10	14	1963	
Rideau Valley	32	4095	30	50	1966	
Saugeen Valley	33	4455	41	44	1950	
Sault Ste. Marie Region	34	300	2	7	1963	
South Lake Simcoe	35	2613	9	25	1971	Upper Holland Valley
South Nation River	36	3916	28	34	1947	
St. Clair Region	37	3805	34	42	1973	Sydenham Valley
Upper Thames River	38	3432	27	42	1947	

Most of the reports tended to refer to certain sections of the watershed for specific action. These will not be discussed here. Some authorities did cite specific problem areas in conjunction with the key issues. The specific locations are discussed below.

Credit Valley identified the Mississauga waterfront development as a concern under urban drainage. Most of Caledon Creek was a concern due to rural drainage and estate lot development. The Orangeville reservoir and Water Pollution Control Plant caused concern in terms of water quality.

The Lower Trent Authority cited several instances of summer low flow in conjunction with sewage discharge and landfill sites as being of concern for water quality. They also expressed concern over the rising number of extraction industries (gravel quarries) operating within the watershed.

Belleville was identified by the Moira River C.A. in terms of urban drainage problems and as a source of municipal sewage. In addition, the ice management plans call for using the outfall from the WPCP to control ice buildup and thereby reduce flooding. An arsenic problem at Delco was identified as a major water quality issue.

The Napanee Region Conservation Authority expressed concern over the waste discharges from the Strathcona paper mill and the Napanee Water Pollution Control Plant.

The Lake Ontario waterfront development and the closure of beaches were identified by the Metropolitan Toronto and Region Conservation Authority as being high on the priority list. Belleville was identified by the Moira River C.A. in terms of urban drainage problems and as a source of municipal sewage. In addition, the ice management plans call for using the outfall from the WPCP to control ice buildup and thereby reduce flooding. An arsenic problem at Delco was identified as a major water quality issue.

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**Table IV:** Key Issues Identified in Watershed Plans

Authority	Key Issue of Concern
Raisin River	Water Quality - Nutrients - Weed Growth
Credit Valley	Erosion & Sedimentation
Sault Ste. Marie	Structural Flood Control
Lower Trent	Water Quality - Agricultural Runoff
Moira River	Rural Drainage
Mississippi Valley	Erosion & Sedimentation
Napanee	Agricultural Runoff & Erosion
Ganaraska	Erosion
Metropolitan Toronto	Erosion-Urban & Rural Runoff
North Bay - Mattawa	Water Quality-Several Waste Discharges
Lakehead	Erosion & Sedimentation
Cataraqui	Flood Control& Forecasting
Essex	Water Quality-Agricultural Runoff & Drainage
Kawartha	Rural Drainage
Crowe Valley	Flood Control
Maitland Valley	Water Quality - Erosion & Drainage
St. Clair	Flood Control
Ausable-Bayfield	Rural Runoff & Waste Disposal
Grey - Sauble	Flood Control
Lower Thames Valley	Agricultural Runoff
Upper Thames River	Agricultural Runoff
Catfish Creek	Flood Control
Kettle Creek	Water Quality - Waste Discharges
Saugeen Valley	Rural Drainage & Erosion
RideauValley	Erosion & Sedimentation
Otonabee	Erosion & Sedimentation
NickelDistrict	Flood Control
SouthLake Simcoe	Erosion & Sedimentation
Prince Edward	Low Flow Quality
Long Point	Erosion & Sedimentation
South Nation	Water Quality
NiagaraPeninsula	Water Quality - Low Flow
Grand River	Flood Control

The North Bay - Mattawa authority identified a long list of priority concerns. Lake Nipissing is impacted upon by urban stormwater and industrial and municipal waste discharges. Chippewa Creek has urban and waste disposal problems and is possibly suffering contamination via groundwater and seepage from the North Bay landfill site. Wasi and Trout lakes have high nutrient levels and exhibit associated algal and water quality problems. The Mattawa and North Bay sewage lagoons are both problem sites and require relocation studies. In addition, the authority is concerned over the effects of timber harvesting and extraction industries upon the hydrologic and water quality regimes of the watershed.

The Kam river streambank erosion problems resulted in the formation of the Kam River Erosion Control program by the Lakehead Region authority. This is an ongoing study.

Cataraqui Region is attempting to solve the low flow problems in Millhaven Creek. Flood control programs are conflicting with effluent dilution requirements at Odessa. A major basin study for the Gananoque watershed was also identified.

The Kawartha Region authority expressed concern over the low flow dilution problems at Port Perry and Lindsay. The extensive areas of heavy aquatic weed growth and the heavy recreational activity demand are also of prime concern.

The South Maitland River was identified as requiring a basin study by the Maitland Valley C.A. The basin suffers from low flows, high nutrient levels, several municipal waste discharges and intensive agricultural activities. The beach closures at Pioneer, Gorrie and Brussels Conservation areas due to high bacte levels is of prime importance.

The St. Clair Region C.A. identified rural drainage as a prime concern with Strathroy and Wallaceburg being identified for major structural works.

The Sauble River was identified for a basin study by the Grey-Sauble C.A. The river suffers from low flows and extensive agricultural runoff.

The numerous waste discharges, channel erosion and bank failures and intensive agriculture along the Thames River were identified by the Lower Thames Valley C.A.



These problems continue into the jurisdiction of the Upper Thames River C.A. with effluent dilution problems at Stratford and bacti and nutrient problems in the Pittock and Kintore basins being cited as specific examples.

Kettle Creek is impacted upon by agricultural waste discharges, industrial waste discharges, municipal effluent bypass events and low flow effluent dilution problems at St. Thomas. The Kettle Creek Conservation Authority has identified the need for a basin study in the watershed.

The Saugeen Valley C.A. identified the Saugeen River for a basin study to serve as a model for application to the rest of the watershed. Problems arise mainly from agricultural activities and a proliferation of extraction industries.

The South Lake Simcoe C.A. identified the health of Lake Simcoe as a major concern. The LSEMS project was identified as the key item to alleviate the problem.

The Prince Edward Region C.A. expressed a desire for a watershed study on Bloomfield Creek. Additional areas of concern were water quality in West Lake and a hydrogeologic study to assess the groundwater quality and quantity.

Agricultural activities are fairly intensive throughout the jurisdiction of Long Point Region and the watershed shows associated high nutrient and bacti levels as well as extensive growths of algae and aquatic plants. The authority identified the need for research to establish acceptable application rates for fertilizers, herbicides and pesticides.

A similar situation of high nutrient and bacti levels, low DO values, and extensive algae and aquatic plant growths exists within the jurisdiction of the South Nation River C.A. They cited the ongoing South Nation River Basin Water Management Study as the best vehicle towards a solution.

### 2.1.2 Trends

In this section the results of the reviews will be presented in terms of trends within the MOE regions and across the province. The conservation authorities will be referred to by the code numbers as listed in Table III. The use of the code numbers will prevent the production of an endless list of names. Each of the six categories referred to earlier will be addressed below.

### FLOOD CONTROL

Flood control issues are divided into nine categories for discussion purposes.

Twelve percent of the authorities (13,23,27,31) identified the need for site inventory and mapping. In these situations the extent of local flooding has not been fully assessed and in order to meet their prime objective of protection of life and property from flooding these authorities intend to mount a program to inventory the flooding sites within the watersheds. There appears to be no trends within the province with regard to this issue, however 50 percent of these authorities are in Southeastern region.

The next logical step in a flood control policy is the establishment of a mapping base which indicates the floodlines to a series of storm levels (regional, 1:100, 1:25, etc.) as well as the fillines. Most of the authorities 76% (2, 3, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 19, 22, 24, 25, 26, 29, 30, 32, 33, 34, 35, 36, 37,38) identified the need to complete and/or revise the flood and filline mapping base. This program was identified as being ongoing and most of the authorities have detailed mapping completed for the major flood prone areas. This is a province wide issue, however the most work has been done in Southwestern and Southeastern regions.

The Fill, Construction and Alteration to Waterways Guidelines was addressed by 88 percent of the authorities (1, 2, 3, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 29, 31, 32, 33, 35, 36, 37, 38). The issues here were to work with the government in order to develop a practical set of guidelines and then to develop a workable framework for implementation and enforcement activities. No trends in this province wide issue were apparent.

Fifty percent of the watershed plans discussed the need to revise, update and expand the hydrometeorologic network within the basin. All of the authorities (2, 6, 9, 10, 13, 19, 22, 23, 24, 25, 26, 27, 29, 31, 35, 36, 37) touched on the point that with the implementation of the ENVOY 100 system at MNR, real time flood forecasting capabilities are available. Through this system the data recorded at the hydromet stations are telemetered to MNR via the ENVOY 100 system and flood forecast updates are transmitted back to the authority. With this advance in technology the authorities recognized the need for a detailed database to provide for accurate flood forecasting. The proposed work plans ranged from installing staff gauges and recording streamflow meters, to selling plastic rain gauges to basin residents, to installing complete hydromet stations with remote telemetering capabilities.

Eight of the authorities (2, 6, 9, 18, 19, 23, 29, 34), 23%, which responded, indicated that the profusion of small dams in the watersheds were a major concern in flood control. The plans called for the need to establish a small dam operating and maintenance policy. Most of the authorities specified a desire to gain ownership of the small dams, thereby effectively controlling their operation and maintenance. This appears to be a province wide issue and rates a fairly low priority.

Despite their prime objective of protection of life and property from flooding only 35% of the authorities (6, 9, 17, 19, 21, 22, 26, 30, 32, 34, 37, 38) indicated a need for flood control structures. Dyking, channelization, reservoirs, dry dams and ice management were all identified as possible measures. Also included in this category are flood proofing measures for structures within flood prone areas. There appears to be no trend within the province, however about half of the authorities which identified this issue are in Southwestern region.

Direct land acquisition was favoured by only 15% of the authorities (17, 25, 26, 27, 38). Under this scheme the properties which exhibited the greatest risk of flood damage would be either expropriated or bought. The buildings would be removed and the land would be turned back for public use through the establishment of a floodplain conservation area. Some of the authorities proposed to establish these properties as demonstration sites to provide for a means of educating the public as to various measures of flood control and flood proofing.

Twenty one percent (2, 9, 19, 27, 29, 32, 38) of the authorities identified a requirement to develop a hydrologic modeling capability independent of the services provided by MNR. The model capabilities ranged from reservoir operation models to augment summer low flows to full scale flood forecasting models which would be tied into the existing and proposed hydromet stations within the watersheds. This capability would provide the authorities with the luxury of real time flood forecasting as well as having an in-house operations planning tool. Six of the seven authorities desiring this capability are in southern Ontario. No other trends are apparent.

Two authorities (19, 37), 6%, identified the need for a basin study to aid in their understanding of their flooding problems and to produce a sound remedial action plan. The watershed plans indicated that MOE should be contacted to aid the authority in carrying out these basin studies. Both of these authorities are in southwestern region and have identified over fifty percent of above issues in their watershed plans

#### URBAN DRAINAGE

Urban drainage issues were lumped into five categories for review and discussion purposes. Issues covered here ranged from stormwater runoff in old established urban areas to incorporation of new technology in new subdivisions. The issues addressed water quality as well as quantity problems.

The development of a comprehensive stormwater management plan was a key issue for 53% of the authorities (2, 5, 6, 7, 8, 9, 16, 18, 19, 21, 22, 23, 25, 29, 32, 33, 38). Inherent in most of the watershed plans was a need for local urban drainage studies to establish cause and effect relationships for input into the management plan. Government assistance in developing the plan was identified as an essential component by most of the authorities. All of the authorities identifying this issue were in southern Ontario, which correlates well with the fact that the major urban centres are also in southern Ontario. The distribution of the 17 authorities which identified this issue was fairly even among the four southern MOE regions.

Twenty nine percent of the watershed plans (3, 9, 10, 16, 17, 21, 25, 32, 33, 34) called for zoning bylaws as part of their action plans. Most of the zoning changes were in conjunction with hazard land identification for flood control measures. Other zoning issues were concerned with restricting or eliminating certain types of land use and development in areas adjacent to or in the floodplain. Almost all of the authorities with this concept were in southwestern, west-central, and central regions of MOE.

