

# **Cumulative Effects Assessment and Regional Planning in Southern Ontario**

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## 1 .0 INTRODUCTION

The development of Cumulative Effects Assessment as a concept is a continuation of the environmental concerns that arose during the 1960s for widespread environmental degradation from point sources of pollution. The evolution of the environmental movement resulted in the development of regulatory agencies and strategies for dealing with point sources of pollution. Environmental impact assessments emerged in the early 1970s as the panacea to ensure that environmental degradation from large proponent driven projects could be managed. An increase in small industries, urbanization and development, and in the intensity of agriculture has created another type of problem much more insidious than those presented by “big” industry. These activities are not always large enough to warrant an environmental impact assessment but when added to other development activities in an area could result in significant changes to the environment. This, in turn, has resulted in incremental changes in the environment.

Environmental impact assessments typically deal with large development projects and do not adequately address incremental changes or the context in which larger projects occur. We have evolved from being concerned about major and obvious environmental degradation like lake eutrophication to being concerned about environmental degradation as a result of all the smaller activities that individually do not present a problem but taken collectively could present significant environmental damage.

Cumulative Effects Assessment attempts to account for these “nibbling” or incremental effects as well as the larger ones by providing a planning framework in which to evaluate existing and planned development.

In the U.S., the problem of cumulative effects has been recognized and **explicitly addressed** through the National Environmental Policy Act (**NEPA**) and its accompanying regulations issued by the Council on Environmental Quality (CEQ). The CEQ regulations stipulate that environmental impact assessments carried out under the Act must consider direct, indirect and cumulative effects of development activities. With this as a guideline, many U.S. agencies have conducted research into methodologies and techniques for implementing a CEA approach related to specific government agency activities.

The identification of cumulative effects is considered to be important because environmental degradation continues to occur regardless of the attempts that have been made to minimize the environmental problems caused by large scale development. Environmental impact assessment is able to address cumulative effects only in the context of proponent driven activities. In Ontario EIA is carried out only for large public projects and designated private projects. However, the activities contributing to cumulative effects problems are often large private developments such as mining or other forms of resource extraction, agricultural practices, and all the activities associated with urbanization. Land use planning, has an important role to play in controlling environmental degradation resulting **from** these activities.

It has been proposed that CEA be implemented in a regional planning framework (James et al., 1983; CEARC and NRC, 1986; **Dickert** and Tuttle, 1985; **Hollick**, 1986; Sonntag et al., 1987). It is now being recognized that projects should not be assessed in isolation of the larger geographic area in which they are situated. A regional planning framework allows an assessment of the impacts of a project or activities in relation to other activities in a region. For example, projects or

activities can be assessed and evaluated in terms of the total contribution to the region and in terms of the future plans for the Region. This, in turn accounts for other natural, social, economic and cultural factors.

Planning is an appropriate framework in which to implement CEA because the planning profession seeks to implement ideas for the benefit of society and uses knowledge to generate action. The development of policies, for example, must be accompanied by implementation mechanisms such as programs, or activities that cause change to occur. A theory or a policy is not useful if it cannot be translated into action (Wolfe, 1987). “The urban planner has to look forward, has to propose interventions in the human environment, and has to move beyond prediction into normative theory and action” (p.2). The reason to “do” planning is to create policies that can be implemented.

CEA as a theory is not useful if it cannot be implemented. Neither academic rhetoric nor government policy statements alone are adequate to justify its usefulness. A number of things must occur for a theory to be implemented and, therefore, to have the ability to make changes occur. First, the academic rhetoric is important in the initial awareness of the need for the concept to be considered. Second, the government must consider the concept to be a priority and thus deserving of policy statements. Third, the policy statements must not be so broad as to be meaningless but should be able to direct programs, and initiate and lead to research and development. Finally, the policies and programs should lead to courses of action that can be taken to carry out the intent of the concept at a local level.

## 1.1 Goal and Objectives of the Study

In this report, the feasibility of implementing CEA will be examined in light of regional planning in Southwestern Ontario. CEA will be defined and its status established, the appropriateness of regional planning and regional environmental planning will be discussed and criteria for effective implementation of CEA will be developed from the literature. In particular, the paper will examine the feasibility of implementing CEA in southwestern Ontario in relation to the management of water resources. The specific objectives required to carry out this goal are:

- a review of available and current literature pertaining to cumulative effects assessment, regional environmental planning, and regional planning to determine the present status,
- to develop criteria for effective CEA implementation and evaluate the management of water resources based on this criteria,
- to determine if there is enabling legislation at the provincial, regional, and local levels that would allow the incorporation of a CEA approach into a planning framework,
- to determine the extent to which regional municipalities use the existing legislation to control development and the extent to which they cooperate with other agencies to minimize cumulative environmental impacts,
- to determine if environmental agencies in Ontario are already dealing with CEA either explicitly or implicitly and to determine if there is a perceived need for this approach if it does not already exist,
- to determine how planners are involved in environmental planning and assessment at the Regional Municipality of Waterloo.

This report examines the status of CEA and regional planning in the context of the Regional Municipality of Waterloo with a focus on water resource management. First, the report will review the current literature on CEA and regional planning and develop an understanding of the concepts. Second, criteria for effective implementation of CEA will be developed. Third, the opportunities for CEA implementation will be

described given the planning and environmental legislation, policies and **programs**. Interviews with directors, managers and administrators of the environmental agencies supplemented the documented information available and added insight into the possibilities for CEA especially in relation to regional planning.

The extent to which the Regional Municipality of Waterloo and associated urban municipalities utilize the environmental legislation, policies and programs will be evaluated. Documented evidence was supplemented by interviews with Commissioners and Directors of Planning and Development at the Regional level and urban municipalities. This offered valuable insight into the problems that planners foresee with the implementation of CEA in a planning framework and a subsequent increase in responsibility for environmental management. Finally, the report assesses the overall feasibility of implementation of CEA based on the existing status of environmental management for water resources in Southern Ontario and the role of regional planning.

## 2.0 CUMULATIVE EFFECTS ASSESSMENT

Cumulative Effects Assessment (CEA) is a concept based on the principles of ecosystem stability and resilience. It **recognizes** that ecosystems have a certain capacity to accept inputs from anthropogenic or natural disturbances without major changes occurring in the function of the ecosystem. The point at which the inputs are sufficient to produce major positive or negative changes in ecosystem functions is called the threshold. CEA seeks to predict the upper threshold at which additional inputs produce changes to the environment and to avoid negative ecosystem changes (Stakhiv, 1988).



Cumulative effects and the problems inherent in piece meal degradation of the environment have been **recognized** for a number of years. However, the solutions to existing problems and the prevention of others are only beginning to be dealt with because of the complexity of the problems. The impediments to finding a workable means of implementing the concept are numerous. There is no standard “model” to use and no framework in place for managers to deal with these types of problems, therefore the solutions, to date, have been inconsistently applied and with varying degrees of success.

## 2.1 Understanding What CEA Means

There are two interpretations of CEA in the literature that reflect the disciplines and professions that are dealing with CEA. The first and most prevalent interpretation is that CEA is the scientific assessment of effects of activities on the physical and natural environment. This is reflected in the number of papers devoted to the issue of assessing effects of activities on fish populations and aquatic resources and is a direct extension of environmental impact assessment (Bain et al., 1986; Lane and Wallace, 1988 draft). The majority of this kind of CEA research is devoted to assessing the effects of activities on water quality, wetlands and fisheries.

This interpretation relies, for the most part, on scientific facts to predict effects on the environment. In addition, it does not account for potential or induced development that may occur as a result of a particular project or activity and there is little consideration for the social or economic context in which the project operates or will operate in the future. Therefore the effects of these activities are usually not taken into

consideration in the assessment of projects.

**The second** interpretation is that CEA is a concept in which impacts are evaluated in the “context of societal objectives” (Stakhiv, 1988). Stakhiv states that the first interpretation of CEA is a narrow one that does not reflect the comprehensive planning that NEPA and the CEQ intended. The use of CEA as an extension of EIA is, he contends, only a part of the concept. He makes a clear distinction between “effects” and “impacts” whereas the CEQ regulations makes no distinction and uses both synonymously (Schneller-MacDonald and Horak, 1986 draft). Stakhiv (1988), however, states that there is a fundamental difference between the two words that affects the interpretation of the regulations. Effects are the “scientific assessment of facts” while impacts are the “evaluation of the relative importance of effects by analysts and the public”.

