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Achieving Teamwork: Linking Watershed Planning and Coastal Zone Management in the Great Lakes

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A common challenge within coastal management is how to best integrate watershed planning into regional efforts intended to address critical coastal issues, especially those related to water resources and water quality. To examine this challenge two case studies of watershed planning efforts from the coastal environ of Lake Erie have been selected for comparative review. The preparation of a watershed restoration plan for the Maumee Area of Concern (AOC) in northwest Ohio required the assessment of coastal management measures for the Lake Erie portion of the watershed. For the Long Point region, Ontario, on the north shore of Lake Erie, separate planning initiatives for coastal management and watershed planning have evolved over the last two decades. However, what are the best means to ensure that efforts to address water resources are linked between the often focused but distinct planning approaches for coastal and watershed areas within a common management regime? Can a more effective and efficient planning regime be defined to ensure that there exists a consistent and coordinated management approach? The experiences from the Maumee AOC and Long Point region suggest that a consideration of careful coordination policies is needed and the coastal management should be strongly linked to efforts to undertake broader planning objectives within their respective watersheds.

Keywords coastal management, Great Lakes, Lake Erie, Ohio, Ontario, watershed planning

The preparation of the Maumee AOC Stage II/Watershed Restoration Plan was undertaken with direction from the Maumee RAP Advisory Committee (MRAC) and volunteers serving on a Plan Development Team lead by Cherie Blair, Ohio EPA. Additional support for the plan preparation was provided by TMACOG, US EPA Great Lakes Program Office, Ohio EPA Division of Surface Water, and the Ohio Great Lakes RAP Program. The author served on the Plan Development Team and since 2006 has acted as chair of the Maumee RAP Advisory Committee. Research related to the preparation of a Great Lakes shoreline management plan and watershed planning for the Long Point region, Ontario, Canada was completed during several projects that were assisted by numerous individuals, agencies, and funding sources including the Social Sciences and Humanities Research Council of Canada, Long Point World Biosphere Reserve Committee, Royal Canadian Geography Society, Heritage Resources Centre at the University of Waterloo, Long Point Region Conservation Authority, and Regional Municipality of Haldimand-Norfolk.

The ideas expressed in this article are those of the author and do not necessary reflect those of the MRAC, Ohio EPA, Long Point Regional Conservation Authority or other agencies, individuals, and organizations cited in this acknowledgment.

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Introduction

With the development of watershed planning and coastal management initiatives has come the development of a wide diversity of organized arrangements for planning, regulatory approaches, and decision-making to separately address watershed and coastal issues. Watershed management methods, tools, and procedures have been widely developed and employed through North American and worldwide and have been the focus of considerable discussion and analysis (Grayson 1998). Similarly, over the last few decades, coastal management efforts have received much attention and discussion in regards to the preparation and debate over techniques and planning responses to deal with the myriad of complex environmental and human aspects associated with the coastal zone (Beatley, Brower, and Schwab 1994; Clark 1996; Sorensen and McCreary 1990). In regions where the coastal environment includes watershed planning, efforts have been made to integrate both into a common management arrangement—the preparation of many state coastal management plans under the U.S. Coastal Management Program are excellent examples of this effort. Such coordinated planning is strongly recommended as a means of ensuring that the work toward addressing the critical challenges and issues facing both coastal and watershed environments is most efficient and effective (Pickaver and Sadacharan 2007).

In the Great Lakes basin, numerous efforts have been undertaken to address watershed planning through various local, regional, and federal initiatives. Within the United States, the national coastal zone management program has seen the development of state coastal management programs for most Great Lakes states, with the exception of Illinois (Lawrence 1997). In Canada, the efforts of the Ontario Conservation Authorities and the Ontario Ministry of Natural Resources have lead to the development of both watershed and Great Lakes shoreline management plans (Lawrence 1995). This paper will examine the opportunities and challenges in developing linkages between watershed planning and coastal zone management efforts by examining case studies of the lower Maumee watershed the Lake Erie coastal zone of northwest Ohio and the Long Point region in Ontario, Canada, also within the Lake Erie basin. The preparation of watershed plans and how coastal management needs to be integrated into these plans is examined. Discussion focuses on how more effective planning can result from a locally based teamwork approach, but contributing to both watershed and coastal planning.

Case Study 1: Lower Maumee Watershed, Ohio

The lower Maumee River and local streams in northwest Ohio were designated as a Great Lakes Area of Concern (AOC) in 1987 by the International Joint Commission. The Maumee AOC (Figure 1) is comprised of a land area of 775 square miles that consists of several watersheds within northwest Ohio that have streams directly discharging into the western basin of Lake Erie. The population of the AOC is approximately 450,000 with several major urban areas, but over 70% of the land area is used for rural agriculture (MRAC 2006). Over the past twenty years a local partnership of citizens, government, business, and nongovernmental environmental interest groups have worked together as the Maumee Remedial Action Plan (RAP) Advisory Committee to address a wide range of water quality issues facing the Maumee AOC. Several of the problems facing the rivers and streams of this area include: contaminated sediments; nutrient loadings; wetland loss; aquatic habitat degradation; bacteria; combined sewer overflows (CSOs); eutrophication; and non-source pollutants from rural runoff. More information on the efforts of the Maumee RAP to address