Source control programs were desired by only 12% of the authorities (14, 18, 26, 38). These measures included street sweeping, catchbasin cleaning, sewer separation, ponds, etc. The majority of the authorities preferred to leave control measures to the municipalities rather than take an active role as these four have identified.

Forty seven percent of the watershed plans (2, 10, 13, 16, 21, 22, 23, 25, 26, 27, 29, 32, 33, 35, 36, 38) called for the development of a set of master drainage plans. None of the authorities were willing to take the lead role, rather they proposed to assist the municipalities in preparing the plans. Almost all of the plans which called for the preparation of comprehensive stormwater management plans (see above) also identified the need for master drainage plans. All of the authorities except one which called for the preparation of master drainage plans are located in southern Ontario.

The requirement for increased participation in the plan input and review process was the most popular issue with 62% of the authorities identifying it in their watershed plans (1, 2, 6, 7, 9, 10, 13, 14, 15, 16, 17, 19, 23, 25, 26, 29, 32, 33, 35, 37, 38). Increased involvement of the authority in this process would ensure that all proposed development plans met with the objectives and long range strategies of the conservation authority for the watershed. This is a province wide issue.

## RURAL DRAINAGE

Rural drainage issues, as discussed earlier, deal primarily with non-urban drainage in the watershed. Estate lot development issues tended to be split between urban and rural drainage by most of the authorities and represents one of the grey areas linking the category breakdown presented in this review. For review purposes rural drainage issues were categorized into eight subject areas. Rural drainage ranked slightly ahead of urban drainage in terms of involvement issues cited in the watershed plans with none of the authorities identifying involvement in more than half of the issues.

The most popular issue identified was the need for demonstration projects. This issue was cited in 62% of the watershed plans (1, 2, 7, 9, 10, 13, 16, 17, 18, 19, 23, 25, 26, 27, 31, 32, 33, 36, 37, 38). These projects would be setup either on authority lands or on private lands under agreement with the landowner. The projects would demonstrate types of drainage, proper construction techniques and proper maintenance. Several authorities desired to set up parallel demonstrations of improper techniques to effectively communicate the ideas. This appears to be a province wide issue, however initial projects have already been established by most of the authorities in southwestern region. There appears to be a trend of increasing involvement from east to west within the province.

Nine percent of the watershed plans (14, 24, 31) called for major revisions to the drainage act. The greatest desire was for the conservation authorities to have jurisdiction over drainage projects and drain maintenance programs. Two of the three authorities are in southeastern region while the third is in southwestern region.

The second most cited issue was a desire for increased involvement with OMAF over drainage plan reviews and drain maintenance programs. This issue was cited in 50% of the reviewed plans (5, 6, 7, 8, 10, 14, 16, 17, 23, 24, 25, 26, 29, 32, 33, 36, 37). The authorities desire to have a greater involvement in drainage plan proposal reviews to ensure that they fit within the overall objectives of the watershed plan. Involvement in drain maintenance programs would ensure that the authority could oversee the project and provide for incorporation of new techniques to provide for efficient drainage schemes with minimal environmental impact. All of the authorities desiring this involvement, with the exception of one, are located in southern Ontario.

Thirty two percent of the authorities do not have a complete picture of the drainage activities within their jurisdiction, thus they identified the need to implement or augment existing site mapping and inventory projects (2, 7, 13, 18, 19, 23, 25, 27, 32, 37, 38). The requirement to inventory and prioritize the sites was deemed essential before implementing a remedial action plan. Again, all of the authorities citing this issue, with the exception of one, are in southern Ontario. There is also a trend from east to west with more of the

authorities in southeastern region requiring site inventory and mapping.

Intensive agricultural activities were cited in nine percent of the watershed plans (2, 23, 38) as being the main cause of rural drainage problems. All of the plans called for increased effort on the part of the authority to educate the public and provide measures to upgrade the utilized technology. Two of the three authorities are in southeastern region and the third is in southwestern region.

The development of, or enhancement of an extension services program was a key remedial action issue for 44% of the authorities (6, 7, 9, 10, 13, 14, 16, 19, 21, 22, 30, 35, 36, 37, 38). The extension services program would provide technical and/or financial assistance to private landowners to solve existing problems or upgrade marginal situations. The conservation authority would provide manpower assistance and/or equipment loan or lease to carry out projects approved by the authority. Some of the authorities indicated that grant programs would also be developed to provide financial assistance to landowners exhibiting hardship situations. Participation in the program would be elective rather than by enforcement. All of the authorities attempting to offer this type of service are in southern Ontario.

Ten of the watershed plans (1, 3, 9, 16, 19, 22, 26, 27, 33, 36), 29%, identified the desire for the development of comprehensive rural drainage plans. These plans would be similar in nature to urban drainage plans and would call for minimum construction and maintenance guidelines. These plans would also ensure integrated programs within the watershed and that all future plans would fit within the long range objectives of the watershed plans.

Research into the effects of rural drainage upon the hydrologic and water quality regimes of the watershed was requested by 12% of the authorities (2, 24, 32, 33). A co-ordinated research program between MOE, OMAF and the authorities was requested in each case. Three of the four requests came from authorities in southeastern region.

## EROSION AND SEDIMENTATION

Erosion and sedimentation problems ranked with water quality as the number one issue of concern in the watershed plans. Erosion problems arising from streambanks, shoreline, land surface and wind were all cited. Natural as well as land use activity related problems were also identified. The review was summarized into ten subject areas.

The top ranking issue of concern was the requirement for a comprehensive site mapping, inventory and prioritization program. Seventy nine percent of the conservation authorities included this issue as an essential component of their watershed plans (1, 2, 6, 7, 9, 10, 13, 14, 15, 16, 17, 19, 21, 22, 23, 25, 27, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38). Without a proper database of the problem areas an effective remedial action plan cannot be implemented. This was recognized as the key component in the erosion and sedimentation strategies by all the authorities in this province wide issue.

Provision of funding to private landowners to implement erosion control measures was identified as a component in 44% of the watershed plans (3, 5, 7, 8, 14, 16, 17, 19, 25, 30, 33, 35, 36, 37, 38). Funding would be provided either through existing government grant programs, such as OSCEPAP, or through programs to be developed by the authorities. This concept was limited to authorities in southern Ontario. There is a trend within the province of funding arising from a combination of authority programs and OSCEPAP in southwestern region to solely authority programs in southeastern region .

Poor quality agricultural activities were implicated as a major contributor to erosion and sedimentation problems in 23% of the watershed plans (8, 10, 15, 18, 22, 24, 33, 38). Authorities citing this issue were primarily in southwestern and central regions. The remedial action most frequently proposed was the promotion of sound agricultural practices.

Part of the remedial action plan for the above issue is the use of demonstration projects. Fifty six percent of the authorities included this as a component of their watershed plans (1, 7, 9, 10, 13, 16, 17, 18, 19, 24, 25, 26, 27, 32, 33, 35, 36, 38). These projects would be setup to demonstrate various erosion control measures, their proper construction and maintenance. Sites would be setup either on authority lands or on private lands via an agreement with the landowner. This is a province wide issue, however several authorities in southwestern region have already developed demonstration farms to provide for demonstration and comparison of a wide range of technologies.

Reforestation of both public and private lands was a required component in 44% of the reviewed plans (1, 3, 9, 16, 17, 18, 19, 21, 24, 29, 32, 33, 35, 36, 38). Reforestation was cited as a primary control measure for wind erosion, shoreline and streambank erosion. Most of the authorities have active programs for authority owned or leased property. The plans called for the establishment of private landowner assistance projects. Under the program the authority would provide manpower and equipment to plant the trees purchased by the landowner from the authority. None of the authorities in northern Ontario identified this as part of their plans.

The development and promotion of an extension services program was indicated by 56% of the authorities (3, 6, 9, 13, 14, 16, 19, 23, 25, 26, 27, 29, 30, 32, 33, 35, 36, 37, 38) to be part of their watershed plans. The extension service program is a facility whereby the conservation authorities provide technical assistance to private landowners for control measures. The assistance would be in the form of manpower and/or equipment. This appears to be a province wide issue.

A priority issue for 44% of the conservation authorities is the development of a comprehensive erosion control program (1, 2, 13, 14, 15, 17, 19, 21, 22, 24, 25, 26, 27, 35, 37). This is an abatement oriented program in which the authority identifies and prioritizes the erosion sites. Voluntary compliance with the authority's remedial action plan is desired, however the authorities are prepared to do the remedial action at the landowner's expense. All of the plans indicated that all reasonable measures would be taken to solicit voluntary compliance as the authorities would prefer not to have a "police" image to the watershed residents. This is a province wide issue.

Coupled with all of the strategies in the erosion and sedimentation section of the watershed plans is an effective public information program. Specific reference to the enhancement or establishment of such a program was made in 38% of the watershed plans (1, 6, 8, 10, 14, 16, 22, 24, 27, 29, 32, 33, 35). Components of the program call for the production and distribution of information brochures, displays at local fairs, radio and/or television advertising, and direct contact by knowledgeable field personnel. This program was primarily identified by authorities in southern Ontario, however the distribution appeared to be province wide.

Two of the authorities (21,37), 6%, identified that a land acquisition program is part of their control strategy. The program would involve acquiring the land which was exhibiting high erosion rates or a high erosion potential. Lands in this category would fall within the hazard land classification in the zoning by-laws. This appears to be a local issue and one which would be chosen as a last resort.

A conservation services program was favoured by 35% of the conservation authorities (3, 9, 10, 14, 16, 25, 29, 30, 33, 35, 37, 38). This program is similar to the extension services program except that a pro-active approach would be taken. The use of sound conservation practices would be promoted through this program. The authority would promote the adoption of conservation tillage equipment and practices through on site demonstrations and equipment loans and leases. In addition, the authority would promote the use of a wide range of erosion control practices before the situation in the watershed becomes too severe. This appears to be an issue restricted to southern Ontario.



## WATER QUALITY

Concerns over present and future water quality problems ranked equally with erosion and sedimentation as the top priority issue among the watershed plans. Water quality is intimately related to water use activities and fish and wildlife management objectives. This review will only address the issues which directly impact upon instream water quality problems. The review is categorized into thirteen subject areas to facilitate discussion.

The conservation authorities are closely allied with MOE through the Provincial Water Quality Monitoring Network (PWQMN). The authorities allocate staff resources to perform the water quality sampling for the ministry. In addition, many of the authorities have supplemented the network with their own sampling locations. Fifty percent of the watershed plans examined the issue of the usefulness of the existing PWQMN (2, 3, 5, 7, 8, 13, 14, 16, 17, 18, 19, 23, 26, 31, 33, 35, 36). The major concerns were over the usefulness of the existing station locations with respect to proposed and ongoing authority watershed activities. The major complaint is that the stations are not located to provide information about local issues and point source inputs. The main component of the programs is to negotiate with MOE concerning expansion of the existing network or relocation of certain stations to sites which the authorities consider to be priority. All of the authorities, except one, which addressed this issue are situated in southern Ontario. There is no apparent trend throughout the four southern regions.

Companion to the network revisions is the need identified by 29% of the authorities for enhanced analysis of the collected data. At present, MOE sends a copy of the final approved data back to the authorities with no analyses. The ten authorities (1, 2, 5, 11, 13, 14, 19, 22, 29, 35) which identified this issue have all requested MOE for trend analysis and help with performing and understanding statistical tests on the data. The acquisition of microcomputers by most of the authorities has greatly enhanced their capability to handle and analyze data. The plans call for MOE assistance in these areas. All of the authorities requesting this assistance are in southwestern, central and southeastern regions.

Thirty five percent of the watershed plans identified a multitude of known and unknown source areas as contributing to general quality problems. All of their authorities (2, 5, 7, 17, 18, 19, 24, 25, 29, 31, 32, 35) identified the need for abatement oriented sampling and "search and destroy" projects. The plans called for liaising with both MOE and OMAF in order to carry out the projects. In most cases the plans indicated that enforcement activities would be left to the jurisdiction of the appropriate government agencies. This issue was restricted to authorities in southern Ontario.

Low flow problems were cited in 32% of the plans (6, 10, 13, 14, 18, 19, 25, 30, 31, 36, 38). Problems with low flow are generally effluent dilution DO—BOD quality associated. Some of the authorities indicated that water use conflicts between flood protection and flow augmentation required resolving. MOE assistance in providing remedial action plans was requested in all cases. Again, this appears to a problem generally distributed throughout southern Ontario.