Scientifically assessing the effects of disturbances on natural systems is considered to be a limited interpretation of the concept but one which is being focused on presently (CEARC and NRC, 1986). As opposed to purely scientific assessment of effects, the concept also includes the consideration of societal needs and trade-offs required to meet these needs yet maintain a certain environmental quality. The assessment of cumulative “effects”, therefore, is seen as a scientific, determinate activity that meets the narrowly defined prescriptions of an environmental impact statement. Cumulative “impact” analysis (CIA), alternately, is an objective comprehensive planning view that incorporates values, public perceptions and trade-offs. CIA, therefore, can be related to a futures or goal oriented planning approach as opposed to an incremental site specific and immediate decision-making tool.

In this paper, CEA will continue to be used because it is the terminology that is advocated by the Canadian Environmental Assessment and Research Council (CEARC). The inference, however, is that it refers to Stakhiv's Cumulative Impact Analysis concept as opposed to the narrower scientific assessment of effects.

## 2.2 Characterization of CEA Problems

Lane and Wallace, 1988 (draft) describe four types of activities that can lead to cumulative effects: 1) large projects that have multiple activities, 2) multiple projects with multiple activities, 3) catastrophic or sudden events and 4) broad scale environmental deterioration where the primary cause can be many small activities or one large activity. EIA addresses only the first and second types of activity and even then is limited in spatial and temporal considerations. These activities (1 and 2) are proponent driven while 3 and 4 are ecosystem driven. Catastrophic occurrences of natural origin are not generally considered in EIA except in the case of proposed development on a flood plain or the increased risk of flooding as a result of the development of dams and reservoirs. The fourth activity, broad scale deterioration of the environment from smaller activities, is not assessed in EIA. Yet it is the result of many small and seemingly insignificant activities that continue to cause environmental degradation. Although these are not the focus of EIAs, other forms of control and management attempt to deal with the resultant problems.

Peterson et al., 1987 and Lane and Wallace (1988 draft) have identified the following types of problems in Canada that can be considered to produce cumulative effects:

- long range transport of air pollutants
- urban air quality and **airshed** saturation
- **mobilization** of persistent or bioaccumulated substances
- climatic modification
- occupation of land/water by human made structures or features
- habitat alienation (aquatic and terrestrial)
- habitat fragmentation (aquatic and terrestrial)
- decreases in soil quality and quantity
- effects of the use of agricultural, silvicultural and horticultural chemicals
- reduction of groundwater supplies and groundwater contamination
- increased sediment, chemical and thermal loading of **freshwater** and marine habitats
- accelerating rates of renewable resource harvesting
- long term containment and disposal of toxic wastes
- activities and development producing carcinogenic-teratogenic effects
- loss of biological diversity
- change in hydrological regimes of major rivers/estuaries

This list illustrates how widespread cumulative effects problems are and how they permeate almost every activity being undertaken in both the private and public sector. Industrial discharges, mining activities, agriculture and forestry practices, physical restructuring, and urbanization all have the potential to create cumulative effects problems. Therefore, the approach that has been taken to reduce the impacts from single large projects is not adequate to deal with the environmental degradation occurring on a widespread scale.

After almost ten years of legislation in the United States, frameworks for **conceptualizing** and methodologies for implementing CEA are still evolving. Many agencies have now realized that CEA is too complex to address with a single generic approach but the need to assess cumulative effects in terms of a planning framework has not been uniformly **recognized**.

The U.S. experience offers a great deal of insight that can be used in a Canadian context. Although our political and legal systems differ there is **much that can be** learned at the conceptual level from work conducted in the United States and in relation to the “science” behind effects assessment. This information is valuable in any context and Canadian researchers could benefit and continue to carry on the research being done there. In Canada, however, we must appreciate that the political system in which environmental policy gets implemented works differently from the American political system and there is, therefore, a limit to the information that is applicable to us. The approach to legislation requirements, policy development and program implementation must reflect this difference.

Bain et al. (unpublished) have stated that it is not enough to merely conclude that CEA is an impossible task and ignore it. We must continue to research the possibility of dealing with cumulative effects problems. Without this research we will never come to grips with the problems or the resolutions.

### 3.0 REGIONAL PLANNING

Increasingly the literature reflects the notion that CEA can and will be implemented in a meaningful and effective manner only if it is incorporated into a regional planning framework (Cooper and Zedler, 1980; James et al., 1983; Clark, 1985; Dickert and Tuttle, 1985; CEARC and NRC, 1986; Joyce et al., 1986). The assessment of projects on a case by case basis is not sufficient because it does not account for other development that is occurring or will occur in the region in the future, secondary or indirect impacts on the environment and ultimately on society, or the overall context in which development is occurring. It also

does not account for the incremental degradation of the environment from **nonpoint** sources of pollution or catastrophic events. Therefore, to consider **CEA** only as an extension of EIA is both shortsighted and unrealistic.

A regional environmental planning perspective is considered to be essential in the management of water resources (Cooper and **Zedler**, 1980; New South Wales Science and Technology Council, 1983; Clarke, 1985; Dickert and Tuttle, 1985; CEARC and NRC, 1986). Proponents of an integrated and comprehensive approach to water resource management have advocated the watershed or river basin as the most logical unit for analysis and delivery of policies and programs (Environment Canada, 1975; Dickert and Tuttle, 1985; Pearce et al., 1985).

Regional planning, on the other hand, is seldom defined by natural boundaries. It is bounded by political jurisdictions. While watershed planning is focused on managing water quality and quantity, regional planning is multi-functional and must consider factors such as economic development, transportation, settlement patterns, etc. Regional planning decisions, however, affect the quality and quantity of water resources both within and outside of its political boundaries. Activities initiated upstream ultimately affect downstream users, thus regional planning must consider the impacts of its decisions in a broad context even though its boundaries do not always cover an entire watershed. Degradation of water quality and quantity affects not only the natural environment but the health, aesthetics and quality of life for all users of the resource.

Environmental managers and scientists are beginning to realize the influence that land use planning has on environmental quality (Domey, 1985; Brown, 1986; and Stakhiv, 1988). For example, Stakhiv (1988)

acknowledges that the determinants of land use patterns (regional economics, population growth and financial incentives) are responsible for environmental perturbations that cause cumulative effects. Brown (1986) discusses the cumulative effects of urban development and its potentially devastating impact on water resources, natural diversity and energy inputs and outflows. He states that the most far reaching effects of urban **development** are long term changes to the hydrological patterns through changes to the ground and surface water by flood control and stormwater management.

There is not much evidence that land use planners **recognize** that they have a potential role to play in environmental management. Mattyasovszky (1975) warned planners to be aware of how land use affects stability, productivity and cyclicity of ecosystems and suggested that they can act in a proactive way by prescribing conditions, restrictions and specifications to proposed and existing uses. Robinson and Webster (1985) added that, in Canada, "... planning related to land use, environmental quality, and socioeconomic development is done by different agencies, under separate legislation, with no requirements for a coordinated approach. Confusion often results" (p.30). While Armour and Walker (1977) describe three municipalities in Canada that have taken key roles in incorporating environmental management and planning, there are few examples in Canada where land use planning and environmental planning for water resources have converged.

The implementation of CEA, can be interpreted to require the integration of both land use planning at a regional level and ecological information (Bardecki, 1988). For management of water resources there must also be organization at a watershed level. Petak (1980) describes a new type of professional that is emerging to carry out this integrated approach. He

distinguishes between traditional technological engineers/planners and ecological or comprehensive environmental planners. The former two professionals (engineers and planners) are **characterized** as using a technological approach to planning, as being more concerned with an end product, as relying on objective information, as using quantitative tools and as looking for a technological fix. Comprehensive environmental planning, alternately, uses an ecological, predictive approach; attempts to adapt to uncertainties; focuses on the process to achieve the goals; relies on qualitative and subjective variables; uses both qualitative and quantitative tools; develops policy options; defines network interrelationships; and seeks to restore and maintain the integrity of the environment. Petak **recognizes** that a truly comprehensive approach to planning is not possible and that compromise is required between the objective of the traditional engineer/planner and the ecologist or comprehensive environmental planner.

### 3.1 Regional Planning in Ontario

Planning has traditionally been segmented into categories. Land use planners, social planners, environmental planners and others have tended to work in isolation from each other. It is important to realize, however, that each type of planning is part of an integrated network with one affecting the other. The impacts of environmental and land use planning ultimately affect the social and economic components of our environment and vice versa so there must be an awareness of all components. CEA offers the possibility of integrating all of these facets into a “teamwork” approach to problem-solving, policy-making and decision-making.