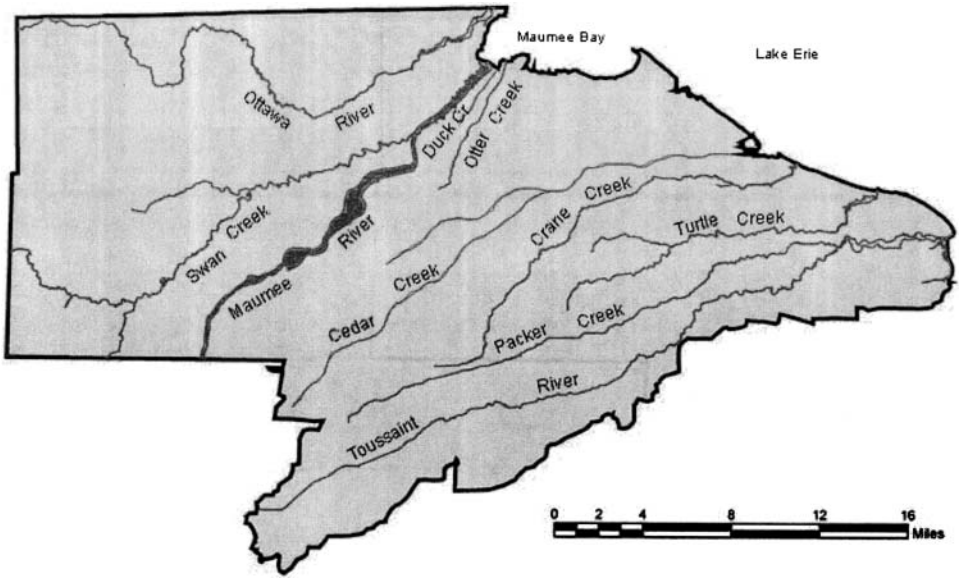

Figure 1. Maumee Area of Concern, NW Ohio.

water quality through various programs, projects, research, public education, and outreach can be found at www.partnersforcleanstreams.org.

After months of discussion in 2006, the Maumee RAP Committee determined in early 2007 that their best path forward for efficiency, effectiveness, and sustainability would be to form their own nonprofit 501(c)3 organization and to leave the umbrella of the Toledo Metropolitan Area Council of Governments (TMACOG). In March 2007, Partners for Clean Streams (PCS) Inc. was officially created as the new "umbrella" organization for various water quality programs and initiatives within the Maumee AOC. In January 2008, the Maumee RAP Committee completed its merger into the PCS organization to become the Maumee RAP Advisory Committee (www.partnersforcleanstreams.org). PCS was formed with an interest in supporting local and regional water quality improvements in the metro-Toledo area. PCS is striving for abundant open space and a high quality natural environment; adequate floodwater storage capacities and flourishing wildlife; stakeholders who take local ownership in their resources; and rivers, streams, and lakes that are clean, clear, and safe.

Watershed Restoration Plan

In January 2006 the Maumee Remedial Action Plan (RAP) Committee submitted a State II Watershed Restoration Plan for the Maumee River Great Lakes AOC to the State of Ohio for review and endorsement (www.partnersforcleanstreams.org). The plan was created in order to fulfill the requirements, needs and/or use of five water quality programs, including: Ohio Department of Natural Resources (DNR) Watershed Coordinator Program; Ohio Environmental Protection Agency (EPA) Great Lakes RAP Program; Ohio DNR Coastal Nonpoint Source Pollution Control Program; Ohio EPA Total Maximum Daily Load Program; and U.S. Fish and Wildlife Service (F&S) Natural Resources Damage Program (ODNR 2000; OEPA 2003).

This Plan is intended to serve as a comprehensive regional water quality improvement plan in order to provide a single resource for all jurisdictions, agencies, organizations, and individuals who are working to restore the waterways within the Maumee AOC. The plan includes information and maps regarding: Great Lakes Areas of Concern and Remedial Action Plans; an environmental background on the Maumee AOC (hydrology, geology, eco-regions, land use, etc.); information for the six 11-digit hydrologic units; and one large river unit that comprise the Maumee AOC (MRAC 2006).

Watershed Projects Tables (WPTs) were also prepared that contain detailed project lists for each major watershed and the WPTs were organized to facilitate the delisting of areas and/or issues for the Maumee AOC. The WPTs include: the causes and sources of water quality concerns; projects; potential project partners; funding sources; timeline; status; performance/Environmental Measures; Hydrologic Unit Code (HUC)/Stream Segment Addressed; and the Beneficial Use Impairment (BUI) affected (MRAC 2006).

This plan has received "Full Endorsement Pending" status from the State of Ohio and it will be fully endorsed with the completion of a Coastal Nonpoint Source Pollution Management Measures section. As the Maumee RAP Advisory Committee begins the implementation of this plan, they are evaluating what projects will best lead them to delisting, as well as how PCS can establish itself as a new organization with community support. This strategic and organizational planning is expected to be captured in Volume 3 of the plan, which is expected to be submitted to Ohio EPA along with other requested changes in 2011.