Potential or actual groundwater contamination problems were identified by two authorities (30, 31). This comprised six percent of the reviewed plans. In these cases MOE assistance was solicited to help to determine the source and extent of the problem and to help develop a remedial action plan. Both authorities are in southeastern region.

Problems associated with waste discharges were referred to in 41% of the plans. These watersheds (1, 8, 9, 14, 16, 17, 18, 19, 23, 24, 27, 32, 37, 38) received point source wastes from municipal and industrial sources and a combination of point and non—point agricultural sources. The waste types range from nutrients to industrial trace contaminants. All of the authorities identified the need for cooperation with government agencies to develop programs to assess the extent of the problems and to provide remedial action plans. This is a province wide issue.

Half of the watershed plans (1, 8, 9, 10, 14, 16, 17, 19, 23, 24, 25, 32, 33, 35, 36, 37, 38) identified a multitude of agricultural activities as being a major contributor to degraded water quality. This southern Ontario issue was distributed equally west to east although the magnitude of the problems appear to be greater and better defined in southwestern and west—central regions. Some of the problems which were specifically identified are; cattle access, manure pile leaching, suspected illegal tile drain connections, barnyard runoff, pesticide and fertilizer application drift and runoff, and soil erosion. This issue was also addressed in the rural drainage and the erosion and sedimentation sections.

The MOE Self Help program for inland lakes was considered by 17% of the conservation authorities (2, 6, 13, 22, 27, 30). Under this program the Ministry provides assistance to landowners, primarily cottage owners, on inland lakes to carry out a water quality analysis program. They also identified the need for more analysis of the data and better transferral of the information back to the residents. The authorities in southeastern region are the most supportive of this program.

Twenty six percent of the authorities indicated that there are many local problem areas within their watersheds (2, 3, 7, 17, 22, 25, 27, 37, 38). The plans identified that these small scale problem areas are largely unknown in terms of contributing sources and abatement measures. These authorities, distributed throughout the province, have all identified the need for MOE assistance in carrying out local studies within the watersheds. The plans call for abatement type of monitoring surveys and remedial measure implementations.

Three of the authorities (2, 6, 9), 9%, identified drinking water concerns in their plans. Two of the authorities are in southeastern region and the third is in west-central region. All three authorities identified a requirement for assistance in carrying out groundwater studies.

High nutrient levels and bacterial contamination were cited in 26% of the watershed plans (7, 9, 14, 16, 19, 25, 32, 36, 38) as being issues of high level concern. The majority of the authorities experiencing these problems are in southwestern and west central regions. Some of the plans identified specific sources while others stressed the mainly unknown nature of the problem. All of the watershed plans called for studies to be conducted to identify the sources and develop remedial action plans.

Aquatic plant problems play a significant role in the daily operations of 29% of the conservation authorities (2, 9, 13, 14, 16, 19, 25, 31, 32, 36). Problems range from aesthetics and loss of recreational use to presenting a hazard to navigation. Weed harvesting and chemical control are the two major programs currently used. The majority of the authorities expressing concerns due to navigational problems are in central and southeastern regions while the authorities in west-central and southwestern regions are more concerned from a DO quality and aesthetics view. There is a high degree of overlap between the authorities identifying weed problems and those expressing nutrient level concerns. This is not unexpected. Action plans identified in the watershed plans range from nutrient source abatement to research into more efficient control methods.

Most of the conservation authorities identified a matrix of water quality concerns in their watershed plans. Some of them have a fairly clear picture of the problems while others have almost no conception of the source areas. In fact, 29% of the authorities requested assistance from MOE and OMAF in carrying out comprehensive watershed basin studies (1, 2, 6, 7, 14, 18, 19, 27, 30, 33). Requests were identified by both northern and southern Ontario authorities. Most of the basin studies would require problem identification, contributing source area isolation, and remedial action plan formulation.

## OTHER

In the course of the review there were five areas of concern which were referred to but which fell into several of the above categories. It was decided to treat them separately, thus the "other" category was defined.

The public information and awareness programs received the most attention with 85% of the authorities identifying areas for improvement (1, 3, 5, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 27, 29, 31, 32, 33, 35, 36, 37, 38). The technical level information programs were identified and discussed above. The programs referred to here involved communicating information to the general public. Plans call for development of historic and natural history conservation areas, enhanced co-operative educational programs in conjunction with local school boards, production of brochures and information bulletins, radio and television programs etc.

The main objective of these plans are to make the public more aware of the issues of concern in the watershed, alert them to the authorities programs to deal with the issues and to solicit the public's assistance and support in implementing the programs. This is a province wide concern.

Beaches, as one would expect, are an issue of high level concern among the conservation authorities. Recreational beach areas are one of the main reasons why the public come to conservation areas and hence are a major source of income for the authorities. Seventy four percent of the conservation authorities indicated that they operate recreational beaches (1, 2, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 17, 19, 21, 22, 23, 25, 29, 30, 32, 33, 35, 37, 38) and all of them expressed concern over fear of closures. Some of the authorities identified that some beaches are intermittently closed while others identified long term closures. All of the plans called for programs to either clean up the beaches and contributing source areas or develop technologies to maintain the open status of the beach. The beach issue is province wide in nature.

Although discussed earlier in the erosion and sedimentation section, reforestation warrants discussion here also. Fifty three percent of the watershed plans discussed reforestation projects for purposes other than erosion and sediment control (2, 5, 7, 8, 10, 13, 14, 15, 18, 22, 24, 25, 27, 30, 32, 33, 37, 38). Most of the authority owned or leased land is under reforestation and forest management projects. The watershed plans called for increased involvement with private landowners. Under these programs the landowner would enter into a forest management agreement with the authority in return for technical and manpower assistance in carrying out the reforestation project. These projects would be primarily aimed at idle land tracts. This issue was identified throughout the province.

Twelve percent of the watershed plans (1, 2, 15, 17) indicated that the authority does not have a private landowner assistance program at present. The development of such a program was identified as an essential component in the plan. Under a private landowner assistance program the authority would provide assistance to a landowner, financial or technical (manpower and/or mechanical), in return for certain guarantees from the resident. Projects to be carried out could range from minor floodproofing to major erosion control structures. Distribution of the four authorities is even across the province.

Wetlands play a prominent role in the hydrologic regime of a watershed. The issue of wetland preservation was raised in 53% of the watershed plans (2, 3, 6, 7, 9, 10, 13, 14, 16, 26, 29, 30, 32, 33, 35, 36, 37, 38).

The authorities, primarily in southern Ontario, have varying approaches to the wetlands. Some authorities call for basic research into the effects of wetlands on the hydrologic and water quality regimes of the watersheds. Most of the watershed plans call for acquisition of wetlands to preserve their extent and quality.

## 2.2. Annual Reports

The following review of the annual reports is presented to serve as a comparison between the activities identified in the watershed plans and the activities being actively carried out by the conservation authorities.

The activities identified in the annual reports were categorized into 18 subject areas. Table V presents the summarized results. The table shows the percentage of authorities actively involved in the activity and lists the authorities. The same numbering codes as used in the previous section are used here.

Very few of the annual report activities exhibited trends within the province. Most of the activities are distributed province wide. Exceptions to this are; structural floodproofing being only in southwestern and central regions; development of a flood control policy is an activity solely in southeastern region; expansion of the hydromet networks was active in central, southeastern and northeastern regions; rural drainage is an active activity in southeastern and west central regions; demonstration projects (primarily erosion and sedimentation related) are a current item in southwestern, west-central and southeastern regions; refinements in the water quality monitoring networks is ongoing in southwestern and central regions; another hot issue in southwestern, west-central and central regions is the preservation of wetlands; the promotion of the OSCEPAP is going on only in southwestern region as is a hazard land acquisition program; southeastern region lays claim to all of the hydrologic model development.

**Table V:** Annual Report Summary Results

Activity	% Authorities	
	Actively Involved	Authorities Actively Involved
Erosion Control	71	1, 5, 7, 10, 13, 14, 15, 16, 17, 18, 19, 21, 23, 24, 25, 26, 27, 29, 31, 32, 33, 35, 36, 38
Structural Flood proofing	6	3, 5
Reforestation	71	1, 2, 3, 5, 7, 9, 10, 11, 13, 16, 17, 18, 19, 24, 25, 26, 27, 29, 30, 32, 33, 35, 37, 38
Flood Control Policy	6	22, 34
Structural Flood Control	50	2, 3, 5, 7, 9, 10, 11, 13, 16, 17, 18, 19, 24, 25, 26, 27, 29, 30, 32
Expand Hydromet Network	12	13, 22, 23, 26
Developing Public Information Program	23	2, 9, 21, 23, 25, 26, 27, 37
Flood and Fill Line Mapping	56	3, 7, 9, 10, 11, 15, 16, 17, 19, 22, 24, 25, 26, 30, 33, 35, 36, 37, 38
Plan Input and Review	65	1, 2, 3, 6, 9, 10, 11, 14, 15, 16, 17, 21, 22, 25, 26, 27, 30, 35, 36, 37, 38
Conservation Service Program	35	1, 3, 7, 9, 14, 19, 21, 24, 27, 30, 33, 38
Basin Studies	23	2, 10, 21, 27, 30, 35, 36, 38
Rural Drainage	6	2, 16
Demonstration Projects	18	1, 7, 9, 17, 19, 36
Water Quality Monitoring	9	1, 7, 13
Wetland Preservation	15	3, 11, 13, 16, 38
Promotion of OSCEPAP	6	1, 37
Land Acquisition	3	38
Hydrologic Model	3	36

It is interesting to compare the trends of issues identified in the watershed plans to the trends of activities in the annual reports. Generally, there is a close similarity in the trends between the plans and the annual reports. There are a few interesting differences, these are discussed below.

The issue of expansion of the hydromet networks was identified province wide in the plans. This activity is only receiving attention in the eastern sections of the province (central, southeastern and northeastern regions). The prime reason for this being the fact that flooding problems have been more prevalent in southwestern Ontario, thus a greater effort has been put into developing the flood forecasting capabilities in these regions. The authorities in the eastern section of the province are devoting a greater portion of their effort to developing the capabilities which already exists within southwestern Ontario.

The hazard land acquisition program is only active in southwestern Ontario while it was identified as a province wide issue. This is not a surprising fact. The conservation authorities in southwestern Ontario have done the most work towards mapping and inventorying their lands for flood and erosion events. They are, by consequence, in the best position to carry out hazard land identification and zoning activities.

Flood forecasting and hydrologic model development while an issue identified throughout the province was, surprisingly, only identified as being a current activity in southeastern region. The development of a model requires a good database and monitoring network, particularly for flood forecasting. As this is best developed in southwestern Ontario it would make sense for the model development activity to be current there also. One possible explanation for this not being the case is the expansion of the hydromet networks in eastern Ontario. An obvious plan of action would be to develop such a network in conjunction with model development.

Rural drainage problems were cited throughout southern Ontario in the watershed plans, however the current activities are restricted to southeastern and west central regions. This may not be a true reflection of the picture as only two authorities identified rural drainage activities in their annual reports.

Demonstration projects, although desired throughout the province, are actively receiving attention in three regions. Authorities in southeastern region are active in demonstrating rural drainage techniques. This is in conjunction with the rural drainage activities being carried out in the region. Authorities in southwestern and west-central regions are primarily involved with erosion and sedimentation demonstration projects.

The issue of wetland preservation is a southern Ontario issue. Authorities in southwestern, west-central and central regions are active in pursuing this activity. This agrees well with the fact that the land base is more developed in these areas, thus the wetland recharge areas are under greater pressure. Protection of these areas is, therefore, of more immediate concern for these conservation authorities.

Tables VI and VII present the watershed plan issues vs the annual report activities in a slightly different manner. In these tables the authorities are compared in terms of levels of activities. A high rating indicates that the activity was of prime concern to the authority and/or a high number of issues were identified in the plan. A low rating indicates a low priority to the authority and/or a low number of issues. It should also be remembered that an issue could earn a high rating but the authority might identify a low number of activities. In this case an activity level of high was assigned.