In Ontario, regional planning did not occur until the late 1950s with the formation of the Metropolitan Region of Toronto (1958) and as a response to the urbanization problems created by a substantial population move to the cities after the war years. It was not until the early 1970s that Regional municipalities were designated. There are thirteen regional municipalities, most of which are located in the heavily urbanized southwestern portion of the province. Initially regional planning was intended to be established on a province wide basis but there is no indication that this will happen.

The duties of a regional government are outlined in Acts specifically designed for each region. In general, the duties of regional planning have been described by Webster and Robinson (1985) as: preparation and adoption of regional plans designed to guide development within a region; provision of assistance to member municipalities in preparing their general municipal plans and by-laws; advisory body to municipalities on various planning matters; review and approval of subdivision applications, discussion of inter municipal problems and problem solving; delivery of certain rural services to unincorporated areas; and encouragement of public interest in the planning process.

Not all regional municipalities in Ontario carry out the same functions, however. For example, some regional governments conduct economic development while others leave this task to the area municipalities. The type of environmental policies in Official Plans also differs between regional governments.

Cullingworth (1987) states that the regional planning in Ontario is probably the best established of any regional planning agency in Canada. It is, however, not without its problems. Initially the regional

**governments were meant to** cooperate closely with the provincial planning agency to provide policies and plans that would satisfy both levels of government. However, the province has a history of “confused, ill-conceived policies and actions”, and this cooperation has not always been easy to manage. This is also true for environmental policies initiated by the Ministry of **Municipal** Affairs and implemented by the regional **municipalities**. This will be discussed in Section Seven.

### 3.2 Watershed Planning

In Canada, watershed planning was promoted with the Canada Water Act of 1970 (Pearce et al., 1985). This Act stated that the federal government could enter into agreements with the provinces to carry out river basin planning. In the early 1970s Environment Canada promoted river basin planning and supported joint agreements with some of the provinces (Environment Canada, 1975). They stressed that watershed plans must be flexible and adaptable to change, must involve the public in a meaningful way, and multiple objectives must be understood and planned for. In addition, they **recognized** that water quality problems are inseparable from water quantity and land management problems.

In Ontario, watershed planning in some form or other has been conducted since the Grand River Conservation Commission of 1934. Presently there are thirty nine Conservation Authorities (CA) in the province, most of which are located in the southern part of the province (Powell, 1983). The **CAs** are administered provincially but require the support of two thirds of the municipalities in the watershed to become established and to provide funding. This system appears to work in Southern Ontario because of the large population base in the southern part of the province. Other areas in Canada might not be able to

establish watershed planning on this basis. Watersheds that are sparsely populated or dominated by rural municipalities, for example, may not get the financial support from the municipalities or may not require watershed planning.

The large population and intensive urbanization within Southern Ontario has created a number of problems that must be addressed on a watershed basis. Fortunately most watersheds here are contained within the province and do not transcend provincial boundaries. The Great Lakes, however, are shared by the U.S. and Canada. The International Joint Commission is an agency that was created to deal with the management of international boundary waters. This presents another level of planning that is difficult to administer but it has had an effect on water resource management in Southern Ontario by supporting research and studies aimed at improving water quality.

#### 4.0 REQUIREMENTS FOR EFFECTIVE IMPLEMENTATION OF CEA

Without a working model of CEA as described by Stakhiv (1988), it is difficult to evaluate the feasibility of implementing the concept. Although there are examples of CEA being applied to large proponent driven projects (P.Lane and Associates Ltd. and Washburn and Gillis and Associates Ltd., 1988 and others), there is only one example of where it has been implemented in both a regional environmental and regional planning framework, the Lake Tahoe Basin (Felts and Wandesforde-Smith, 1973 and Strong, 1984). In addition, the concept has been incorporated into other cases of regional environmental assessment (Cooper and Zedler, 1980; James et al., 1983; Dicker-t and Tuttle, 1985; and Dames and Moore, 1988).

From these applications and other studies there emerge a number of criteria that are considered to be important components of a regional planning approach to CEA implementation. These include: commitment to implement, a legislative base, effective public involvement, knowledge of cumulative effects problems, industry cooperation and coordination, scientific analysis, and a planning framework. The following is a discussion of **each** of these criteria as described in the literature.

#### 4.1 Commitment to Implement

There are two possible levels of commitment that must exist in order to implement CEA. First, political support must be at the basis of any change (Irving et al., 1986). From this level comes the support for legislation, policies and programs. The resources flow from this level to ensure that the programs can be implemented. Without the political awareness and support for environmental issues, it would be impossible to direct any kind of meaningful change.

Political commitment refers not only to the awareness by politicians of environmental problems but to the willingness to commit resources to resolve the problems. This may initially require broad policy statements but must inevitably be supported by adequate research and development funds with which to implement the policy.

Second, there must be commitment from line staff, directors, and managers to the philosophy of CEA, to multidisciplinary teamwork within agencies, to interagency coordination and to planning (Lane and Wallace, 1988 draft and Irving et al., 1986). The political support provides the basis for the work carried out within and between agencies.

## 4.2 Legislative Base

As mentioned previously, the impetus for the research on CEA in the United States has been the national and state legislation and supporting regulations. Although there are a number of criticisms on the litigative and confrontational nature of impact assessment in the U.S. (Schneller-MacDonald and Horak, 1986 draft) it is questionable whether CEA would have been supported and developed to the extent that it has today if there had not been a legislative requirement to initiate research spurred on by political commitment. Even though there are still a great number of problems to resolve in implementing CEA in the U.S., there have been some major attempts to deal with the issues. Nevertheless, Estevez et al. (1986) state that it has taken a long time to bring the issue of cumulative effects to the point where it can be discussed and considered for inclusion in the language of legislation in the U.S.

The problems experienced in the U.S. with regard to the implementation of the CEA concept have been attributed to the lack of a clear and concise definition in the legislation, and the fact that no responsibility has been given to any one agency to coordinate activities (Horak and Vlachos, 1984 and Lane and Wallace, 1988 draft). A similar legislation in Australia is considered to be problematic because it does not specifically state who is responsible for carrying out CEA (NSW Science and Technology Council, 1983).

In Vermont, where the state implemented CEA legislation in 1970 through the Environmental Conservation Act, the problems encountered in applying the legislation include confusion over who should pay for the baseline carrying capacity studies and the need for an ongoing

commitment **from** state agencies who facilitate the process by providing information and carrying out inspections (**Cowart**, 1986). The legislation initially required that all proposed development be evaluated in a regional planning context against existing and planned development. This part of the legislation was never enacted fully and this is considered a major stumbling block in its success.

A legislative base is important but it is inadequate if it does not explicitly state who has the responsibility for carrying out assessments, who collects and maintains data records, and if it does not require a regional planning framework or context for consideration of cumulative effects of development. Responsibility for CEA is not clear cut. The U.S. public agencies are responsible for conducting CEA for their projects. However, if CEA is considered to be an activity that accounts for all four types of cumulative effects problems, then the responsibility must be shared between public agencies responsible for maintenance of regional environmental data bases, monitoring and supervision and decision-making and the private sector who are responsible for individual projects and ongoing activities.

#### 4.3 Public Involvement

Canadians are now showing a higher level of concern for environmental issues than ever before (Bird and Rapport, 1986). Involvement of the public in the issue of CEA is important to ensure that political commitment is forthcoming and continual. A number of researchers have indicated that water resource management, regional planning and the resolution of CEA problems require public involvement as well as public education of the values of water resources (**Bobrow** et al., 1984; Sader

and Cox, 1986; Brown, 1986; Dorsey, 1987).

Without public awareness, Sadler and Cox (1986) state that decision-making tends to have a limited **management** perspective and this can be detrimental to future water users. They claim that a narrow decision-making view, for example, one that considers only water supply, can impact negatively on other components of water resources such as water quality or recreational capability. Likewise, decisions made to enhance economic development without consideration for the impacts on water resources can have long term and cumulative impacts. The public can help to put broader issues on the political agenda and ensure that a narrow perspective does not jeopardize future uses.

In addition, many cumulative effect type problems are the result of small private activities that can become additively or synergistically cumulative. The public must become part of the resolution and therefore must be aware that they are contributing to the problem and secondly, must be given feasible options to help resolve the problems.

#### 4.4 Knowledge of Cumulative Effects Problems

As fundamental as the political commitment is the need for awareness and education of resource managers, environmental managers and planners, scientists, and other professionals with the ability to contribute to CEA (**Horak** and Vlachos, 1984; Irving et al., 1986 and Sadler and Cox, 1986). Implementation requires professionals with the vision and skills necessary to develop policies and programs to deal with cumulative effects issues and problems.