During this planning and review stage the Maumee RAP Committee has continued to develop and implement watershed projects and has maintained its community outreach efforts such as:

- Ecological and Human Health Risk Assessment for Duck and Otter Creeks;
- Highland Park Dam Decommissioning and Riparian Enhancement;
- Wetland and Riparian Inventory and Restoration Plans for Swan Creek and the Ottawa River;
- Partnering for Clean Streams Scout Patch Program;
- Get the Lead Out!; and
- Clean Your Streams.

PCS continues to assist other community partners with projects such as the Ottawa River Dam Decommission and Stream Restoration Project; Ottawa River Wetland Inventory; and Rain Garden Initiative (www.maumeerap.org and www.partnersforcleanstreams.org). A recent grant from the 2010 Great Lakes Restoration Initiative was awarded by the USEPA Great Lakes National Program Office to PCS that will be utilized to conduct a $1.3 million wetland, riparian and stream corridor restoration project within the Ottawa River/Ten Mile Creek Watershed of the Maumee Area of Concern.

Ohio Coastal Management Plan

The Ohio Coastal Management Program (OCMP) integrates management of the Lake Erie coast in Ohio with the aim to preserve, protect, develop, restore, and enhance coastal resources. The management program, which received federal approval on May 16, 1997, is networked, with the Ohio Department of Natural Resources (ODNR) serving as the lead agency. The Ohio Coastal Management Plan has been updated several times since then to reflect changes in Ohio Revised and Administrative codes, and organizational changes. The plan was most recently updated and federal re-approved in April 2007. Of the 41 policies in

the program, all or portions of 30 policies are enforceable, with 11 polices that are defined as enhancement policies (ONDR, 2007).

The State of Ohio has developed the policies for the program, which describes the current state coastal legislation and management policies. With the exception of implementation of Ohio's new coastal erosion program mandated by Ohio Revised Code (O.R.C.) Chapter 1506.06-.09 and amendments to Ohio's *Coastal Management Act*, the OCMP provides for no new state programs, regulations, or laws. It is based on an approach termed "networking," which is a framework and process for linking existing state programs, agencies, and laws into a system that will meet Federal requirements for an effective state coastal management program (ODNR 2007). Within ODNR, the Office of Coastal Management (OCM) has the lead for coordinating the programs of ODNR and other state agencies into a comprehensive coastal zone management program and it is responsible for implementing a comprehensive coastal erosion and flood plain management program The ODNR is currently completing development of the erosion management program pursuant to changes to Chapter 1506 enacted in May 1994 (ODNR 2007).

The ODNR and Ohio EPA share authority for protecting Ohio's coastal wetlands and other ecologically sensitive resources. Specifically, the Ohio Environmental Protection Agency (Ohio EPA) is responsible for implementing the state's water quality program. The objectives of this program are to:

- assure attainment of State Water Quality Standards;
- provide financial support for research and pollution abatement projects;
- promote soil and water conservation and prevention of agricultural and urban sediment pollution in cooperation with ODNR; and to
- implement the Ohio Nonpoint Source Management program in cooperation with ODNR through a broad matrix of authorities.

The Ohio EPA regulates a range of activities in wetlands through its state water quality laws, particularly through certification of federally permitted and licensed activities pursuant to section 401 of the Clean Water Act. Ohio EPA's certification process includes a sequenced review which requires projects to avoid, minimize, and mitigate for any loss of wetlands. The Ohio EPA implements a broad range of air quality, solid waste, and hazardous waste programs to protect Ohio's natural resources. The federal Coastal Zone Management Act (CZMA) requires that states specifically address the issue of shoreline erosion, shorefront access, and energy facility siting as part of program development (ODNR 2007).

Further, the ODNR has other responsibilities under the state coastal management plan:

- authority to acquire, manage, and restore coastal wetlands:
- authority to protect the public trust in Lake Erie waters and underlying lands through the submerged lands leasing program, submerged lands preserves, and permits for salvage and recovery of submerged abandoned property;
- responsibility for implementing a comprehensive plan to improve public access to Lake Erie's shoreline and waters;
- management of all commercial and non-commercial taking of fish and wildlife as well as the protection of non-game and endangered species;
- implements management programs regarding oil and gas, and mineral development for Lake Erie as well as surface mining; and
- implements several authorities that affect the withdrawal of waters from Lake Erie.

It should be noted that the Ohio coastal area includes: all of the waters of Lake Erie to the international boundary with Canada; the islands in the lake; the bed of the lake; and adjacent

shorelands within Ohio. The inland coastal management boundary of the Ohio coastal area, which is described in Chapter 3 of Part II of the plan, includes all shorelands subject to erosion or flooding, estuarine areas and wetlands, and other areas the use of which may directly and significantly affect Lake Erie waters. The inland extent of the boundary varies based on the biogeographic features of the area. For example, the boundary extends inland along the Maumee River while in urban areas, the coastal boundary generally is less than a half mile from the shore (ODNR 2007).