Examination of the information in these two tables yields some interesting results. With the exception of urban drainage the average activity level in the plans was slightly higher than that indicated in the annual reports. This indicates that either the work programs are going to become more intense as more programs come on-line or that the authority work programs are constrained by monetary and/or manpower limitations. Flood control received the lowest activity rating, while erosion and sedimentation rated the highest. There are no obvious regional trends in these ranking results, neither are there any outstanding provincial trends. Some of the authorities rated higher in the annual reports than in the watershed plans. There was no consistency in this trend between issues and among authorities. This indicates that some of the authorities underestimated the level of the problem in the watershed in their watershed plans. Once programs were initiated the true magnitude of the problem was realized and the remedial action programs were adjusted accordingly.

### **3.0 Effect on Ministry**

In this section of the review two areas will be discussed. What is the Ministry's role in addressing the issues and concerns expressed by the conservation authorities in their watershed plans and annual reports? What are the implications upon future Ministry programs and what impact might this have on the Ministry's mandate?

This section of the review is based upon the ministry goal: "To ensure that the surface waters of the province are of a quality which is satisfactory for aquatic life and recreation".



**Table VI:** Level of Activity Identified in Watershed Plan

Conservation Authority	Flood Control	Urban Drainage	Rural Drainage	Erosion & Sedimentation	Water Quality	Other
Ausable-Bayfield	L	L	M	H	H	M
Cataraqui Region	H	M	H	M	H	H
Catfish Creek	M	N	M	M	M	L
Central Lake Ontario						
Credit Valley	L	L	M	H	M	H
Crowe Valley	M	L	L	L	L	M
Essex Region	M	L	M	M	H	H
Ganaraska Region	M	L	N	L	M	L
Grand River	H	M	M	M	H	M
Grey-Sauble	M	M	M	M	M	M
Halton Region	L	N	N	N	L	L
Hamilton Region						
Kawartha Region	M	M	M	H	M	H
Kettle Creek	M	L	M	M	H	M
Lakehead Region	M	N	N	M	L	M
Long Point Region	L	L	H	H	H	M
Lower Thames Valley	H	M	M	H	M	L
Lower Trent Region	M	M	M	H	H	M
Maitland Valley	H	M	M	H	H	M
Mattagami Region						
Metropolitan Toronto & Region	L	M	L	H	L	M
Mississippi Valley	M	M	M	H	M	L
Moira River	M	M	H	M	H	M
Napanee Region	L	L	M	H	M	L
Niagara Peninsula	M	M	M	M	H	M
Nickel District	M	M	M	M	L	L
North Bay-Mattawa	H	M	L	H	H	M
Nottawasaga Valley						
Otonabee Region	H	M	L	H	M	M
Prince Edward Region	L	N	M	M	H	M
Raisin River Region	M	N	H	L	M	M
Rideau Valley	M	M	M	H	M	M
Saugeen Valley	M	M	H	H	M	M
Sault Ste. Marie Region	M	M	L	L	N	N

**Table VI:** Level of Activity Identified in Watershed Plan

Conservation Authority	Flood Control	Urban Drainage	Rural Drainage	Erosion & Sedimentation	Water Quality	Other
South Lake Simcoe	H	M	M	H		M
South Nation	M	L	M	H	H	L
St. Clair Region	H	M	M	H	M	M
Upper Thames River	M	M	M	H	M	L

H - High Level of Activity

N - Medium Level of Activity

L - Low Level of Activity

N - None Identified

**Table VII:** Level of Activity in Current Annual Report

Conservation Authority	Flood Control	Urban Drainage	Rural Drainage	& Sedi-mentation	Water Quality	Other
Ausable-Bayfield	N	N	M	H	M	L
Cataraqui Region	M	M	H	H	M	H
Catfish Creek	M	M	M	H	L	L
Central Lake Ontario						
Credit Valley	M	L	L	M	M	M
Crowe Valley	M	M	N	N	N	N
Essex Region	N	N	H	H	M	H
Ganaraska Region						
Grand River	H	M	M	H	M	L
Grey-Sauble	M	M	M	H	M	L
Halton Region	L	M	N	L	M	M
Hamilton Region						
Kawartha Region	N	M	M	H	H	H
Kettle Creek	N	M	M	H	N	L
Lakehead Region	M	H	L	M	M	N
Long Point Region	M	H	N	H	L	M
Lower Thames Valley	M	M	M	M	L	L
Lower Trent Region	M	L	L	M	M	H
Maitland Valley	H	L	M	H	N	M
Mattagami Region						
Metropolitan Toronto & Region	M	H	M	H	H	L
Mississippi Valley	H	M	N	N	N	N
Moira River	M	L	L	M	M	H
Napanee Region	M	L	H	H	L	M
Niagara Peninsula	M	M	L	M	N	L
Nickel District	H	M	N	H	L	M
North Bay-Mattawa	M	M	L	H	H	M
Nottawasaga Valley						
Otonabee Region	M	N	N	M	N	M
Prince Edward Region	L	M	L	M	M	L
Raisin River Region	N	N	M	M	N	N
Rideau Valley	H	M	N	M	M	M
Saugeen Valley	M	M	L	M	L	M
Sault Ste. Marie Region	M	L	N	N	N	N
South Lake Simcoe	L	M	M	M	M	L
South Nation	H	M	M	H	M	M
St.Clair Region	H	M	M	H	L	M
Upper Thames River	H	M	M	H	M	M

H - High level of Activity

L - Low

M - Medium level of Activity

N - None Identified

Under the category of flood control the ministry might interact with the conservation authorities in three areas. The ministry could be called upon to provide technical assistance to some of the authorities when they establish new stations in their hydro-meteorologic network. The major program in which the ministry should be involved is in the development of the flood forecast and hydrologic models. The ministry has been involved in model development in past studies (Thames River, Grand River, etc). There is a definite need for the continued contact with the authorities in this area. MOE can play either a lead role in developing the technology and transfer to the authority or it can work in conjunction with the authority by providing technical assistance. Two authorities, Maitland Valley and St. Clair Region, directly identified the need for government assistance in carrying out basin studies to assess the hydrologic regime in the watersheds. The ministry should pursue this activity.

Rural drainage issues fall primarily under the jurisdiction of the Ministry of Agriculture and Food, OMAF. Two possible areas of MOE involvement here are in demonstration projects and in drainage research. This should involve co-operative efforts between OMAF, MOE and the conservation authorities. The grey area concerning jurisdiction over municipal drains and tile drains is a subject which requires examination by both MOE & OMAF. The eventual clarification of this conflict could result in a change in MOE's mandate. Some of the activities identified under the demonstration projects and extension services program may warrant ministry input under the agricultural programs.

The issue of erosion and sedimentation is a subject area where MOE should play a lead role. As any erosional activity acts to alter the quality of the receiving water it is completely within the goal of MOE to address these activities. Ministry involvement should probably cover the funding, demonstration projects, conservation services and extension services aspects. There is a large opportunity for co-operative research-remedial action type of activities to be carried out with the authorities. The rural beaches program and the enhanced OSCEPAP program are two areas which should be examined with respect to erosion and sedimentation.

Water quality issues fall directly within the mandate of the ministry, thus this is the area where MOE has the greatest potential for co-operative efforts with the conservation authorities.

The requirement by MNR that the conservation authorities acquire the ENVOY 100 system to link them into the provincial flood forecast system has introduced them to the wonders of microcomputer technology. Almost all of the authorities have, by now, acquired computers and are actively pursuing avenues to give them a better understanding of their watersheds. The logical first step is for the authorities to computerize their water quality data and perform some sort of analysis. As discussed earlier, twenty nine percent of the authorities requested direct MOE assistance in data analysis. MOE should take an active role

in this area in providing comprehensive assistance in the fields of data management and analysis.

A companion to the above is the request by 17 of the conservation authorities that the Provincial Water Quality Monitoring Network stations be re-examined. All of the authorities fully support the existing program whereby staff from the authorities carry out the sample collection program for MOE. The authorities feel that the data collected from these stations are not sufficient to resolve the problems within the watershed. They would prefer to either relocate sampling stations or expand the network to provide more meaningful localized data. MOE should take an active role in examining each request and developing a monitoring program which meets the needs of both the ministry and the authorities.

The regional offices as well as head office should examine the many requests for MOE assistance in carrying out abatement action programs. Most of the authorities lack either the technical expertise or manpower and equipment to carry out such programs. It is also within the mandate of the ministry to carry out enforcement activities. The authorities prefer that the government take this role as they desire to remain on "good terms" with the watershed residents.

The many cases of waste discharges causing localized problems are an area for probable waste assimilation studies. They should be examined on a case by case basis to determine what the best course of action should be. In cases where several discharges are impacting upon a receiving waterbody the potential exists for the Ministry to participate in an integrated water management study with the Conservation Authority and other ministries.

Agricultural activities were cited as being a primary source of water quality problems in 50% of the watershed plans. This is a definite area for attention by the agricultural programs group in the ministry. This is an area where the ministry should carry out an advertising and P-R program to make the conservation authorities aware of the programs and facilities available from the ministry.

A major historical involvement of the ministry has been that of carrying out comprehensive basin studies. Based on the direct request for MOE to carry out such investigations by the authorities this will continue to be a major MOE involvement. The authorities which requested basin studies did so based on the fact that there are either a multitude of interacting sources impacting upon the watershed which require a comprehensive remedial action program to effect a change or that their interactions and their full extent are unknown. A second reason for the requests is that the authorities lack the technical expertise, the manpower and the monetary resources to carry out such major

programs.

As 74% of the authorities identified that they operate recreational beach areas and that these beaches represent major public relational and monetary sources for them, the ministry should be concerned over the well being of the beaches. This area provides a large potential for future ministry involvement through the recently developed provincial beaches program.

The above discussion indicates that there is a vast potential for ministry interaction with the conservation authorities as they proceed with the implementation of their watershed plans. A problem arises when the limited resources of MOE are considered-too much work too few resources. Where should MOE focus its attention? Which authorities should receive assistance first? How should they be prioritized?

An attempt to develop a subjective method to answer these questions is presented in Table VIII. In this table the involvement of the conservation authorities is summarized in terms of number of activities identified in the watershed plans and the number of current activities identified in the annual reports. The authorities can then be ranked within the particular subject area of interest. For example, under the subject of flood control the Maitland Valley C.A. (7) ranks number one with seven identified issues of concern. If erosion is the subject of concern then two authorities, 33 and 35 (Saugeen Valley, South Lake Simcoe) share top honour with eight issues.

In attempting to rank the authorities with basin studies in mind then it is best to consider the total number of issues identified in the watershed plans. With this in mind Maitland Valley ranks number one with 30 issues, followed closely by Upper Thames with 29 issues.

It can be seen from this table that there is a group of nine authorities which identified 25 or more issues in their watershed plans. It is not possible to carry out nine parallel basin studies, thus this group must be ranked. In order to aid this process the number of activities identified in the annual reports is included in Table VIII. Taking this into consideration Cataraqui Region (26 issues identified, working on 6) would be ranked higher than the Rideau Valley (26 issues identified, working on 4). The logic for this ranking being that an authority addressing more problems would probably yield a better success rate in terms of problems alleviated with MOE assistance. One flaw in this logic is that the authority addressing the lower number of issues may be doing so only because of limitations in technical expertise or manpower. In this case, assistance from MOE could result in a considerable number of issues being addressed and alleviated.

No attempt will be made here to develop a priority list of conservation authorities for MOE assistance. The information presented here can serve as a screening tool to produce a short list for prioritizing. The watershed plans should then be reviewed for detailed information. The conservation authorities should then be consulted and interviewed as real world circumstances often change frequently while things in print tend to be "engraved in stone". All of these facts should then be considered together when preparing a final priority list.

One major impact upon the present ministry mandate is that MOE will probably be increasingly called upon to take a proactive rather than a reactive role. Once the immediate, obvious problem situations are resolved the conservation authority programs are going to shift to marginal or potential situations. If MOE is going to continue to assist the authorities in their programs then the ministry will have to redirect its programs. The ministry will become increasingly involved in preventing a potential problem from occurring rather than attacking a pollution problem once it has occurred.

#### **4.0 Reviews**

The material presented in the following section is a summary review for each conservation authority. The information tabulated here is the supportive documentation for the preceding discussions.