Sadler and Cox (1986) state that “to be more effective, water management is likely to require modification of the traditional view that it is primarily a technical activity involving construction of engineering works to modify hydrologic systems”(p. 19). Likewise, it is important for those involved with the problem-solving of CEA to understand that the resolution of cumulative effects problems of any kind requires not only a technical solution but one that considers alternatives, and social and cultural impacts.

Dorcey (1987) suggests that the key to effective water resource management is the ability to interact with all the players concerned with water resources. The success of any approach is on a key person who can maintain good communication among all parties and who has the skills to mediate if necessary. He claims that at the present time these are the skills that are lacking to make water resource management effective. Cardy and Gregory (1987) also state that the managers role is paramount in implementing policy and bringing together agencies and interested parties on water related issues.

CEA implementation for water resources requires strong planners and managers who can identify and act on issues, be proactive, develop policies that reflect the issues, prevent crisis situations, can communicate with other professionals and the public, have an appreciation of the diversity of issues in water resources, and who have strong administrative skills (Dorcey 1987; Cardy and Gregory, 1987). The use of a multidisciplinary approach is essential in CEA because it is a planning process and because no one discipline has the expertise to carry out a CEA (Lane and Wallace, 1988 draft).



It is important that those involved in environmental planning and **management be aware** of the research that has already been completed in the U.S., **Australia** and elsewhere and be able to direct research in Canada **to** complement that which has already been done. The importance and necessity of a CEA approach must be **recognized** by those who can direct and by those who can carry out research. Dorcey admits that there are few professionals who fit the characteristics listed above. However, he does stress that there needs to be a move away from **specialization** in professions to multidisciplinary training and ability to “manage”, administer, and deal with diverse interests.

#### 4.5 Industry Cooperation and Coordination

Environmental degradation does not occur only as a result of public activities. The private sector must also be made aware of cumulative effects problems. Agricultural and forestry practices, mining activities, industrial discharges and private development contribute significantly to the types and seriousness of cumulative effects problems across Canada (Peterson et al, 1987; Lane and Wallace, 1988, draft). It is important therefore to have the commitment of the private sector in environmental management of cumulative effects.

The industrial sector has the ability to direct resources into research and development to improve pollution abatement technologies and to reduce the impacts of their activities on water resources. This requires that industry and government coordinate their activities and develop a communication system in which government understands the motivations, actions and steps that industry must take to develop the technology to reduce environmental impacts yet maintain economic feasibility (**Horak** and Vlachos, 1984).

Agriculture poses a special problem in dealing with **nonpoint** sources of pollution. Farming practices have historically not been subject to environmental regulations in either the U.S. (Myers, 1986) or Canada. As a result, the agricultural industry has been cited as a major contributor to cumulative effects problems.

The Standing Committee on Agriculture, Fisheries and Forestry (Sparrow, 1984) stated that “Canada is facing the most serious agricultural crisis in its history and unless action is taken quickly, this country will lose a major portion of its agricultural capability” (p.3). There is a challenge, in Canada, to provide opportunities to farmers to adopt conservation based practices and still maintain economic feasibility. The Committee concluded that “soil conservation cannot be dealt with in isolation from related issues such as water quality, land use, wildlife, management of fisheries and **forestry**” (p.11). They recommended, among other things, that provincial governments strengthen and more conscientiously enforce their land use legislation to preserve agricultural land.

Clearly, there is a need to bring private industry into plans for assessing and managing cumulative effects related to their activities.

#### 4.6 Scientific Analysis

Although CEA can be considered to be a planning process that contributes to decision-making, there is also a need for scientific analysis of effects. There is no one technique or method for conducting the scientific analysis of a CEA (Horak and Vlachos, 1984; Irving et al., 1986; Lane and Wallace 1988 draft; and Stakhiv, 1988). Each situation

requires an approach that reflects the location, the activities or proposed project and its characteristics, the type of cumulative effects problem(s) anticipated, and the resources available. Although often advocated in CEA, hypothesis testing and rigid experimentation are not considered appropriate (Lane and Wallace, 1988 draft).

Central to the concept of CEA is the ability to know how far an ecosystem can be pushed by anthropogenic or natural inputs before the resiliency or stability of a system has been reached (Stakhiv, 1988). There are no general thresholds established for ecosystems because each is dependent on the interactions of a number of species, populations and unique microclimatic conditions. Therefore, the setting of thresholds is a central theme of CEA but difficult to estimate. In addition, the scientific community is not always able to predict effects on biological communities from pollutants easily or accurately at the ecosystem level. There is still a lot that is unknown about the structure and function of various types of ecosystems. Presently, data is available for a limited number of species and this data must be extrapolated to other species. This is not always adequate or accurate but there is no alternative since there are hundreds of thousands of species in various life stages that could be studied (Bamthouse and Suter II, 1984).

Techniques for proponent driven CEA have been adapted from existing EIA approaches with the knowledge that few EIA techniques can account for secondary or higher order, indirect, temporal or spatial requirements of cumulative effects. In the United States, a number of approaches are being used to resolve cumulative effects problems (Lane and Wallace, 1988 draft). The general approach is a problem solving one that could include nominal group techniques, cause/effect analysis, cluster impact assessment, collaborative problem solving, modelling, risk

assessment, trend analysis and forecasting, mapping, networks, matrices, and checklists. The approaches are not limited to one technique but rather a number of techniques are used based on the information and resources available, and the budget. The key to the success of the problem solving approaches is considered to be their adaptability, cooperation among professionals within and between agencies, and the multidisciplinary nature of planning teams.

One of the key components of CEA is the development of a comprehensive data base. A regional environmental data base is important because it provides the necessary baseline data with which to evaluate subsequent development, shows trends that can be evaluated against natural and anthropogenic changes, and is at a scale at which these trends can be shown (Pocock, 1981 and James et al., 1983). Data requirements are not only defined by the physical or biological environment, the rate and location of growth and development are also important because growth influences the biophysical changes that will occur (Dames and Moore, 1988). The key to development of an environmental data base is that it should be flexible, easy to add data to and retrieve data from, and be accessible to anyone carrying out development.

The collection of environmental data must be an ongoing activity. A knowledge of historical information is important as a baseline against which to measure the impact of future development. Data collection must occur on a continual basis, however, in order to discern natural variation from changes occurring as a result of poor development patterns (Brown, 1986 and Stakhiv, 1988).

There is still a lot of basic research that must be carried out in order for us to better understand and predict causes and effects of activities on **ecosystems** (Horak and Vlachos, 1984 and Brown, 1986). The development of regional environmental data bases and monitoring allows the process of planning and managing cumulative effects to be better able to adapt to changes that cannot be predicted accurately.

#### 4.7 Planning for Development

“Growth and change, which are inextricably linked to the economic and social trends that influence land use are at the heart of the concept of cumulative impacts analysis”. (Dames and Moore, 1988, p.5- 1)

The need for a regional planning framework as a context in which to assess the cumulative effects of development activities of any scale has been discussed extensively. Planning, especially land use planning, has the potential to be a pivotal factor in the successful implementation of a CEA approach to environmental management. Both Dames and Moore (1988) and Stakhiv (1988) **recognize** that land use planning, population growth, and regional economics set the context in which cumulative effects must be evaluated. Although science can attempt to provide guidance by predicting the impacts or consequences of development, decision makers are responsible for evaluating development opportunities in light of a number of social, economic and institutional as well as environmental factors.

To be useful in a CEA context, land use planning must be proactive, anticipatory and able to adapt to changes as they occur (Bardecki, 1988). Regional plans must be detailed enough to provide guidance to both the developers and to those conducting assessments (**Cowart**, 1986) and plans should be based on regional environmental data bases (Cooper and

Zedler, 1980).

There are numerous techniques that have evolved to aid planners in developing plans that reflect the capability and suitability of the landscape for development, for example the **McHarg** overlay technique and recent attempts to predict environmental thresholds and carrying capacities (McHarg, 1971; Tahoe Regional Planning Agency, 1982). The use of municipal Master Plans and land use plans as a means of reducing environmental degradation, however, is only useful in areas that carry out municipal planning. The strength of municipal plans to minimize environmental problems as a result of development depends on a number of factors related to the awareness of planners, of politicians and the public of the need for this type of approach and the ability to carry out environmental protection through existing mandates, policies and control mechanisms.

The social and economic vitality of a region is closely tied to environmental quality. Historically, planning decisions have tended to be made without regard for environmental consequences. The consequences are generally a reduction of environmental quality that is manifested as loss of aesthetic landscapes and recreational opportunities, or eventually to serious health problems due to reduction in water quality and quantity which in turn can lead to severe economic problems. Planning, therefore, must consider environmental issues as part of the decision making process. The environment may not always be given top priority but it must begin to be a major consideration.