Ohio Nonpoint Source (NPS) Coastal Management Measures

To address the impacts of nonpoint source pollution on coastal water quality, Congress enacted section 6217 of the *Coastal Zone Act* in November 1990. Section 6217 requires that each state with an approved coastal zone management program develop and submit for approval a Coastal Nonpoint Pollution Control Program (CNPCP) to the USEPA and the National Oceanic and Atmospheric Administration (NOAA). The purpose of the program "shall be to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters, working in close conjunction with other State and local authorities" (ODNR 2000). To gain Federal approval, each state CNPCP must provide for the implementation, at a minimum, of management measures in conformance with those specified in the USEPA guidance published under subsection (g) of section 6217. The Ohio CNPCP is administered by the Ohio Department of Natural Resources (ODNR 2006). Coastal Nonpoint Source (NPS) Management Measures need to be addressed by Lake Erie Basin watersheds, which includes portions of 35 counties and covers an area of 11,649 square miles. The major sub-watersheds, or streams within the Lake Erie watershed include the Maumee, Portage, Sandusky, Huron, Vermillion, Black, Rocky, Chagrin, Cuyahoga, Grand, and Ashtabula. Watershed plans within the Ohio Lake Erie Basin must describe how the required coastal NPS management measures will be implemented within the specific watershed, if watershed inventory or sources and causes of impairment indicate applicability (ODNR 2006).

Moreover, Ohio's Nonpoint Source Management Program has issued a set of guiding principles (from ODNR 2006):

1. Local groups organized to protect or improve water resources are vital to the successful implementation of nonpoint source programs and projects;
2. The State of Ohio shares responsibility with local agencies and organizations in the implementation of watershed protection projects;
3. Protection and restoration of stream integrity (sinuosity, riparian habitat, and flow) is one of the highest priorities of Ohio's nonpoint program;
4. Program priorities are set by involving multiple stakeholders including, but not limited to, government, academia, industry, environmental groups, and local citizens;
5. Attention and funding is focused on local watershed and aquifer projects that directly improve water quality;
6. Water resources are prioritized, and programs and projects are targeted to priority areas;
7. Federal, state, and locally funded best management practices have coordinated cost sharing amounts and requirements;
8. That existing regulations that target nonpoint sources are uniformly enforced;

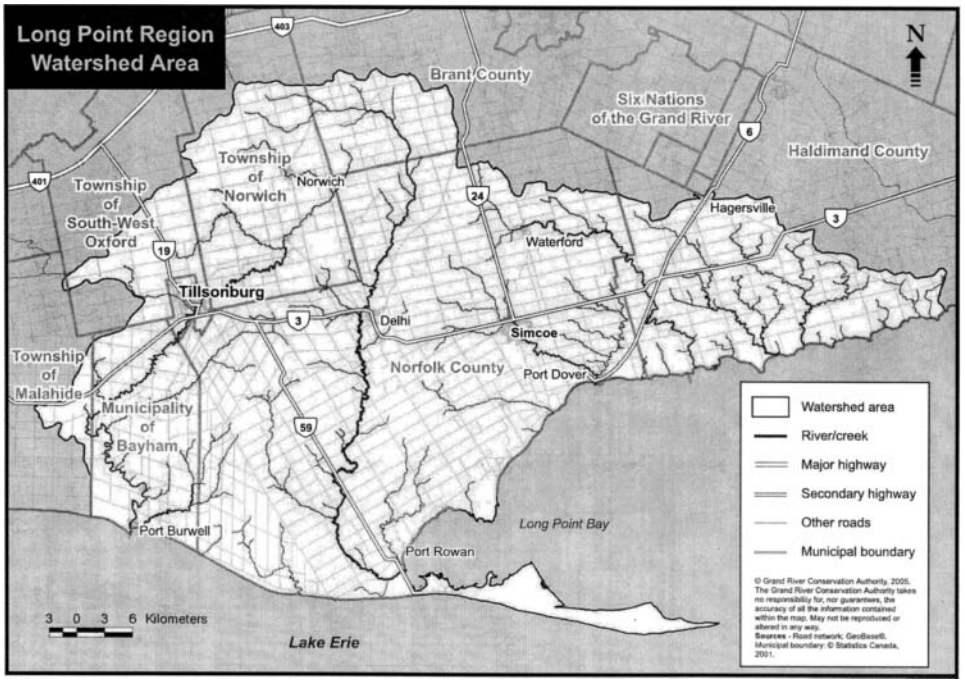

Figure 2. Long Point Region, Lake Erie, Ontario.

9. Funding is available for nonpoint source research and evaluation of nonpoint source programs and best management practices; and
10. Education and training are integral to the success of nonpoint source programs.