A standard format was prepared to facilitate quick and easy comparisons between the authorities. Each review presents the current active projects which were identified in the annual reports. The watershed plan review, which follows the annual report highlights, is subdivided into the six categories discussed earlier, (Flood Control, Urban Drainage, Rural Drainage, Erosion & Sedimentation, Water Quality, Other).

The material here, as mentioned earlier, is supportive documentation to the foregoing discussions. It also provides for an intermediate level of information prior to a detailed review of the watershed plan. It is suggested that this material be used in conjunction with the foregoing prior to delving into the detailed plans.

**Table VIII:** Summary of Activity Involvement in Watershed Plans and Annual Reports

NUMBER OF ISSUES IDENTIFIED IN WATERSHED PLAN

Conservation Authority	Flood Control	Urban Drainage	Rural Drainage	Erosion & Sedimentation	Water Quality	Other	Total	Activities in Annual Report
1	1	1	2	5	4	3	16	7
2	5	3	4	2	7	5	26	6
3	2	1	1	4	2	2	12	7
4								
5		1	1	1	3	3	9	3
6	4	2	2	3	4	2	17	2
7	2	2	4	3	5	4	20	6
8	2	1	1	3	3	3	13	
9	6	3	3	5	4	4	25	7
10	3	3	3	5	2	4	20	6
11	1				1	1	3	4
12								
13	4	2	3	4	4	5	22	5
14	2	2	3	6	7	4	24	3
15	2	1		3		4	10	3
16	2	4	4	7	4	4	25	6
17	4	2	2	5	5	3	21	6
18	2	2	2	3	5	2	16	3
19	7	2	4	6	8	3	30	6
20								
21	2	3	1	4		2	12	6
22	4	2	2	4	3	3	18	4
23	4	3	4	2	3	2	18	3
24	3		3	5	3	2	16	4
25	4	4	3	6	5	4	26	5
26	5	3	3	3	1	2	17	7
27	5	1	3	5	4	2	20	6
28								
29	5	3	1	5	2	3	19	3
30	2		1	4	4	3	14	5
31	3		2	1	4	2	12	1
32	4	4	4	5	4	5	26	4
33	2	4	4	8	3	4	25	6
34	3	1		1			5	1
35	3	2	2	8	4	3	22	6
36	3	1	4	5	4	3	20	7
37	5	2	4	7	3	4	25	5
38	5	4	4	7	5	4	29	9



**TABLE VIII:** Summary of Activity Involvement in Watershed Plans and Annual Reports.

CONSERVATION AUTHORITY	RANK BASED ON PLAN	RANK BASED ON ANNUAL REPORT
1	12	2
2	3	3
3	15	2
4		
5	17	6
6	11	7
7	8	3
8	14	
9	4	2
10	8	3
11	19	5
12		
13	6	4
14	5	6
15	16	6
16	4	3
17	7	3
18	12	6
19	1	3
20		
21	15	3
22	10	5
23	10	6
24	12	5
25	3	4
26	11	2
27	8	3
28		
29	9	6
30	13	4
31	15	8
32	3	5
33	4	3
34	18	8
35	6	3
36	8	2
37	4	4
38	2	1

CONSERVATION AUTHORITY:

AREA:

MOE REGION:

ANNUAL REPORT CURRENT PROJECTS

WATERSHED PLAN

- 1) FLOOD CONTROL
- 2) URBAN DRAINAGE
- 3) RURAL DRAINAGE
- 4) EROSION & SEDIMENTATION
- 5) WATER QUALITY
- 6) OTHER AREAS OF CONCERN

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CONSERVATION AUTHORITY: Raisin River Region

AREA: 1481 km<sup>2</sup>

MOE REGION: Southeastern

### ANNUAL REPORT CURRENT PROJECTS

- active farm drainage and erosion control program

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - priority issue
  - inventory, site mapping and prioritizing to be done
  - develop Fill and Construction Guidelines
  - install 5 additional stream gauges
- 2) URBAN DRAINAGE
  - no specific objectives
- 3) RURAL DRAINAGE
  - no specific objectives
  - poor tillage practices and cattle access are major problems
  - implement demonstration projects
  - possible OSCEPAP funding
  - attempt to include municipal drainage works under C.A. authority
  - organic and chemical fertilizer runoff
  - 50 - 60% of land area is agricultural
- 4) EROSION & SEDIMENTATION
  - no formal objectives
  - site mapping and prioritize areas
  - no surface soil erosion plans
- 5) WATER QUALITY
  - set own standards
  - extend MOE network
  - implement local control strategies
  - request MOE aid to develop remedial action plans
  - implement a groundwater inventory
  - low flow odour and aesthetic problems
- 6) OTHER AREAS OF CONCERN
  - extensive areas of weed growth
  - weed harvesting required to maintain public use of water
  - enhance public information and Extension Service programs

8330g/jmt/ src

CONSERVATION AUTHORITY: Credit Valley

AREA: 1070 km<sup>2</sup> MOE REGION: Central

#### ANNUAL REPORT CURRENT PROJECTS

- active erosion control program
- active structural floodproofing program active reforestation program
- water quality project in Orangeville reservoir

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- extensive streamflow network
- plan for 20 year flood protection

##### 2) URBAN DRAINAGE

- Mississauga Waterfront Development Plan
- implement a stormwater management plan

##### 3) RURAL DRAINAGE

- intensive row cropping
- estate developments are of increasing concern
- no conservation land management demonstrations planned
- request OMAF to provide funding for demonstrations
- Caledon Creek is area of prime concern

##### 4) EROSION & SEDIMENTATION

- active program for 28 years
- 11 high priority target areas
- 79 medium priority sites
- enforce structural and non-structural remedial measures
- high level incentive program

5) WATER QUALITY

- 15 MOE sample sites
- liaise with MOE to expand network
- expand data analysis
- problems with Orangeville reservoir and STP
- request MOE for assistance with special studies to investigate localized problems

6) OTHER AREAS OF CONCERN

- 3 major beach areas
- active reforestation project - up to 150000 trees per year
- active land acquisition program
- expand public information program
- expand enforcement program
- implement a Private Lands Reforestation Program

8330g/jmt/ src

CONSERVATION AUTHORITY: Sault Ste. Marie Region

AREA: 300 km<sup>2</sup> MOE REGION: Northeastern

#### ANNUAL REPORT CURRENT PROJECTS

- adopt regional flood level
- review floodplain policy

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- complete mapping to regional flood level
- complete channelization of urban area
- operate dams at 1:100 year storm policy

##### 2) URBAN DRAINAGE

- channelization
- enforce Provincial Hazard Land Policy

##### 3) RURAL DRAINAGE

- declining numbers of active farms
- large scale logging activities

##### 4) EROSION & SEDIMENTATION

- no streambank erosion control projects
- inventory, map and prioritize areas

##### 5) WATER QUALITY

- no identified problems

##### 6) OTHER AREAS OF CONCERN

- none identified

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CONSERVATION AUTHORITY: Lower Trent Region

AREA: 2121 km<sup>2</sup> MOE REGION: Central

#### ANNUAL REPORT CURRENT PROJECTS

- active reforestation project
- industrial spill project for Trenton
- ice jam and flood control projects
- streambank erosion inventory complete
- pollution conference at Loyalist College
- site for 1986 Planning Match
- active erosion control program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- extensive streamflow and precipitation network
- significant urban development in flood prone areas
- enact a Fill, Construction and Alteration to Waterways Regulation
- small dam operation policy

##### 2) URBAN DRAINAGE

- develop a master drainage plan
- develop a comprehensive control strategy for wet and dry flows
- incorporate major-minor concept in all new development
- include erosion and sediment controls in plan

##### 3) RURAL DRAINAGE

- very limited quality and quantity data
- 150,000 metres of tiles being installed per year
- require mapping and inventory project
- initiate an education and demonstration program

##### 4) EROSION & SEDIMENTATION

- cattle access, poor tillage practices, intense row cropping
- identified as major problems
- active remedial measures program
- possible OSCEPAP funding
- active tree planting program
- demonstration farm sites

5) WATER QUALITY

- summer low flow problems
- review and expand MOE network
- request MOE to aid in comprehensive quality surveys
- request MOE to aid in abatement monitoring and programs
- sewage and landfill problems
- extraction industry increasing

6) OTHER AREAS OF CONCERN

- leave regulation and enforcement to respective ministries (OMAF, MOE, MNR)
- increase private reforestation and windbreak programs
- implement public education program

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CONSERVATION AUTHORITY: Moira River

AREA: 2875 km<sup>2</sup> MOE REGION: Southeastern

#### ANNUAL REPORT CURRENT PROJECTS

- E.A. sought for Belleville STP outfall for ice management
- 2 additional stream gauges
- 70% funding for streambank erosion control projects
- selling plastic rain gauges to watershed residents
- reduction of flood line from regional to 1:100 year
- radio, TV, and newsletters form active public information program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- ice management project
- need a private dam policy
- need to map and prioritize flood risk areas
- upgrade flood forecasting network from 5 to 13 streamflow gauges and 2 met. stations
- establish and enforce fill and construction guidelines

##### 2) URBAN DRAINAGE

- Belleville is only major area
- establish master drainage plans
- implement fill and construction regulations
- more active participation in plan review process

##### 3) RURAL DRAINAGE

- request OMAF assistance to inventory field and streambank erosion sites
- implement remedial measures with OMAF assistance
- institute a set of standard erosion control techniques
- cattle access, poor tillage practices, poor drain maintenance are identified problems
- possible OSCEPAP target

##### 4) EROSION & SEDIMENTATION

- request OMAF assistance for inventory of sites
- OMAF assistance to improve public awareness program
- develop a Private Lands Extension Service

5) WATER QUALITY

- review MOE network
- request OMAF and MOE assistance in agricultural areas for abatement monitoring and incentive program
- arsenic problem at Delco
- MOE request for assistance domestic and private sewage problems
- request MOE to refine monitoring network and abatement studies

6) OTHER AREAS OF CONCERN

- 6 beach areas - some summer low flow aesthetic problems
- need to re-focus public awareness and information programs

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CONSERVATION AUTHORITY: Mississippi Valley

AREA: 4450 km<sup>2</sup> MOE REGION: Southeastern

#### ANNUAL REPORT CURRENT PROJECTS

- floodplain mapping nearly complete
- very active plan review process — 311 proposals reviewed
- finalized a flood warning procedure manual
- installed 7 additional streamflow gauges

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- enact Fill, Construction and Alterations to Waterways regulations
- inventory and map flood plain
- expand hydromet network from 5 stations
- expand staff gauge network
- implement structural control measures
- implement a preventative program

##### 2) URBAN DRAINAGE

- ensure recognition of storm water management principles in plans
- prepare master drainage and stormwater management plans
- ensure programs are in accordance with the Provincial Floodplain Management Policy

##### 3) RURAL DRAINAGE

- area contains highly erodable silt and clay soils
- topic of recent and increasing concern
- no historical involvement
- develop a rural master drainage plan with OMAF
- expand Extension Services Program

##### 4) EROSION & SEDIMENTATION

- problem is of prime concern
- no historical program involvement
- inventory and map priority sites
- develop an erosion control program
- expand public information program
- poor agricultural practices are cited as major source

5) WATER QUALITY

- 13 MOE sites
- expand contact with MOE over local issues
- expand MOE initiated Self Help Monitoring Program

6) OTHER AREAS OF CONCERN

- active reforestation program
- increase percentage of hardwood trees in replanting 2 major beach areas
- small scale public information and awareness program
- requires review and expansion

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CONSERVATION AUTHORITY: Napanee Region

AREA: 1961 km<sup>2</sup> MOE REGION: Southeastern

#### ANNUAL REPORT CURRENT PROJECTS

- flood plain mapping
- active Conservation Services program
- active erosion control program
- 64 erosion control assistance projects
- active reforestation project

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- mapping for 100 year storm
- 2 stormgauges - expand network
- enact. Fill, Construction and Alteration to Waterways regulations
- participate in plain review process
- assist municipalities to prepare flood contingency plans

##### 2) URBAN DRAINAGE

- no significant urban areas
- no official policy for stormwater management

##### 3) RURAL DRAINAGE

- no historical involvement
- OMAF has taken lead role and has had minimal contact with C A
- should increase involvement
- recommend major overhaul of the Drainage Act
- cooperate with OMAF to develop a drainage research program in Ontario