The recognition of land use planning and development controls as being important in environmental planning is not new (McAllister (ed.) 1973; Friend et al. 1976; Rahenkemp et al. 1977; and Joyce, 1981). The

importance of communication and cooperation between the **land use planning and ecology** professions has also been established (**Holling** and Goldberg, 1971; Mattyasovszky, 1975; Domey, **1985**). In urbanized areas, planners are important because they have the ability to control growth and create links between the environmental agencies and planning.

#### 4.8 Guidelines for Implementation

The New South Wales Science and Technology Council (1983) report concluded that even statutory requirements for CEA are not adequate unless there are clear guidelines for implementation. There can be no doubt that as a concept CEA has merit. The concept cannot move into action, however, without tools with **which** to make it work. It is not enough to espouse in the literature, make policy statements in legislation, or to require that regulations be met unless there are **professionals** who agree on the scope and definition of CEA, who have a commitment to carrying out research and who promote the development of the concept in practice. This requires that agencies work cooperatively together, work in multidisciplinary teams and develop an approach to the resolution of CEA problems. It is just as important for the field biologist and the planning technicians to be aware of CEA and its possibilities as it is for the managers and politicians.

Thus, the requirements for effective implementation include commitment **and** awareness, ability to integrate disciplines and work in an interdisciplinary fashion, ability to carry out goal oriented planning, and ability to be flexible and adaptable to change. There is a major need to supplement existing ecosystem theory and knowledge with research and to improve our predictive capabilities. These requirements represent

major challenges to the way our institutions presently operate.

Our track record at working in multidisciplinary teams, at working cooperatively between and within agencies and being flexible are not good. The planning profession, for example, tends to work in a reactive way to problem solving (Robinson and Webster, 1985). Environmental issues have only recently been given attention at the municipal level and only when serious problems occur. Alternately, environmental agencies are staffed with science professionals who are not trained to plan or to manage. For CEA to work there is a need for environmental and planning professions to converge.

## 5.0 METHODOLOGY

The focus of the research for this study is to determine if the requirements for implementing an effective CEA approach exist in Southwestern Ontario. This requires an analysis of the existing environmental legislation and associated policies and programs to determine if there is already an awareness of the concept and if this is carried through in policies and programs. Secondly, the study focuses on regional planning to determine the role that regional planning presently plays in environmental management and to present some recommendations for how it could improve that role to include CEA.

The following environmental agencies and planning municipalities were chosen for the study based on their ability to influence water resources directly through administration of legislation and policies and implementation of programs: Ministry of the Environment, Ministry of Natural Resources, Ministry of Agriculture and Food, Ministry of Municipal Affairs and the Grand River Conservation Authority. The



Regional Municipality of Waterloo was chosen as a regional planning **agency because it** is completely contained within the Grand River watershed, therefore it is influenced by development upstream and it influences the quality and quantity downstream. The Region is considered to be progressive in terms of its environmental policies, it is presently dealing with rapid residential and industrial growth, and it is presently initiating a major water supply project that has the potential to seriously impact both surface and ground water quality and quantity. The three major urban areas within the Region, Kitchener, Waterloo and Cambridge, were also chosen for the interviews because they are accepting the majority of the growth in both the residential and industrial sectors.

### 5.1 Study Design

The study is designed to determine 1) if the requirements for effective implementation of CEA outlined in Chapter Four exist in Ontario for water resource management and 2) the existing and potential role of regional planning in carrying out a CEA approach based on the argument that land use planning is a primary determinant in the quality and quantity of aquatic environments and has a responsibility in the management of water resources. The research includes both review of existing environmental legislation, policies and programs, as well as interviews with agency staff.

An open-ended questionnaire was designed to gather qualitative information on the existing institutions/agencies with responsibilities for water resource management and regional planning. The interviews are required to serve two purposes, 1) to obtain information on existing and proposed policies, programs, and functions of Regional and municipal

**planning departments**, and provincial agencies dealing with environmental management within the Region of Waterloo and 2) to **obtain** information from decision makers within each organization as to their knowledge, opinion and receptivity to CEA and the implementation of it in a regional planning framework based on their experience with the agency and the possibilities that exist to implement it.

Based on the criteria for effective implementation of CEA, a questionnaire was devised to assess, from managers and directors at all levels, the feasibility of implementing a CEA concept. The questionnaire was divided into three sections for agencies involved in environmental management of water resources within the region and four sections for municipalities within the Region and for the Region itself. The first section addresses the feasibility, relevancy, and interpretation of CEA for each agency's work. The second section addresses the regional aspects of CEA and the role of planners and Regional Municipal government in implementation. The third section addresses the existing status of environmental management of water resources within the agency. The fourth section applies only to municipal planning and addresses the manner in which the municipalities deal with environmental issues. See Appendix A and B for the questionnaire format and a list of persons interviewed.

## 5.2 Analysis

With regard to the objectives of the study, the interviews were analyzed according to the information required. Section One of the interviews established the level of awareness about cumulative effects problems by the respondents and offered an indication of how these agencies might contribute to a CEA approach given existing mandates. Section Two

indicated how respondents interpret the role of regional planning in environmental management and gave recommendations for how that role could improve.

The interviews were used to supplement information on the agency structure and function. Therefore, Section Three could easily be analyzed in conjunction with existing statutes, regulations and policies and programs. The interviews added greater depth to this analysis because policies and programs that are being developed but are not yet available could be included and discussed. Also, it gave an indication of existing interpretation of the agencies' mandates and responsibilities from a working perspective. The opportunities and limitations of the legislation, policies and programs were then evaluated based on the criteria developed in Section Four of this report.

Section Four allows an analysis of how regional and municipal planning presently incorporates or integrates environmental issues into the planning process and explores the potential roles and responsibilities of planning in water resource management.

### 5.3 Limitations of the Study

These qualitative interviews are limited in that they do not provide a statistical sampling from which to draw conclusions. The primary purpose of the interviews was to supplement existing documented information and gain an understanding of how agencies perceive CEA and regional planning. This is important in determining the feasibility of implementing CEA because it indicates the receptiveness and willingness of agencies to adopt new ideas. Given that only directors, managers and divisional chiefs were interviewed, the interviews do reveal information

and attitudes about the agencies that have been gleaned through many years of experience. However, the small number of interviews does not allow a detailed analysis of the information by agency.

## 6.0 ENVIRONMENTAL AND PLANNING LEGISLATION

In this section the results of the interviews will be summarized for Section I of the questionnaire dealing with opportunities for implementation of CEA. The provincial environmental and planning legislation and associated regulations will be examined to determine if there is provision for the assessment of cumulative effects. Each agency is responsible for administering a number of pieces of legislation in the form of Acts and regulations which enable the agencies to regulate, make policy statements, and implement **programs** to fulfil their mandate. Mandates are sometimes clearly stated in an Act or derived by the agency from the responsibilities outlined in a number of Acts. By examining the agencies and their associated legislation and regulations it is possible to determine if these agencies have the ability to incorporate a CEA approach to water resource management.

### 6.1 Summary of Interviews

Section I of the interviews addressed the opportunities and limitations of implementing a CEA approach. The interviews revealed that there is little knowledge by the environmental agencies of the CEA legislation or research being carried out in the U.S. or the research being commissioned through the Canadian Environmental Assessment and Research Council. Most respondents claimed that they have an intuitive awareness of cumulative effects problems but had not been introduced to the concept previously. The following is a summary of responses to

specific questions.

**Question: How relevant is the CEA concept to your agency's work?**

The relevance of the concept to the management of water resources was unanimously positive. No one considered the concept to be irrelevant although there were some qualifications regarding the relevancy to particular divisions. For example, the Lands Division of the Grand River Conservation Authority and the Field Division of the Ministry of the Environment thought the concept had limited applicability to their activities but is very relevant to both agency's mandates and other divisions. Another respondent, in OMAF, did not comment on its relevance to that agency's work.

Planners also replied that the concept is relevant to municipal planning since planning must consider the implications of development. It was considered to be an important concept to apply to determine the state of the environment and as a basis for decision making.

**Question? How could your agency participate in a CEA approach?**

The respondents suggested eight ways that agencies could participate in a CEA approach:

- 1) policy formulation
- 2) program development and implementation
- 3) coordination among agencies
- 4) research
- 5) funding
- 6) advisory/plan review
- 7) abatement
- 8) data collection
- 9) monitoring

All agencies felt that they could participate in policy formulation and program development and implementation. However, only the GRCA suggested that they could contribute by acting as a coordinating agency.