Case Study 2: Long Point, Ontario

The Long Point region (Figure 2) takes in the area drained by 14 creeks that empty into Lake Erie. Among them are: Big Otter Creek; Big Creek; Lynn River-Black Creek; Nanticoke Creek and Sandusky Creek (LPRCA 2008). These creeks drain an area of 2,780 square kilometers in portions of Elgin, Norfolk, Oxford, Brant, and Haldimand counties where agriculture is the dominant land use in the watershed (LPRCA 2008). Major communities include Port Burwell in Elgin County; Norwich and Tillsonburg in Oxford County; Delhi, Waterford, Simcoe, and Port Dover in Norfolk County; and Jarvis and Hagersville in Haldimand County. The total population is estimated at 102,000 people (LPRCA 2008). Nearly two-thirds of those people rely on municipally operated water supply for their drinking water and other water needs (LPRCA 2008). Of the more than 60,000 residents on municipal water supply, approximately 75 percent rely on groundwater resources, with the balance served by a Lake Erie supply (LPRCA 2008). The remaining residents of the watershed rely on private wells for their drinking water supply. The Long Point Region Conservation Authority (LPRCA) works with local communities and its many partners to achieve the conservation, restoration, development and responsible management of water, land, and natural habitats through programs that balance human, environmental, and economic needs (LPRCA 2002).

Watershed planning and coastal management efforts within the Long Point region are very complex, reflecting the wide range of goals and objectives of a variety of private and public agencies. A significant number of agencies support efforts to manage land use and resource management. Skibicki (1993) has recognized significant institutional nodes and corridors in the Long Point area that are related to initiatives for conservation and protection. The Long Point region contains over 30 major management agencies at federal, provincial, regional and local levels. A large number of additional programs, policies, legislation, nongovernmental organizations, and informal stewardship initiatives; all contribute to Lake Erie shoreline land use and resource management (Skibicki 1993). However, these various institutional arrangements are often not directly concerned with issues of shoreline management. The programs and policies indirectly influence land use practices and resource management initiatives at shoreline sites, for example, management and planning of parks and protected areas at Big Creek, Long Point, and Turkey Point that include the Lake Erie shoreline within their planning areas. In addition, policies related to wetlands, municipal planning, watershed management, natural areas, provincial parks, and fisheries all have indirect influence on attempts to manage the Lake Erie shoreline.

Watershed Planning

The Long Point watershed is a collection of major streams that drain into Lake Erie and they have a combined length of 3,700 km (LPRCA 2008). The watershed also has 225 km of Lake Erie shoreline, including the international renowned Long Point sand spit—designated by UNESCO in 1990 as a World Biosphere Reserve. The watershed measures 100 km by 60 km at its widest and deepest locations. The surface elevation ranges from 357 m above sea level in the northwest (west of Norwich), to 173.5 m above sea level along the Lake Erie shoreline (LPRCA 2008). In response to provincial concerns for water quality issues, flood control and related land management issues, Conservation Authorities were first established in the Province of Ontario in 1947 with the Long Point Region Conservation Authority created in 1971 (OMOE 1993).

Under the Conservation Authorities Act, a Conservation Authority is 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 (Shrubsole 1996). In addition to the legal responsibilities, there is significant public interest and support for the type of environmental activities that Conservation Authorities undertake. Conservation Authorities have a responsibility to the public, in general, to carry on with those activities (Thomson and Powell 1992). In order to fulfill those responsibilities, the Long Point Region Conservation Authority (LPRCA) has established watershed planning mandates and objectives (from LPRCA 2002):

1. to ensure that the Long Point Region watershed lands and waters are properly safeguarded, managed, and restored;
2. to protect, manage, and restore watershed woodlands, wetlands, and natural habitats;
3. to develop and maintain programs that will protect life and property from natural
4. hazards such as flooding and erosion; and
5. to provide opportunities for the public to enjoy, learn from, and respect the watershed's natural and cultural environments.

Watershed planning efforts focus on water-related projects and provide assistance to landowners in order to enhance the quality and quantity of private water supply sources. The LPRCA is responsible for maintaining operating plans for the management and

maintenance of the various water control structures (dams and reservoirs) under its control. The Authority assesses and monitors water quality within the watershed including both surface and ground water resources (LPRCA 2002). The LPRCA works with local municipalities to protect, manage, and restore critical and significant natural areas including forests and wetlands, and fish and wildlife habitat. The Authority is the responsible regulatory agencies for floodplain management and hazards areas. These include oversight of areas subject to long-term erosion problems such as those experienced along the Lake Erie shoreline at Turkey Point, Long Point, and Port Dover (LPRCA 2002). The LPRCA coordinates efforts among the local municipalities within the Long Point watershed in regard to land use planning and decision making related to both water quality and water quantity (flood control) issues, including those issues along the Lake Erie shoreline.

Regional Official Plan

The Regional Municipality of Haldimand-Norfolk Official Plan has designated hazard lands to regulate land uses in areas prone to shoreline flooding and erosion. The Lakeshore Policy Area defines permitted uses that require the approval of regional council reviewed by the Long Point Region Conservation Authority (RMHN 1976). Specific application of the Hazards Lands Policy is conducted through area municipal secondary plans and zoning by-laws. The 1:100 year regulatory flood line has been mapped at Long Point and Turkey Point, indicating that the majority of the existing land surface in the area is subject to land use restrictions (RMHN 1983). In addition, lands between the water's edge and the 100 year recession line are considered within the Lakeshore Erosion Prone Area and subject to additional planning restrictions (RMHN 1983).