##### 4) EROSION & SEDIMENTATION

- no widespread problem, some small localized or potential sites
- cattle access is major problem - 14 sites identified
- established an Erosion Control Assistance Program (ECAP) - 65% grants
- OSCEPAP funding used for agricultural problems
- demonstration projects
- expand public information program
- expand tree planting program

5) WATER QUALITY

- Strathcona Paper Mill and Napanee STP are major point sources
- 5 MOE sample sites
- some localized problems — agricultural runoff is suspect
- require MOE assistance for upstream lakes monitoring and remedial actions

6) OTHER AREAS OF CONCERN

- develop private lands forest management program
- expand public education and information programs

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CONSERVATION AUTHORITY: Ganaraska Region

AREA: 935 km<sup>2</sup> MOE REGION: Central

#### ANNUAL REPORT CURRENT PROJECTS

- no report sent

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - incorporate floodplain management guidelines into official plans
  - adopt fill and construction regulations
  - complete mapping to regional storm level
- 2) URBAN DRAINAGE
  - promote sound stormwater management practices
- 3) RURAL DRAINAGE
  - no involvement
  - leave to OMAF to locate and solve problems
- 4) EROSION & SEDIMENTATION
  - public information program, funding and technical assistance
  - land use regulation
  - area is prone to wind erosion
  - poor tillage practices, row cropping
  - 50% of area is erosion susceptible.
- 5) WATER QUALITY
  - Public information program
  - maintain and possibly enhance MOE network
  - bacti violation problems, some nitrogen problems
  - 29 quality stations + 6 MOE stations = 35 in total
  - cattle access problems
- 6) OTHER AREAS OF CONCERN
  - implementation of public education and information program
  - maintain private landowner reforestation assistance
  - 5 beach areas

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CONSERVATION AUTHORITY: Metropolitan Toronto and Region

AREA: 3802 km<sup>2</sup> MOE REGION: Central

#### ANNUAL REPORT CURRENT PROJECTS

- reviewed 200 subdivision plans
- active structural flood control program
- metro waterfront development program
- TAWMS study
- active Extension Services program and Reforestation
- active erosion and sediment control program
- active public information program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- implement Fill, Construction and Alterations to Waterways guidelines
- acquire land within the regional flood line
- structural works in priority areas

##### 2) URBAN DRAINAGE

- designate Flood Damage Centres
- incorporate major-minor concept into all new subdivision plans
- develop master drainage plans
- develop storm water management plans

##### 3) RURAL DRAINAGE

- conservation land management program
- reforestation and vegetation management program

##### 4) EROSION & SEDIMENTATION

- mapping, prioritizing and designating erosion prone zones
- develop an erosion-sediment control plan
- structural works in priority areas
- private land remedial measures are to be paid for by the landowner
- priority site land acquisition program
- conservation land management program



5) WATER QUALITY

- no specific plans or problem areas identified

6) OTHER AREAS OF CONCERN

- beach closures
- Lake Ontario Waterfront Development Program
- expand public information and awareness programs

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CONSERVATION AUTHORITY: North Bay - Mattawa

AREA: 2807 km<sup>2</sup> MOE REGION: Northeastern

#### ANNUAL REPORT CURRENT PROJECTS

- Chippewa Creek Flood & Erosion Control Programme is primary project
- Wasi River Watershed Management Study implemented
- Trout Lake Watershed Management Study implemented
- active plan input and review process
- active Conservation Services Program - manual for policy and procedures prepared
- active public information program
- active reforestation program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- land acquisition program within the 1:25 year flood line
- most of area has been mapped
- sites are prioritized
- remedial action plans in study or implementation phase for 5 major areas
- desire to develop a flood risk model
- expand hydromet network
- enforce Fill, Construction and Alteration to Waterways regulations.

##### 2) URBAN DRAINAGE

- no direct role or policies
- become involved in preparation of Stormwater Master Drainage Plans
- initiate a North Bay runoff impact study with MOE

##### 3) RURAL DRAINAGE

- expand role in planning and construction phases
- set standards for construction
- inventory, map and prioritize problem areas
- set up a demonstration project

4) EROSION & SEDIMENTATION

- major management responsibility
- establish an erosion control program
- require site inventory, mapping and evaluation program
- establish a private lands assistance program
- establish demonstration sites
- expand public information programs
- enforce Fill and Construction guidelines
- require detailed soil and soil infiltration mapping

5) WATER QUALITY

- involve MOE in all projects and programs
- Lake Nipissing has urban, industrial and sewage outfall problems
- Chippewa Creek has urban and waste disposal problems
- Wasi Lake has nutrient problems
- involve MOE in developing a comprehensive watershed management strategy
- several lakes require MOE aid for abatement purposes
- Mattawa and North Bay Lagoons require relocation study with MOE
- North Bay landfill site is contaminating Chippewa Creek through groundwater

6) OTHER AREAS OF CONCERN

- require study to investigate impact of timber harvesting on hydrologic balance of watershed
- expand reforestation program
- extractive industry impacts require further study
- expand public awareness and information program

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CONSERVATION AUTHORITY: Lakehead Region

AREA: 2538 km<sup>2</sup> MOE REGION: Northwestern

#### ANNUAL REPORT CURRENT PROJECTS

- Kam River Erosion Control Project underway
- floodplain and fill line mapping continuing
- active plan review program (600 reviewed)
- expanded water quality monitoring program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- 8 streamflow gauges, 9 met stations
- enact Fill, Construction and Alteration to Waterways Regulations
- more active plan review program
- flood and fill line mapping

##### 2) URBAN DRAINAGE

- no overall master drainage plan
- no policies or criteria at present

##### 3) RURAL DRAINAGE

- not a major concern

##### 4) EROSION & SEDIMENTATION

- streambank erosion has been the sole historical involvement
- mapping and site prioritizing
- some local agricultural problems
- implement a Kam River Erosion Control program

##### 5) WATER QUALITY

- 20 MOE sample sites
- 6) OTHER AREAS OF CONCERN
- 3 beach areas - daily monitoring of quality
- expand private land owners assistance program
- expand reforestation program
- implement a public awareness and demonstration program

CONSERVATION AUTHORITY: Cataraqui Region

AREA: 3331 km<sup>2</sup> MOE REGION: Southeastern

#### ANNUAL REPORT CURRENT PROJECTS

- low flow problems on Millhaven Creek
- active flood control and maintenance program
- active plan review process
- Gananoque Watershed Management Study in progress
- active enforcement of Fill and Construction regulations
- active rural drainage program
- active reforestation program
- active public awareness program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- 37 streamflow and staff gauges
- develop flood forecast model techniques
- possible conflict between control structure capacities and MOE low flow requirements for effluent dilution at Odessa
- expand hydromet network
- implement a small and private dam operating policy
- continue flood and fill line mapping
- implement Fill, Construction and Alteration to Waterways regulations
- expand plan input and review process

##### 2) URBAN DRAINAGE

- no master plans
- promote stormwater management
- assist municipalities in preparing master drainage plans

##### 3) RURAL DRAINAGE

- develop an agricultural practices program
- implement a demonstration project program
- require an inventory and mapping of existing drains
- require research into impacts of drainage on receiving waters
- increase input into drainage proposal reviews

4) EROSION & SEDIMENTATION

- require site inventory, mapping and prioritizing
- develop an erosion control program
- possible enhanced OSCEPAP watershed

5) WATER QUALITY

- 9 MOE sample sites
- request MOE to review and expand network (20 additional identified)
- request for data trend analysis
- request MOE for site specific studies and abatement monitoring
- request MOE to promote and expand cottager Self Help program
- declining water quality in watershed
- initiate an active program with MOE to determine causes of declining quality and implement remedial actions
- some drinking water problems also identified

6) OTHER AREAS OF CONCERN

- reforestation and windbreak planting program requires promotion
- wetland preservation
- aquatic plant growth problems
- 4 beach areas
- promote Extension Services Program

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CONSERVATION AUTHORITY: Essex Region

AREA: 1673 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- active erosion control program (5 projects underway)
- active extension service program
- active demonstration site program
- active erosion and soil loss mapping program
- active reforestation program
- promotion of OSCEPAP (57 grants)

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- 13% of area is subject to flooding (7000 structures) from the Regional storm
- implement Fill, Construction and Alteration to Waterways regulations
- update floodplain mapping

##### 2) URBAN DRAINAGE

- participate in plan review process
- develop stormwater management plans

##### 3) RURAL DRAINAGE

- intensive row cropping (65% of agricultural land)
- high field erosion rate
- area is extensively drained
- liaise with OMAF and promote demonstration projects
- promote extension service program
- update mapping and site inventory

##### 4) EROSION & SEDIMENTATION

- very high rates of stream and ditchbank erosion
- demonstration sites
- provide financial incentive for remedial measures
- update mapping and site inventory

5) WATER QUALITY

- algae and aquatic plant problems
- all streams violate Blue Book for sediments, nutrients and bacte
- establish a non point source pollution control strategy
- demonstration sites
- expand MOE monitoring network

6) OTHER AREAS OF CONCERN

- wetland preservation
- reforestation program for windbreaks and erosion control
- beaches and possible closures are a priority issue
- promote public awareness and information program

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CONSERVATION AUTHORITY: Kawartha Region

AREA: 2564 km<sup>2</sup> MOE REGION: Central

#### ANNUAL REPORT CURRENT PROJECTS

- active erosion control program
- active water quality monitoring program
- active reforestation program
- active wetland preservation program
- active volunteer rain and staff gauge reading program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- expand hydromet network (8 rain gauges and 6 snow courses)
- floodplain mapping required
- enact flood and fill regulations
- increase involvement in plan review process
- no streamflow gauges within jurisdictional boundary
- fill line mapping required

##### 2) URBAN DRAINAGE

- develop drainage criteria and master plan
- increase involvement in plan review process
- little historical involvement
- incorporate major-minor concept and erosion and sediment control measures into all new plans

##### 3) RURAL DRAINAGE

- expand extension service program
- approximately 80% of land use is agricultural
- approximately 1000 acres per year are being tile drained
- inventory and mapping program in place
- increase involvement in drain reviews and construction
- set up demonstration projects

- 4) EROSION & SEDIMENTATION
  - inventory, map and prioritize sites (39 priority sites)
  - implement erosion control guidelines
  - expand extension service program
  - airphoto program in place
  - set up demonstration projects
  
- 5) WATER QUALITY
  - expand sample network (10 MOE and 4 Authority)
  - expand analysis of MOE data
  - low flows cause dilution problems at Port Perry and Lindsay
  - expand MOE Self Help Program
  
- 6) OTHER AREAS OF CONCERN
  - expand public awareness and information program
  - expand wetland preservation
  - extensive aquatic weed growth problems
  - expand reforestation program
  - heavy recreational—swimming activities demands

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CONSERVATION AUTHORITY: Halton Region

AREA: 1044 km<sup>2</sup> MOE REGION: Central

#### ANNUAL REPORT CURRENT PROJECTS

- flood plain mapping active
- active plan input and review program
- extraction industry and landfill sites are problems
- active wetland inventory program
- active reforestation program

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - no report available
  - enact Fill, Construction and Alteration to Waterways regulations
- 2) URBAN DRAINAGE
- 3) RURAL DRAINAGE
- 4) EROSION & SEDIMENTATION
- 5) WATER QUALITY
  - 14 MOE sample sites
  - require enhanced trend analysis in data
- 6) OTHER AREAS OF CONCERN
  - 1 beach area

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CONSERVATION AUTHORITY: Crowe Valley

AREA: 2007 km<sup>2</sup> MOE REGION: Southeastern

### ANNUAL REPORT CURRENT PROJECTS

- active flood control projects
- active plan input and review process

### WATERSHED PLAN

#### 1) FLOOD CONTROL

- establish control of small dam operations
- promote floodproofing and structural works in localized areas
- upgrade floodplain mapping and air photo survey
- expand hydromet network from 3 to 11
- participate in plan input and review process

#### 2) URBAN DRAINAGE

- problem at Havelock on Matheson Creek
- aid municipalities in identifying problems and solutions

#### 3) RURAL DRAINAGE

- no major problems
- provide technical assistance to landowners
- leave funding and direct involvement to government
- promote public awareness

#### 4) EROSION & SEDIMENTATION

- not a major problem
- inventory and mapping required
- provide technical assistance to landowners
- leave funding and direct involvement to government
- promote public awareness