Only MNR and MOE indicated their contributions could be data collection and monitoring. MNR **alone** identified funding as a possible contribution of their agency.

Planners contributed to the list by stating that they could identify the studies that might be required to fill information gaps, and data requirements for the assessment of development proposals. In addition, one of the municipal respondents identified the need for inspection of development projects to ensure compliance with conditions of approval.

Question: What changes would be required in **your agency** to implement a CEA approach?

Five types of changes were identified as being necessary before CEA can be implemented. These included:

- more staff,
- additional funding,
- more information/data,
- organizational changes including improved interagency cooperation, and
- a change in the direction of the agency.

All agencies identified the lack of staff and all except MNR identified lack of funding as major deterrents to the implementation of a CEA approach. Only MNR identified major information and data gaps as a significant problem. Most agencies felt that they have the technical expertise to carry out CEA but without the political support and adequate resources, many solutions to cumulative effects problems cannot be implemented.

Planners added that the implementation of a CEA approach would require policy amendments to the Official Plan as well as the addition of environmental planners to the staff.

Question: Please **identify** the **types** of cumulative effects **problems** that your **agency** has a mandate to address.

From the list of cumulative effects problems in Canada (Lane and Wallace, 1988 draft) respondents indicated the types of problems their agency has a mandate for dealing with. Table 6.1 indicates the problems and the agencies that claim to have a mandate to deal with the problem. There is a large amount of overlap in the agencies that claim to have a mandate to address most of the cumulative effects problems. All agencies have a mandate to address at least some of these problems if not all.

Question: How are these cumulative effects **problems** being addressed?

In general, the responses to this question included such solutions as programs to address specific problems, strategic planning for specific resources, regulation and permitting, development of data bases to aid in the management of a specific component of a resource, and environmental impact assessment. The adequacy of these solutions was not so clearly stated. OMAF bases the evaluation of their approaches on the popularity of the programs that they make available to their clients. MOE could not adequately explain if their approaches are successful at addressing cumulative effects. This was primarily attributed to the lack of planning and coordinating department within the Ministry and to other organizational problems.

MNR stated that the legislation and regulations are used to try and address the cumulative effects problems but it is difficult to justify the refusal of a permit for small projects that contribute to cumulative effects. They rely on municipalities for enforcement through the planning approval process. The GRCA response to this question was limited. One respondent claimed that he did not know how successful their

Table 6.1 A list of cumulative effects problems and an indication of the agencies responsible for these types of problems.  
(source of CE list: Lane and Wallace, 1988 draft)

cumulative effects problem	AGENCY				
	MOE	MNR	GRCA	OMAF	Munic.
1) long range transport of air pollutants and ecosystem acidification	*	*		*	
2) urban/rural air quality and <b>airshed</b> saturation	*	*			*
3) mobilization of persistent or <b>bio-</b> accumulated substances	*	*			*
4) climatic modification	*			*	*
5) occupation of land/water by man-made features	*	*	*	*	*
6) habitat alienation	*	*	*	*	*
7) habitat fragmentation	*	*	*	*	*
8) decreases in soil quantity and quality	*	*	*	*	*
9) use of agricultural, silvicultural and horticultural chemicals	*	*	*	*	
10) reduction of groundwater supplies and contamination	*	*	*	*	*
11) increased sediment, chemical and thermal loading to freshwater and marine habitats	*	*	*	*	*
12) accelerating rates of renewable resource harvesting	*	*	*		*
13) long term containment and disposal of toxic wastes	*		*	*	*
14) activities and developments producing carcinogenic - teratogenic effects	*	*	*	*	
15) loss of biological diversity	*	*	*	*	*
16) change in hydrological regimes of major rivers/estuaries	*	*	*	*	*



approaches are or whether there is any way of measuring the success of programs.

Planners have attempted to resolve problems through the planning process of development approvals. Sometimes the problems have been resolved with the use of engineering structures such as channelization while the more recent solutions, for example, to stormwater management have included the development of Master Drainage Plans and the requirement of stormwater management plans for subdivision development.

**Question:** What obstacles have been encountered in **trying** to address these problems?

Respondents cited eleven obstacles in their attempts to address cumulative effects problems. These are listed in Table 6.2 with an indication of the agencies that identified them. The obstacles that are common to at least three of the agencies include lack of cooperation from other agencies, lack of resources to carry out programs adequately, technical problems and data gaps, jurisdictional conflicts, and lack of political commitment. Most respondents indicated that with political commitment, other problems such as lack of funding could be resolved. However, technical problems such as the lack of knowledge about ecosystems and uncertainty in predicting effects were also considered to be major impediments.

With regard to water resources, planners indicated that the major obstacles they encounter are related to the lack of a clear responsibility for water resources by any one agency. It is sometimes difficult to discern who has responsibility for specific problems. Related to this is the lack of integrated water resource policies and communication

Table 6.2 Obstacles encountered in addressing cumulative effects problems

Obstacle	AGENCY				
	MOE	MNR	GRCA	OMAF	Munic.
1) cooperation of planners and municipalities	*	*	-	*	-
2) cooperation of industry	*	*	-	*	*
3) cooperation of other agencies	*	-	*	-	-
4) resources (funding and staff)	*	-	*	*	*
5) implementation mechanism	*	-	-	-	*
6) technical problems/data gaps	*	*	*	*	*
7) <b>organizational</b> problems	*	-	-	-	-
8) jurisdictional conflicts	*	*	*	*	*
9) political commitment	*	*	*	*	*
10) legislative authority	*	-	-	-	-
11) resource user conflicts		*	*	-	-

between agencies. In addition, municipal planning has no clear jurisdiction for dealing with water resource management.

## 6.2 Environmental Legislation

The Ontario environmental legislation related to water resources is listed by agency in Tables 6.3, 6.4 and 6.5. The following is a brief discussion of the purpose of each agency's legislation and the opportunities and limitations they present for the implementation of a CEA approach. A legislative requirement was not cited by interview respondents as a requirement for implementation. Some respondents indicated that the legislation required for CEA already exists.

### Ministry of the Environment

“The Ministry of the Environment’s objective is to protect human health and the ecosystem by ensuring that acceptable environmental standards of air, water, and land are maintained.”

The legislation administered by the Ministry of Environment is primarily regulatory, enabling the ministry to control discharges into the natural environment. With regard to water resources, MOE is concerned with maintaining the quality and quantity of water for safe use by humans. In order to do this, the Ministry’s legislation enables it to regulate point source discharges of pollution, develop standards for sewage treatment plant discharges, control the taking of water from surface or groundwater sources, and license the use of pesticides.

The Environmental Protection Act gives the agency its primary mandate with regard to the protection of water quality. It allows the Minister to make regulations with regard to pollution control, and to carry out a variety of activities including research, monitoring programs, and the

Table 6.3 Legislation administered by the Ministry of the Environment

Act	Purpose
Environmental Protection Act	enables MOE to make regulations regarding discharges of pollution to natural environment
Ontario Water Resources Act	enables MOE to regulate the taking of water and establish standards for sewage treatment effluents
Pesticides Control Act	to ensure that pesticide users are licensed and to prevent users <b>from</b> discharging pesticides into the environment above the level which is considered safe for human health
Environmental Assessment Act	enables the Minister to require the assessment of environmental impacts of proponent driven activities

Table 6.4 Legislation Administered by the Ministry of Natural Resources, Ontario for Water Resources

Acts	Purpose
Federal Acts: Fisheries Act	protection of fish and fish habitat
Migratory Bird Convention Act	protection of waterfowl habitat
Provincial Acts: Endangered Species Act	prohibits the destruction of rare and endangered species or the interference or destruction of their habitat
Beds of Navigable Water Act	establishes beds of navigable waters as Crown land
Public Lands Act	establishes that <b>MNR</b> can manage, sell or dispose of lands under its charge
Conservation Lands Act	establishes tax relief for wetland landowners to maintain provincially significant wetlands in southern Ontario
Beach Protection Act	allows <b>MNR</b> to manage sand extraction in or adjacent to watercourses
Pits and Quarries Act	allows <b>MNR</b> to permit pit and quarry development
Game and Fish Act	allows <b>MNR</b> to manage fish and wildlife
Lakes and Rivers Improvements Act	allows <b>MNR</b> to permit dam development
Conservation Authorities Act	establishes the mandate of the <b>CAs</b> and <b>MNR</b> as the provincial agency responsible for funding <b>CAs</b>
Forestry Act	allows <b>CAs</b> and municipalities to obtain funding to acquire land for forestry purposes

Table 6.5 Acts administered by the Ontario Ministry of Agriculture and Food

Act	Purpose
Drainage Act	sets criteria for approval of drainage permits, enables Minister to make grants available for new drainage works, maintenance, repair and minor adjustments
Tile Drainage Installation Act	requires licenses for drainage work does not apply to agricultural land allows the making of regulations for prescribing standards and procedures of drainage works
Ministry of Agriculture and Food Act	allows the Minister to establish programs for the encouragement of any branch of the agency, allows the Minister to guarantee loans to farmers

dissemination of information. In addition, it gives the Ministry the authority to enter into agreements with any government or person with the intent of protecting or conserving the natural environment. This is the main vehicle that MOE has for dealing with **nonpoint** source and industrial pollution.