The Regional Municipality of Haldimand-Norfolk (RMHN) has completed revisions of the regional Official Plan. The Issues and Options Paper for the Regional Official Plan Review prepared in 1993 discusses several options concerning lakeshore development:

1. that the regional official plan require amendments to reflect the Provincial Great Lakes-St. Lawrence River Flood and Erosion Policy Statement when approved by the provincial government;
2. that the regional official plan limit expansion of new lakeshore development to existing development nodes;
3. that the regional official plan permit development along the entire shoreline;
4. that the regional official plan allow conversion of resort (seasonal or cottage) residential buildings to permanent residential use at growth nodes along the shoreline (Port Dover, Port Rowan as well as appropriate lakeshore hamlets), and
5. Council could retain current policies permitting limited permanent development along the lakeshore, reflecting minimum requirements under Provincial policy, or amend the regional official plan to be more restrictive.

Review and public discussion of these options and revisions to the regional official plan was completed in 1994–95. The RMHN supports the preservation of the open nature of the lakeshore by limiting development to designated areas or nodes in the area municipal plans. The preferred form of development of resort residential development is nodes or clusters rather than strip development. Port Dover and Port Rowan will remain designated growth nodes and parts of the north causeway have been designated for resort/commercial development through a secondary plan. The Official Plan also limits the amount of conversion of seasonal residences to year round occupance and new permanent residential development along the lakeshore as allowed in the area plans. The number of seasonal

cottage conversions will be monitored, however, no criteria or limits are suggested within the plan.

The RMHN has stated the need for detailed site studies for shoreline development to determine the suitability of areas relative to hazards, the regulatory shoreline, and other land uses. In addition, the RMHN wishes to maintain a reserve of cottage properties for seasonal use, allow provisions for public access to the shore, and examine the implications of upgrading infrastructure such as roadways, water, sewage treatment and social services. Any proposed development study will include the potential negative impacts on significant biotic areas such as wetlands, forested areas, and fish habitat and cultural heritage resources (RMHN 1983).

Regulation of land uses in areas prone to shoreline flooding and erosion as identified under the revised Official Plan reflects the existing Hazard Lands policy and plan designations. The proposed plan states that the major expansion of any existing non-conforming uses in Hazard Lands will be discouraged. The Official Plan indicates that all natural shoreline processes shall be respected and due consideration and regard will be given to approved provincial policy and relevant recommendations in the LPRCA shoreline management plan (RMHN 1983). The Official Plan incorporates the new criteria for regulatory shorelines as defined in the comprehensive set of provincial land use policy statements for the Great Lakes (Province of Ontario 2001). These regulations control the type and location of development in areas prone to Great Lakes shoreline flooding and erosion through the use of setbacks.

Additional shoreline land use management issues discussed in the RMHN Official Plan include: provisions for detailed studies of the impact of proposed private shoreline erosion control and the protection of significant biotic areas such as wetlands; areas of natural and scientific interest; wildlife and fish habitat; and Carolinian Canada sites and environmentally sensitive areas (ESAs) as identified by the RMHN. The future identification of significant biotic areas including natural corridors and shorelines of lakes, rivers, and streams will be completed and integrated into the Official Plan. Protection of the significant biotic areas will extend to private land by reviewed proposed changes in land uses and requirements for environmental impact statements (EISs). The RMHN Official Plan also states that the Long Point sand spit shall be protected as wilderness and no new development will be permitted.

On January 1, 2001, the regional municipality was dissolved and two single-tier municipalities, the Town of Haldimand and the Town of Norfolk, were formed with the Official Plan policies divided among the two new legal jurisdictions. The existing RMHN Official Plan was revised to reflect this change of planning and new municipal boundaries.

Long Point Region Shoreline Management Plan

In 1988–89 the LPRCA developed a shoreline management plan (SMP) (Philpott 1989), which defines key components of a Lake Erie shoreline management program within the Long Point region to include, prevention, protection, emergency responses, public information, environment, and monitoring (OMNR 1987). The focus of the SMP is the establishment of regulatory shoreline zones, including a 1:100 year flood uprush limit, 100-year erosion limit, and dynamic beach limit (setback to protect dune and beaches from development) (OMNR 1987). The hazard land use setback reflects the Provincial Policy Statement for Great Lakes Shoreline Flooding and Erosion by the Ontario Ministry of Natural Resources and land use planning reform in Ontario (Province of Ontario 2001). The SMP also includes description of specific site conditions including: land use and

development; rates, frequency, and magnitude of hazards; and the risk of damage to property and life.