#### 5) WATER QUALITY

- 4 MOE sample sites
- expand MOE Self Help Program
- develop with MOE and MNR an all-encompassing water quality monitoring plan
- municipal water supply at Marmora
- low flow augmentation

#### 6) OTHER AREAS OF CONCERN

- beach and recreational activities
- inventory and assess wetland areas

CONSERVATION AUTHORITY: Maitland Valley

AREA: 2989 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- active flood damage reduction program (6 communities)
- active soil and water conservation planning service
- active shoreline erosion risk mapping program
- active reforestation program
- active erosion control demonstration program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- promote volunteer rain gauge observation network
- expand hydromet network from 12 to 15 stations
- structural floodproofing and channel improvements in most urban centres
- floodplain mapping and updates
- implement fill and construction guidelines
- develop a base flow and flood flow model
- develop a small dam operating policy

##### 2) URBAN DRAINAGE

- develop urban stormwater management plans
- basin study may be required
- increase involvement in plan input and review process

##### 3) RURAL DRAINAGE

- develop a rural stormwater policy
- local basin studies may be required
- 90% of watershed has been municipally drained
- demonstration projects
- expand extension service program
- implement drainage and erosion control program

4) EROSION & SEDIMENTATION

- 95% of soil area is moderate in erodibility
- provide technical and funding assistance
- demonstration projects
- series of basin studies is required
- inventory and mapping required
- extension service program
- increase reforestation effort on private lands
- implement a Waterfront Erosion Control project

5) WATER QUALITY

- 16 MOE sample sites
- 8 existing STPs and 1 proposed
- low flow problems to achieve sufficient effluent dilution
- require a major basin study on South Maitland
- severe algal and aquatic plant problems
- consult with MOE to improve network
- require MOE assistance to develop remedial measures
- program increase MOE data analysis
- conduct a manure management survey

6) OTHER AREAS OF CONCERN

- beach closures at Pioneer, Gorrie, Brussels Conservation areas
- expand public awareness and information program
- develop a set of comprehensive Water Management Regulations

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CONSERVATION AUTHORITY: St. Clair Region

AREA: 3805 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- major flood control project completed (Sydenham River Diversion)
- active OSCEPAP program (70 requests in 1984)
- active ice breaking program
- active plan review program
- active fill regulation program
- active reforestation program
- active public information program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- fill and floodline mapping
- implement major structural control programs
- enforce fill and construction guidelines
- expand hydromet network from 7 to 12
- develop an ice management program
- require a water management study

##### 2) URBAN DRAINAGE

- develop a stormwater management program
- expand involvement in plan input and review process

##### 3) RURAL DRAINAGE

- major structural projects at Strathroy and Wallaceburg
- increase involvement in drain reviews
- inventory and map locations
- liaise with OMAF and provide technical and funding assistance
- demonstration projects

4) EROSION & SEDIMENTATION

- promote soil conservation program
- implement a shoreline erosion control study
- inventory and map sites
- acquire erosion prone land
- provide technical and funding assistance to landowners not qualifying for OSCEPAP grants
- demonstration projects

5) WATER QUALITY

- 12 MOE sample sites
- cattle access and farm waste discharge are identified problems
- request MOE assistance for municipal and industrial waste assimilation studies

6) OTHER AREAS OF CONCERN

- 5 beach areas
- expand wetland acquisition program
- expand reforestation program
- expand public awareness and information program

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CONSERVATION AUTHORITY: Ausable- Bayfield

AREA: 2450 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- 2 major erosion control projects completed
- active reforestation program
- Soil and Water Conservation Program implemented
- enacted fill and construction guidelines
- Manure Management - Water Quality Program report produced
- active MOE abatement involvement
- active plan review program
- active erosion control assistance and demonstration program

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - develop fill and construction guidelines
  - expand public awareness
- 2) URBAN DRAINAGE
  - expand plan input and review process
- 3) RURAL DRAINAGE
  - review drainage plans
  - demonstration projects
  - adopt a drain maintenance program
- 4) EROSION & SEDIMENTATION
  - provide technical assistance and promote public awareness
  - inventory and map sites
  - demonstration projects
  - develop a Soil Erosion Control program
  - expand private land reforestation assistance program
- 5) WATER QUALITY
  - 13 MOE sample sites
  - cattle access and farm waste disposal are major problems
  - expand data analysis program
  - develop a rural pollution control educational program
  - develop a comprehensive water management strategy
- 6) OTHER AREAS OF CONCERN
  - expand public awareness and information program
  - expand extension service program
  - develop recreational opportunities to fullest
  - beach areas

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CONSERVATION AUTHORITY: Grey - Sauble

AREA: 3146 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- active erosion control projects (Sydenham River)
- active structural flood control program
- Sauble River study ongoing
- ice jam studies
- extension service erosion control program (6 projects)
- active reforestation program
- active plan review (587 reviewed)
- active erosion site mapping and inventory

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- 3 stream gauges - expand network
- 7 snowcourses
- flood and fill line mapping
- implement fill, construction and alteration to waterways regulations
- increase involvement with plan input and review process
- reforest marginal lands
- install a precipitation gauge network

##### 2) URBAN DRAINAGE

- assist in preparation of master drainage plans
- hazard land zoning

##### 3) RURAL DRAINAGE

- liaise with OMAF over municipal drain reviews
- demonstration projects
- expand extension service program
- low flow problems on South Sauble River

- 4) EROSION & SEDIMENTATION
  - inventory and mapping
  - expand public awareness program
  - liaise with OMAF to improve agricultural practices
  - expand conservation services program
  - demonstration projects
  -
- 5) WATER QUALITY
  - 15 MOE sample sites
  - study to assess the impacts of agriculture on water quality with MOE and OMAF
- 6) OTHER AREAS OF CONCERN
  - 6 beach areas
  - expand reforestation program
  - expand public information and awareness program
  - wetland preservation program

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CONSERVATION AUTHORITY: Lower Thames Valley

AREA: 8257 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- ice breaking program
- active flood control program
- erosion control site inventory is ongoing
- active plan review process (393 reviews)
- active reforestation program
- 2 land management demonstration properties set up

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- flooding is frequent and widespread
- implement fill and construction regulations
- fill line mapping and bylaw zoning
- increase plan review process
- acquire hazard lands
- develop an ice management plan
- 16 stream flow stations
- 4 rain gauges
- major structural flood control program

##### 2) URBAN DRAINAGE

- plan input and review
- zoning bylaws
- implement fill and construction guidelines

##### 3) RURAL DRAINAGE

- participate in plan input and review process
- demonstration projects

4) EROSION & SEDIMENTATION

- promote OSCEPAP
- increase technical and funding assistance
- channel erosion and bank failures are common
- map and prioritize sites
- 9 erosion control studies proposed
- 11 capital works projects demonstration projects
- increase private land reforestation effort

5) WATER QUALITY

- problems from agricultural runoff and waste disposal
- 7 MOE sample sites
- implement a diffuse source erosion control study
- implement remedial measure funding through Private Lands Assistance Program
- negotiate with MOE to increase network

6) OTHER AREAS OF CONCERN

- 4 beach areas
- expand and promote Conservation Services Program
- expand public awareness and information program

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CONSERVATION AUTHORITY: Upper Thames River

AREA: 3432 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- wetland acquisition
- fill line mapping
- major structural flood control program in London
- major erosion control projects at 4 sites
- active plan review program (1000 reviews)
- active floodplain acquisition program
- active extension service program
- active Diffuse Source Control Program (150 landowners received assistance)
- target watershed program (Pittock, Avon, Kintore)
- active reforestation

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- develop a flood control operations model
- conflicts with summer low flows
- 12 streamflow gauges
- 10 rain gauges, 2 full met stations
- structural flood proofing and control measures
- acquire hazard lands
- complete fill and floodline mapping
- enact fill and construction guidelines

##### 2) URBAN DRAINAGE

- increase plan input and review
- very limited historical involvement
- develop stormwater management policy
- aid in development of Master Drainage Plans
- promote source control programs

##### 3) RURAL DRAINAGE

- poor construction and maintenance are problems
- require inventory and mapping
- many low flow problems demonstration projects
- drain maintenance program and equipment rental will be made available

4) EROSION & SEDIMENTATION

- inventory and mapping of sites
- intense rowcropping
- liaise with MOE, MNR and OMAF to promote extension services
- technical and funding assistance through Private Lands Assistance Program
- demonstration projects
- promote OSCEPAP
- increase reforestation

5) WATER QUALITY

- high nutrient levels
- cattle access and farm waste disposal are major problems
- severe bacti problems
- low flow problems
- Stratford effluent dilution problems

6) OTHER AREAS OF CONCERN

- increase wetland preservation
- increase reforestation effort
- increase level of public awareness and information program
- beach areas

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CONSERVATION AUTHORITY: Catfish Creek

AREA: 490 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- wetland acquisition
- active soil conservation and extension service program (7 projects funded)
- ice management study
- structural floodproofing and control projects
- active flood and fill line mapping
- active plan review
- active reforestation program

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - enact fill and construction guidelines fill and floodline mapping
  - hazard land zoning
  - ice management program
- 2) URBAN DRAINAGE
  - no concerns identified
- 3) RURAL DRAINAGE
  - develop a comprehensive drainage policy
  - encourage use of effective erosion control measures in construction
  - encourage a drain maintenance program
- 4) EROSION & SEDIMENTATION
  - expand Conservation Services Program
  - increase private land reforestation assistance
  - provide technical and funding assistance
- 5) WATER QUALITY
  - 3 MOE sample sites
  - liaise with MOE to expand network
  - implement local abatement studies with MOE and OMAF
- 6) OTHER AREAS OF CONCERN
  - wetland acquisition
  - increase public awareness and information program



CONSERVATION AUTHORITY: Kettle Creek

AREA: 515 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- active soil erosion program
- private lands assistance program
- active plan input and review
- active conservation services program (28 projects)

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - hazard land zoning
  - ice management program
  - fill and floodline mapping
  - enact fill and construction guidelines
  - 5 rain gauges, 1 met station
- 2) URBAN DRAINAGE
  - encourage street sweeping and other source controls
  - plan input and review
- 3) RURAL DRAINAGE
  - promote drain maintenance program
  - advise on amendments to Drainage Act
  - participate in plan reviews
- 4) EROSION & SEDIMENTATION
  - promote use of soil conservation practices
  - increase public awareness
  - provide technical and funding assistance
  - rural fill line mapping
  - develop a shoreline erosion program
  - inventory and map sites
  - expand Private Lands Assistance Program to 15 priority sites

5) WATER QUALITY

- cattle access and farm waste disposal are problems request enhanced data analysis from MOE
- request MOE to assist in basin study
- 7 MOE sample sites
- negotiate with MOE to expand network and/or relocate stations
- low flow effluent dilution problems at St. Thomas bypass event problems
- municipal and industrial waste discharges

6) OTHER AREAS OF CONCERN

- wetland preservation
- aquatic weed problems
- develop reforestation program
- increase level of public awareness and information

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CONSERVATION AUTHORITY: Saugeen Valley

AREA: 4455 km<sup>2</sup> MOE REGION: Southwestern

#### ANNUAL REPORT CURRENT PROJECTS

- active erosion control program
- structural flood control program
- active private landowner assistance program
- fill and flood line mapping is ongoing
- active reforestation program
- plan input and review

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - 13 streamflow gauges
  - flood and fill line mapping
  - implement fill and construction guidelines
  - hazard land zoning
- 2) URBAN DRAINAGE
  - develop master drainage plans
  - participate in plan input and review
  - assist in stormwater management studies
- 3) RURAL DRAINAGE
  - drainage is becoming increasingly prevalent
  - liaise with MOE and OMAF to research effects of drainage
  - promote drain maintenance program
  - plan review
  - demonstration projects
  - develop comprehensive policies and guidelines
  - investigate alternative water and land management practices

4) EROSION & SEDIMENTATION

- liaise with OMAF to promote use of sound conservation practices
- provide technical and funding assistance
- implement a Private Land Management Extension Program
- increase public awareness
- increase private land reforestation
- establish an agricultural land use monitoring program
- demonstration projects
- inventory and map sites
- establish a demonstration farm with OMAF