The Water Resources Act gives MOE the mandate to regulate the quantity of water discharged from sewage treatment plants and the taking of water from groundwater or surface water. Applications to take water are reviewed in light of availability of supply, the use to which the water will be put, and the effect of the taking on existing water users. The Pesticides Act regulates the type of pesticides that can be used, the application, and the licensing of persons to administer pesticides. Regulation 751(sec.3) exempts an agriculturalist from the Act for performing land exterminations on farmland or for forestry management.

The Environmental Assessment Act is the legislative base for assessing the environmental impacts of large public proponent driven projects. It is presently under review. The Act gives the Minister the ability to require the assessment of private projects but the Ministry has enforced this only for Energy-from-Waste projects. The Act designates certain types of projects as requiring class assessments. These assessments usually do not require full public hearings. Projects can be exempted from the Act if it is deemed by the Minister to be in the public interest to do so. Since 1982 there have been 950 exemptions (Pushchak, 1985). The Minister may assign conditions to the approval of projects such as monitoring and mitigation of environmental effects.

## Ministry of Natural Resources

**The** Ministry of Natural Resources (MNR) was formed on April 01, 1972 as a result of a major restructuring of the Ontario government. The mandate of the agency is derived from a number of Acts that the ministry has responsibility for and is expressed as a goal statement: “to provide opportunities for outdoor recreation and resource development for the continuous social and economic benefit of the public of Ontario and to administer, protect and conserve public lands and waters.”

There are three levels of decision-making and planning within the agency: Ministry Main Office carries out policy planning, the Region carries out strategic planning and the District implements the operational plans. Policy is developed within four groups in the Deputy Minister’s office: forest resources, lands and waters, outdoor recreation, and finance and administration.

The focus of MNR activities is primarily related to resource development on public land. Therefore, activities that focus on resources such as forestry are concentrated in Northern Ontario on Crown land. Likewise, the program objectives for the Lands and Waters Group and the Outdoor Recreation Group are geared toward the administration and provision of services on public lands. In Southern Ontario, where 99.8% of the land is privately owned (MOE, 1983), the agency relies on the participation and cooperation of the public to ensure that agency goals and objectives are carried out.

Freshwater is a federal responsibility under the Fisheries Act if a waterbody is fish bearing. The province, however, owns all the land under navigable waters. Presumably landowners can own the water of non fish bearing streams or the land under unnavigable waters. Much of



the legislation is related to the development of structures or the dumping of material into water or onto the bed of a watercourse. Legislation administered by MNR can be divided into five categories for the following purposes: 1) to enable the ministry to carry out policies, programs, agreements etc., 2) to manage aggregate extraction, forestry, wildlife, and outdoor recreation 3) to regulate development on Crown Land, 4) to protect the natural environment, 5) and to establish a provincial agency under which the Conservation Authorities operate. Only the Acts which relate to water resources are included here.

In Ontario, there are two pieces of federal legislation that are implemented by the province, the Fisheries Act and the Migratory Birds Convention Act. Table 6.4 summarizes the federal and provincial Acts administered by MNR and the primary purpose of each with regard to water resources.

#### Ministry of Agriculture and Food

The Ontario Ministry of Agriculture and Food (OMAF) is a client based agency whose mandate is to act as an advisory service to the farm community. Like most other agencies it has gone through a number of organizational changes in the last few years. The most recent change has been the addition of a Soil and Water Management Branch with a mandate to provide administrative support and monitoring activities related to the soil and water programs of OMAF. Specifically, the goal of the Branch is to promote management and provide information on the responsible use of soil and water resources for a viable sustainable agriculture in Ontario to the farm community.

OMAF administers a number of Acts but only four have a potential impact on water resources. The Acts are listed in Table 6.5. The

Drainage Act is significant because it promotes the drainage of wetlands by allowing the Minister to offer subsidies to farmers for drainage projects. The OMAF Act allows the agency to develop policies and programs to promote agricultural activities.

#### Grand River Conservation Authority

The Grand River Conservation Authority (GRCA) has a long history of watershed management. Initially, the Grand River Conservation Commission was established through an Act of Cabinet in 1934 with the mandate to control water supply in the Grand River. In 1948 the Grand Valley Conservation Authority was formed. It acted in an advisory capacity to farmers and property owners on conservation issues and provided regional parks in the valley. In 1966 the Grand River Conservation Commission merged with the Grand Valley Conservation Authority to form the Grand River Conservation Authority. The boundaries of this agency are based on the watershed of the Grand River.

The Conservation Authorities (CAs) are given power under the Conservation Authorities Act which is administered by the Ministry of Natural Resources (MNR). The CAs are formed at the request of a majority of municipalities in a watershed and are jointly funded by these municipalities and MNR. Subsequently, the CAs are administered by representatives from each of the municipalities.

The mandate of the GRCA is to "...to study and investigate the watershed to determine a program whereby the nature resources of the watershed may be conserved, restored, developed or managed, . ..to control the flow of surface waters in order to prevent floods or pollution or to reduce the adverse effects thereof, . ..to collaborate and enter into

agreements with ministries and agencies of government, municipal council and local boards and other organizations, . . . to plan and produce trees...for any purpose, . . .and to cause research to be done.” (Conservation Authorities Act, sec.21, p. 10)

This mandate is so broad that each of the thirty eight **CAs** in Ontario have chosen a slightly different focus. The GRCA are presently involved with land and water management, flood management, recreation and education. With regard to water resources, the GRCA focuses its operations almost entirely on water quantity operations related to flood control. Activities and projects carried out by the GRCA for flood control have been given a class environmental assessment designation under the Environmental Assessment Act.

#### Regulations

Under the CA Act, and Regulations 356/74 (1981) the GRCA has the ability to prohibit, regulate or require permission for the construction of any building or structure or the placing of fill in any place susceptible to flooding during a regional storm or in any area where the **CAs** have jurisdiction (for fill only). The regulations require that proposed projects are evaluated and considered cumulatively with regard to the effect a project will have on the flood potential for the area but not for the environmental effects. An applicant is not required to provide a plan of mitigating measures for erosion control or other means of water quality protection during or after the construction.

### 6.3 Planning Legislation

#### Ministry of Municipal Affairs

The Ministry of Municipal Affairs (**MMA**) administers two Acts that are relevant to water resources and the Region of Waterloo. The recently amended Planning Act, 1983, now contains a number of references to the environment that were not included previously. This Act is important because it clearly indicates that municipal planning must have regard for the natural environment as well as the cultural, social and economic environment. Section 2 of the Act states that the Minister will have regard to matters of provincial interest. The term “provincial interest” is open to interpretation but examples are given that include aspects of the cultural, social, economic and natural environment. In considering draft plans of subdivisions (Section 50 (4)), consideration must be given to these matters of provincial interest.

Section 3 of the Act is important because it enables the Minister to issue policy statements relating to matters of provincial interest as identified in Section 2. Section 3(5) states that municipal councils, boards, ministers, ministries, commissions, and agencies of the government shall have regard to any policy statement issued under this section of the Act. In addition, other agencies, municipalities and anyone interested, must be consulted during the development of the policy statement. Four policy statements have been promulgated or drafted as a result of this section and will be discussed in Section Seven of this report.

Each municipal planning region is legislated under an Act. The Regional Municipality of Waterloo Act sets out the duties of Regional Council and the responsibility of the Regional Municipality for services within the Region. The categories of services includes waterworks, sewage and

land drainage collection, treatment and disposal, regional roads, electrical service areas, and planning. Section 96 gives Regional Council responsibility for conducting background studies on the physical, social and economic conditions in relation to development in the Region, preparing maps, drawings, texts, statistical information and other materials necessary for planning for development, public participation and cooperation in solving problems within the Region. The Region is also responsible for approving subdivision plans. Under the Act, the Region may enter into agreements with other agencies to carry out studies relating to the Region.