The SMP proposes management concepts for selected sites including: Long Point; Turkey Point; Port Dover; and the shoreline from Peacock Point to Featherstone. The key recommendations of the SMP are: (1) no use of structural protection on the lakeside of Long Point; (2) no new development and modification of seasonal residences at Long Point; (3) designation of Hastings Drive as a "No Re-Build" zone; (4) raising of dwellings on flood prone bayside at Long Point and Turkey Point; (5) flood proofing of any new development at the Port Dover beach; and (6) no new development from Peacock Point to Featherstone Point *unless* all hazards are eliminated by use of shore protection structures (Philpott 1989).

The SMP has been approved as a policy of the Conservation Authority (CA) and is currently used for public information, plan input review, and to support CA recommendations to local and regional governments concerning development proposals involving official plan and zoning by-law amendments. However, the SMP has no legal basis as the LPRCA currently does not have approved fill and flood regulations along the Lake Erie shoreline. Local municipal governments have this mandate under the Ontario Planning Act and can choose to ignore recommendations and planning review comments from the CA in reference to shoreline development. The SMP stresses an engineered response to shoreline flooding and erosion hazards with limited stress on land use planning. The importance of shoreline geomorphological processes and the relationship to land uses in the context of shoreline flooding and erosion is not given sufficient regard. The role of sediment transport and beach and dune development in maintaining biotic significance is not evident. The existing SMP will need substantial revisions in order to place greater emphasis on land use conflicts and environmental impacts from shoreline flooding and erosion hazards.

Discussion

A review of both the case studies from Ohio and Ontario reveals that although initiatives have been undertaken for watershed and coastal planning in both areas, the implementation and connection between the separate institutional arrangements utilized for the watershed and coastal environments have been limited. In addition, in both locations, current and future activities have been identified that would move towards a stronger integration and coordination between watershed and coastal planning. Such efforts will be important to support the shared goals of providing for comprehensive management and planning of coastal and watershed resources and in order to address the many environmental issues and human impacts in these areas.

Within Ohio, in order to receive state endorsement (which will allow for access to additional funding opportunities related to implementation of the watershed restoration plan), the coastal NPS requirements must be included within all watershed actions plans prepared for the Lake Erie coastal area in Ohio. To date ODNR has approved four watershed action plans in the Lake Erie coastal area that meet the Coastal NPS program requirements. Limited funding and direction have been provided by ODNR for the development of the coastal management measures. Although the watershed action plans often identify many of the issues and approaches to address water quality concerns, including nonpoint source pollutants, the bigger challenge lies in structurally fitting those elements of the plan to fulfill the specific criteria and format of the coastal NPS program requirements.

In contrast to the efforts in Ohio, the focus in the planning process for the Lake Erie shoreline in the Long Point region is on the assessment and mitigation of flood and erosion hazards. Shoreline development is to be controlled by land use regulations that limit

development in areas prone to shoreline flooding and erosion. Setbacks that are based on the 100-year erosion line and include a stable slope, a 1:100 flood level with a wave uprush calculation, and a dynamic beach zone for beach and dune environments, are the common plan mechanisms. The plans also include the premise that if an engineered structure, such as a groyne, wall, breakwater, or revetment, can reduce the threat from the hazards then development can locate within the hazard area. Very little attention is given to environmental concerns such as protection of significant natural features including wetlands, natural processes, fauna, or flora. The majority of these protected areas are wetlands, many of which have already been identified in other planning documents. Their designation within the shoreline management plan provides for recognition of their importance to the shoreline ecosystem and supports the need for integrated management of Great Lakes shorelines.

The Long Point Region Shoreline Management plans reflects a strong concern for flooding and erosion hazards highlighted in the provincial guidelines and lack sufficient information, policy, and program implementation of key land use and environmental issues fundamental to an integrated approach to coastal management. Human and cultural components deemed important to integrated management are largely ignored by the existing plans. Provisions for public consultation are limited, as are communication and education initiatives. Other management principles not contained within the plans are preserving and protecting productivity and biodiversity, provisions for conflict resolution and management coordination, and the concept of sustainable development. There are also limited connections made between the watershed planning efforts in the Long Point region to the Lake Erie shoreline management plan for the same area, and even though the same agency—the Long Point Region Conservation Authority—was responsible for both. It may be that the historical role for the LPRCA in watershed planning allowed for a stronger institutional presence in the development of the watershed plan, while its involvement and responsibilities for a Great Lakes shoreline management plan is a relatively new one. Also within the Long Point region, as noted previously in this article, several other provincial, regional, and federal government agencies share in the mandate and various regulatory responsibilities related to Great Lakes shoreline management, most notably in the areas of land use planning, wetland conservation, shoreline hazards, and protected areas.

What is needed in order to advance strong connections between coastal and watershed planning initiatives are stronger linkages between what are often separate planning approaches, policies, and programs. If at all possible the preferred approach should be that these linkages be developed as integrated elements with the existing planning process rather than considering the creation of new management programs or regimes. Several potential types of planning linkages are proposed here as preliminary examples of the ways and means in which such efforts could be undertaken to address common planning issues and concerns for both coastal environments and watersheds. Comments are then also made as to how to build these linkages into the planning process as well as thoughts as to how the cases of the Maumee Area of Concern and Long Point Region could have benefited from stronger connections between coastal and watershed planning efforts.