5) WATER QUALITY

- localized problem areas - primarily due to agricultural activities
- request MOE assistance for a watershed study to set up South Saugeen as a model for the rest of the watershed request MOE to expand network
- extraction industries are becoming more prevalent

6) OTHER AREAS OF CONCERN

- four beach areas
- preservation of wetlands
- increase public awareness and information
- promote private land reforestation

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CONSERVATION AUTHORITY: Rideau Valley

AREA: 4095 km<sup>2</sup> MOE REGION: Southeastern

#### ANNUAL REPORT CURRENT PROJECTS

- active erosion control program (4 major projects)
- floodplain mapping
- ice management study
- structural flood control program
- reforestation program
- aquatic weed harvesting at several locations

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - implement fill and construction guidelines
  - fill and floodline mapping develop a hydrologic model
  - major structural flood proofing projects
  - hazard land zoning
- 2) URBAN DRAINAGE
  - plan input and review
  - aid in preparation of master drainage plans
  - develop a comprehensive stormwater management plan
- 3) RURAL DRAINAGE
  - participate in plan reviews
  - inventory and mapping
  - research effects of drainage
  - demonstration projects

4) EROSION & SEDIMENTATION

- 31 priority sites
- increase public awareness
- leave remedial measures to control by government agencies
- demonstration projects
- inventory and map sites
- undertake major structural remedial measures
- reforestation program for private lands

5) WATER QUALITY

- municipal, industrial and farm waste discharges are problems
- algal and aquatic plant problems (1316 Hectares)
- leave MOE to handle point source problems

6) OTHER AREAS OF CONCERN

- 4 beach areas
- wetland preservation
- increase public awareness and information
- increase private land reforestation

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CONSERVATION AUTHORITY: Otonabee Region

AREA: 1892 km<sup>2</sup> MOE REGION: Central

#### ANNUAL REPORT CURRENT PROJECTS

- active erosion control program
- active flood control program
- active reforestation program

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - 5 rain gauges, 4 snowcourses, 3 stream flow gauges
  - implement fill and construction guidelines
  - fill and floodline mapping
  - expand hydromet network
  - develop a hydrologic model
  - develop a small dam operation and maintenance program
- 2) URBAN DRAINAGE
  - aid in development of master drainage plans
  - develop a stormwater management policy
  - plan input and review
- 3) RURAL DRAINAGE
  - plan review
- 4) EROSION & SEDIMENTATION
  - 172 sites identified
  - inventory and mapping of rest of watershed
  - provide technical assistance
  - increase private land reforestation
  - promote sound conservation practices
  - undertake structural remedial measures
  - increase public awareness
- 5) WATER QUALITY
  - maintain MOE sample network
  - request MOE to carry out data analysis
  - request MOE to carry out abatement monitoring
- 6) OTHER AREAS OF CONCERN
  - 6 beach areas
  - wetland preservation
  - increase public awareness and information

CONSERVATION AUTHORITY: Nickel District

AREA: 7547 km<sup>2</sup> MOE REGION: Northeastern

#### ANNUAL REPORT CURRENT PROJECTS

- 2 major structural flood control projects floodline mapping
- 3 major erosion control projects
- expansion of hydromet network
- active plan input and review
- active public information program
- reforestation

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - implement fill and construction guidelines
  - expand hydromet network
  - flood and fill line mapping
  - implement structural works where identified
  - develop a water management extension service program
  - hazard land zoning and acquisition
- 2) URBAN DRAINAGE
  - develop a set of plan review guidelines
  - implement a set of urban drainage guidelines and master drainage plans
  - develop a comprehensive pollution control strategy
  -
- 3) RURAL DRAINAGE
  - develop set of erosion control guidelines
  - implement a drain assessment and maintenance program
  - demonstration projects
  -
- 4) EROSION & SEDIMENTATION
  - develop extension services program
  - provide technical assistance
  - develop erosion control guidelines
  - demonstration projects
  -
- 5) WATER QUALITY
  - liaise with MOE to enhance sample network
- 6) OTHER AREAS OF CONCERN
  - wetland preservation
  - expand public awareness and information program



CONSERVATION AUTHORITY: South Lake Simcoe

AREA: 2613 km<sup>2</sup> MOE REGION: Central

#### ANNUAL REPORT CURRENT PROJECTS

- active plan review (578 plans reviewed)
- floodline mapping ongoing
- structural flood control projects
- active erosion control program (7 projects)
- LSEMS
- active reforestation program

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - flood line mapping
  - develop flood protection measures for 14 priority areas
  - implement fill and construction guidelines
  - 6 streamflow gauges, 6 rainfall gauges, 6 snowcourses
  - expand hydromet network
- 2) URBAN DRAINAGE
  - plan input and review
  - aid in preparation of master drainage plans
  - develop comprehensive stormwater management criteria
- 3) RURAL DRAINAGE
  - demonstration projects
  - technical assistance
  - increase public awareness
- 4) EROSION & SEDIMENTATION
  - inventory, map and prioritize sites
  - 18 priority sites identified
  - enhance erosion and sediment control program
  - provide technical assistance and funding
  - expand private land reforestation
  - demonstration projects
  - liaise with OMAF and MOE to enhance soil conservation program
  - increase public awareness

5) WATER QUALITY

- 13 MOE sample sites
- liaise with MOE and OMAF for non-point source remedial and abatement measures
- request MOE assistance in data analysis
- possibly relocate stations or enhance network
- Lake Simcoe monitoring and evaluation

6) OTHER AREAS OF CONCERN

- wetland preservation
- beach areas
- expand public awareness and information program

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CONSERVATION AUTHORITY: Prince Edward Region

AREA: 1010 km<sup>2</sup> MOE REGION: Southeastern

#### ANNUAL REPORT CURRENT PROJECTS

- floodplain mapping
- plan input and review (158 reviews)
- Bloomfield Creek Watershed Management Study completed
- Conservation Services Program developed
- active reforestation program

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - not a major issue
  - structural works to control localized problems
  - 1 rain gauge, 6 snowcourses
  - flood and fill line mapping
- 2) URBAN DRAINAGE
  - not a concern
  - problems to be dealt with by municipality
- 3) RURAL DRAINAGE
  - provide technical and funding assistance through Conservation Services Program
- 4) EROSION & SEDIMENTATION
  - encourage sound soil conservation practices
  - provide technical and funding assistance
  - inventory and map sites
- 5) WATER QUALITY
  - request MOE assistance for intensive monitoring on West Lake
  - 8 MOE sample locations
  - frequent low flow problems
  - conduct a hydrogeologic study to assess groundwater quality and quantity
- 6) OTHER AREAS OF CONCERN
  - 2 beach areas
  - wetland evaluation
  - promote private lands reforestation program

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CONSERVATION AUTHORITY: Long Point Region

AREA: 2782 km<sup>2</sup> MOE REGION: WEST CENTRAL

#### ANNUAL REPORT CURRENT PROJECTS

- master drainage studies complete
- 17 erosion control projects completed active reforestation program
- wetland inventory
- active plan review (1333 reviews) flood plain mapping

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- implement fill and construction guidelines
- flood and fill line mapping
- hazard land zoning

##### 2) URBAN DRAINAGE

- not a major problem
- aid in development of master drainage plans
- develop comprehensive stormwater management plans
- plan input and review

##### 3) RURAL DRAINAGE

- fairly intensive activity
- develop comprehensive watershed drainage plans
- demonstration projects
- provide technical and financial assistance
- increase public awareness
- plan review

##### 4) EROSION & SEDIMENTATION

- ranked as number 1 issue
- promote use of sound agricultural practices promote OSCEPAP
- demonstration projects
- provide technical and financial assistance
- increase public awareness
- private land reforestation program
- develop Conservation Services Program
- inventory and mapping

5) WATER QUALITY

- industrial, municipal, agricultural waste disposal are problems
- 20 MOE sample locations
- bacte problems
- algal and aquatic plant growth problems
- expand MOE network
- research into establishment of acceptable application rates of fertilizers, pesticides, herbicides and insecticides

6) OTHER AREAS OF CONCERN

- 7 beach areas
- inventory wetland areas
- increase public awareness and information program

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CONSERVATION AUTHORITY: South Nation River

AREA: 3916 km<sup>2</sup> MOE REGION: Southeastern

#### ANNUAL REPORT CURRENT PROJECTS

- 2 major structural flood control projects completed
- active erosion control program (4 projects completed)
- South Nation River Basin Water Management Study released to public
- flood forecasting model developed for IBM PC XT
- floodplain mapping complete
- active agricultural demonstration program
- active plan review (230 reviews)

#### WATERSHED PLAN

- 1) FLOOD CONTROL
  - 15 priority projects
  - ice management program
  - flood and fill line mapping
  - fill and construction guidelines expand hydromet network
- 2) URBAN DRAINAGE
  - aid in development of master drainage plans
  - provide technical advice
- 3) RURAL DRAINAGE
  - develop drainage master plans
  - plan review
  - establish a drainage monitoring network demonstration projects
  - provide technical assistance
- 4) EROSION & SEDIMENTATION
  - landowner assistance program (80% grant)
  - demonstration projects
  - promote OSCEPAP
  - reforestation assistance on private lands
  - inventory and map sites
  - provide technical advice

5) WATER QUALITY

- nutrients, bacti and low DO are problems
- extensive algae and aquatic plant growths
- low flow problems
- liaise with MOE to develop a long term monitoring program

6) OTHER AREAS OF CONCERN

- wetland preservation
- increase public awareness and information program

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CONSERVATION AUTHORITY: Niagara Peninsula

AREA: 2424 km<sup>2</sup> MOE REGION: West Central

#### ANNUAL REPORT CURRENT PROJECTS

- active public information and awareness program
- active reforestation program
- active erosion control program
- active plan review (636 reviews)
- floodplain mapping

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- flood and fill line mapping
- enforce Fill, Construction and Alteration to Waterways Guidelines
- flood plain acquisition
- 2 streamflow and 2 rain gauge stations
- expand hydromet network

##### 2) URBAN DRAINAGE

- hazard land zoning
- encourage use of storm water management techniques
- enhance plan review program
- assist in master drainage plan preparation

##### 3) RURAL DRAINAGE

- promote OMAF assistance program
- demonstration projects
- plan review
- mapping and inventory all drains

##### 4) EROSION & SEDIMENTATION

- little historical involvement
- inventory and map sites
- promote private land assistance program
- develop a shoreline management program
- demonstration projects
- promote use of sound conservation practices
- provide technical and financial assistance



5) WATER QUALITY

- low flow dilution problems
- bacti, nutrients, heavy metals, pesticides, herbicides are problems
- aquatic plant growth
- 15 MOE sample sites
- liaise with MOE and OMAF to initiate abatement monitoring
- establish a reservoir monitoring program

6) OTHER AREAS OF CONCERN

- increase public awareness
- promote reforestation program
- 3 beach areas

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CONSERVATION AUTHORITY: Grand River

AREA: 6804 km<sup>2</sup> MOE REGION: West Central

#### ANNUAL REPORT CURRENT PROJECTS

- active flood control program (13 projects)
- active floodplain mapping
- active plan review
- active soil conservation program
- erosion and drainage demonstration sites
- active reforestation program
- active public information and awareness program

#### WATERSHED PLAN

##### 1) FLOOD CONTROL

- 14 major floodprone areas
- structural works (upgrade dykes)
- establish a small dam operating policy
- 30 streamflow gauges
- develop flood forecast model
- upgrade hydromet network
- complete fill line and flood plain mapping
- implement Fill, Construction and Alteration to Waterways Regulations

##### 2) URBAN DRAINAGE

- flood plain regulation
- expand plan input and review
- enforce storm water management guidelines

##### 3) RURAL DRAINAGE

- demonstration projects
- provide technical assistance
- develop planning, construction and maintenance guidelines

##### 4) EROSION & SEDIMENTATION

- bank stabilization projects
- expand private land reforestation program
- demonstration projects
- encourage conservation techniques
- liaise with OMAF and MOE in joint studies site
- inventory and mapping

5) WATER QUALITY

- 745 MOE sample sites
- bacti problems
- low DO problems
- industrial, municipal, agricultural waste discharges
- aquatic weed growth
- continue biologic surveys

6) OTHER AREAS OF CONCERN

- 16 beach areas
- aquatic plant harvesting
- water supply
- wetland preservation
- expand public information and awareness program

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