Planning linkages could take a variety of forms and initiatives, all of which are aimed to realize the essential and necessary connections that are so common and important to the planning efforts for both coastal environments and watersheds. One integrative example would be to make watershed planning a key component of all coastal planning efforts, where defined watersheds are identified and the need for watershed planning has been deemed necessary within coastal environments. Implementation of planning linkages is also an approach to creating stronger coordination mechanisms between the separate efforts of coastal and watershed planning. Another means to link these efforts could be to require that

the state/provincial, regional or local jurisdictions responsible for coastal and watershed be directed to organize coastal planning on a watershed basis. In the absence of formal mechanisms, such linkages could also be achieved by the creation of more informal or ad hoc network or coordinated arrangements between the existing land and water management agencies who have current responsibilities in the areas of coastal and watershed planning. Alternatively, requirements could be developed with current land use or other forms of comprehensive management and planning arrangements to account for both coastal and watershed issues. At the local planning scale, existing decision-making mechanisms could be reformed to ensure that coastal environments and watersheds are both addressed together within environmental or land use plans. Finally, a centralized regional planning arrangement could be created via local or regional jurisdictions to ensure that coordinated coastal and watershed planning is undertaken.

For the Maumee AOC and Long Point case studies, of the aforementioned planning linkages it would appear that three options could provide a stronger context for the efforts to integrate what have historically been separate disconnected planning initiatives for coastal environments and watersheds. The first planning option that would be recommended is the complete integration of coastal planning into the existing watershed planning approach, which was been undertaken under current the planning arrangements by the Maumee RAP and the Long Point Region Conservation Authority. In other words rather than continue to have separate programs dictated by existing state/provincial, regional, or local initiatives, an effort should be made to combine these planning endeavors under one central organizational structure. Secondly, an alternative would be to support an overarching network for regional coordinated efforts that would ensure that the separate efforts at coastal and watershed planning receive regional attention or shared programmatic structure to ensure all related planning approaches and issues were addressed. Some form of regional council, coordinating body, forum, or "umbrella" organization could serve this function. Finally, the last alternative to be considered (and perhaps the most complex and daunting) would be to formally establish (or empower) a regional or local entity that would be given the authority, mandate, resources, and responsibility to undertaken coordinated environmental planning that would include both coastal and watershed issues collectively.

Although it is difficult to determine at this time which of the three means of integrated planning outlined would provide the strongest opportunity to ensure that coastal and watershed planning are linked, serious consideration should be given by both regions to consider these options and determine the best route forward so as to improve the ongoing efforts to address both coastal environments and watersheds in comprehensive, coordinated, and cooperated planning approaches. Such a task and the resulting outcome of selecting a preferred planning linkage for the Maumee AOC and Long Point Region could also provide useful experiences and efforts as models for other Great Lakes jurisdictions and planning initiatives also challenged by the traditional separation of coastal and watershed planning approaches.

Conclusions

To be most effective it will be essential that watershed and coastal planning efforts be better linked and coordinated as such programs are developed within the Great Lakes basin. In examining the examples of the lower Maumee watershed in Ohio and the Long Point region in Ontario it becomes apparent that although important outcomes have been achieved with the preparation of watershed plans and coastal management plans, in both sites there remains an inherent gap between the two undertakings. In Ohio the requirement

for the inclusion of coastal management measures to address nonpoint pollution within a watershed restoration plan does represent a significant step forward and improvement. Within in Ontario, as represented by the case of the Long Point region, the continued involvement of the Long Point Regional Conservation Authority in matters related to Great Lakes shoreline management may provide similar advancements to link watershed and coastal planning.

In order to connect the aims and objectives of watershed planning in the lower Maumee by the preparation of watershed action plans that includes the Ohio Nonpoint Source Coastal Management Measures requirements takes careful effort and dedicated time and commitment on behalf of all responsible parties. A basic underlying element of teamwork is that all parties are working cooperatively towards a common goal. Within the Lake Erie coastal zone of Ohio, watershed planning and the need to address NPS coastal management measures can be seen as such a common goal. However, the program and its specific requirements need to be better integrated and combined into a more unified and state supported effort in order to more efficiently and effectively deliver the plans and ensure that all needed management elements are incorporated into final watershed plans within the coastal zone of Lake Erie in Ohio.

Similar issues occur within the Long Point region of Lake Erie in Ontario, Canada. Although several planning arrangements are in place—with a watershed plan, shoreline management plan, and regional land use plan—coordination and a focus effort on the Lake Erie coast is lacking. Efforts need to be taken in order to bring together the variety of agencies and responsible bodies to develop a more effective and coordinated approach so that watershed and coastal planning can be seen as a single, more unified, comprehensive system for decision-making. Such progress as exhibited in Ohio, and called for in Ontario, can only advance the efforts within the Great Lakes basin to ensure that the intended aims of both watershed and coastal planning can be met through achieving a strong team approach in order to meet the challenges and opportunities facing a society placing such increasing importance to the wise use and sustained management of these critical environments.

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