#### 6.4 Opportunities and Limitations for Cumulative Effects Assessment

The legislation described above has the potential to contribute to a CEA approach and this is illustrated by some of the requirements and enabling sections of the Acts. At the same time, the legislation presents a number of limitations that do little to promote the criteria for effective implementation of CEA. This results in large part from the fact that legislation related to water resources is **fragmented**, overlapping and lacking a common objective.

The legislation, in general, is broad in its scope, vague and allows for a large amount of Ministerial discretion in prescribing conditions for approval of projects or permits for development. An informed Minister, therefore, could require that cumulative effects be considered in the evaluation of projects but this would not be a consistent requirement. Specifically with regard to the criteria for effective implementation of CEA, the existing legislation does not present an integrated framework for consideration of cumulative effects, or for the explicit responsibilities

of various agencies for CEA implementation.

Public involvement in environmental management is provided for in some of the legislation primarily through the provision of public hearings to resolve problems related to the evaluation of projects for permit approvals. Again, the Minister must require, at his/her discretion, the public hearing usually as a result of public concern or perceived inadequacies in preliminary plans and assessments. In particular, the Environmental Assessment Act provides for public hearings to resolve disagreements between proponents of large projects and interest groups and other members of the public who object to a proposal. The effectiveness of the public participation under the Acts such as the Environmental Assessment Act is, however, questionable. The legislation does not specify how the public should participate or who should participate. In addition, the public is at a disadvantage financially because intervenor funding is provided in an ad hoc way and is not guaranteed to all interest groups. The present system has resulted in costly, confrontational and time consuming hearings.

The Planning Act requires that the public be given notice regarding any changes to Official Plans and during the development of policy statements but again does not specify how participation should occur, merely that the municipalities should encourage it. Other methods of promoting public involvement include the provision in some pieces of legislation for the province to initiate programs related to land stewardship and conservation. These are attempts to educate the public about environmental management through the provision of economic incentives and technical advice. For example, the Conservation Land Act offers tax rebates to landowners for maintaining wetlands. The Game and Fish Act enables the Minister of MNR to provide programs to encourage

land stewardship and conservation.

Environmental research is a mandate of the Ministry of the Environment through the Environmental Protection Act. That Act allows MOE to conduct studies on the quality of the environment and environmental planning studies. In addition, the ministry can conduct conferences, seminars, and provide training seminars. This provides the agency with the legislation to enable it to keep its staff informed with emerging concepts in environmental planning and management and to provide this information to the public.

A major deterrent to CEA implementation is the inconsistency of the legislation in its application. Individuals and municipalities, for example, do not require permits for sand extraction yet the environmental consequences of small activities over time can be just as deleterious to the environment as large scale extraction in the short term. Private industry is exempted from the Environmental Assessment Act unless designated by the Minister. Private industry includes pit and quarry operations, mining, forestry and urban development, all of which have the potential to contribute to cumulative effects. Although pits and quarries, mining and forestry operations must submit plans of the proposed development for approval before permits are granted, the evaluation process is not standardized and the rigour with which the evaluations are given is dependent on the evaluator. In addition, urban developments may only have to carry out environmental assessments if subdivision approval is required and the reviewing agencies require mitigating measures or the development is proposed on or adjacent to an Environmentally Sensitive Policy Area.

Agricultural practices are exempt from all environmental pieces of **legislation including the** Environmental Assessment Act, the Water Resources **Act, the** Pesticides Act, and the Environmental Protection Act. This means that farming activities are exempt **from** regulations regarding spills, drainage, excavation of fill **from** waterways, handling and disposition of pesticides, and assessment of the environmental effects of drainage activities. Nevertheless, agricultural activities have been cited as one of the major contributors to **nonpoint** sources of pollution such as siltation, and nutrient enrichment of watercourses, destruction of fish spawning beds and habitat, as well as destruction of wetlands with corresponding fragmentation and destruction of wildlife habitat, and alteration of hydrological functions. Drainage of wetlands, in particular, is a major problem in Southwestern Ontario.

OMAF **recognizes** that there are problems associated with the construction of drainage projects and have provided guidelines and advice on this activity. The Ministry has not yet acknowledged the long term and cumulative effects of drainage on wetlands as described above. There is no indication **from** the Ministry that the Drainage Act will be revoked, yet most interview respondents cited the Drainage Act consistently as a piece of legislation that conflicts with water management objectives of other agencies.

The Environmental Assessment Act is the main piece of legislation for assessment of large proponent driven projects. It is deficient in its requirement for assessment of these projects with regard to cumulative effects. First, it does not specifically mention that cumulative effects must be addressed although it does indicate that indirect effects must be assessed. Traditionally, therefore, environmental assessments have been conducted on a case by case basis with little if any consideration of the



**impact of a project in** conjunction with similar development within a **region, or the long** term and secondary effects of the project. Second, for both individual assessments and class assessments there are seldom any **monitoring requirements** to document conditions previous to, during or after construction to determine if the project has created a positive or negative effect on the environment. A recent study by MOE found that the Environmental Assessment Branch that administers the environmental assessment program could not determine the degree of proponent compliance with the conditions imposed by the EA Board (EA Update, 1987). There is usually no requirement for the proponent to report to MOE on either the completion of the project or the results of compliance monitoring.

Monitoring before, during and after a project is completed provides essential baseline data and information on the effects of development. Monitoring is important because it verifies or rejects assumptions and predictions that were made during the assessment of a project. Monitoring is not specifically required by any piece of legislation although the Minister can require that it be carried out as a condition of approval. Ongoing monitoring for **nonpoint** source pollution is also important. Under the Environmental Protection Act, MOE can conduct monitoring studies if the Minister **recognizes** a need for it.

In general, there is little recognition in the legislation that development proposals or conditions of approval for projects should include conformity with regional or local **Official** Plans. An exception to this is the proposed Aggregate Act (Sec. 11) which states that proposed aggregate sites must conform to zoning by-laws. At the same time, however, the Act supersedes any municipal by-laws, official plans, or development agreements and municipal planning documents cannot pass

by-laws to prohibit resource extraction (Sec. 66). Therefore, it is difficult to discern in that piece of legislation, whether municipal plans are really being given consideration since the aggregates legislation takes precedence over planning legislation. MNR legislation such as this tends to be vague and ambiguous with regard to the requirements for permit approvals which leaves interpretation to the developer, the district manager, and sometimes to the Ontario Municipal Board. The latter is an expensive and time consuming forum in which to clarify the intention of the legislation.

None of the legislation explicitly requires that the cumulative effects of development be considered in the approval or permitting of projects or through regulations. It only refers to control of proponent driven development that requires permitting. It does not take into account the incremental impacts of activities that could have significant detrimental effects over time and that could affect the quality and quantity of the very resources that are attempting to be managed and protected.

Responsibility for water resources is fragmented between all of these agencies. For example, the Ministry of Natural Resources mandate is to protect the environment and specifically water resources through the protection of fisheries and wildlife habitat and through the permit approval process. Yet, there is no mechanism by which the ministry can monitor the quality of the water resources, this is the responsibility of the Ministry of the Environment. The same Ministry of Natural Resources is responsible for managing aggregate extraction and forestry, both of which have the potential to contribute to cumulative effects on water resources which in turn affect fisheries and wildlife. Furthermore, **OMAF** has the ability to encourage wetland destruction through the provision of grants and subsidies for drainage activities while the

Ministry of Natural Resources is equally encouraging in its support to maintain wetlands.

## 7.0 ENVIRONMENTAL POLICIES AND PROGRAMS FOR WATER RESOURCES

In this chapter, the provincial and regional municipal policies and programs relating to water resources will be examined to determine if the opportunities for CEA implementation **from** the legislation have been carried through in policy planning and program implementation. Policies will be discussed by agency while programs will be discussed by type. Programs are rarely carried out in isolation of other agencies. Often, the programs are initiated and administered by a lead agency with technical advice, funding and field assistance from one or more agencies with overlapping interests.

When interview respondents were asked to identify cumulative effects problems that they are attempting to deal with in their agency each respondent identified one or more problems and described how they are addressing these problems. The implementation of policies and programs was given most often as the means of addressing cumulative effects problems. Therefore, the policies and programs produced by these agencies were examined for an indication of how they address the resolution of cumulative effects problems. Table 7.1 lists the policies by agency and describes the general intent of each and Table 7.2 lists the programs and associated agency participation. The following is a brief discussion of the how the policies and programs do or do not reflect a CEA approach.

Table 7.1 Environmental Policies Administered by Ontario Government Ministries and Agencies

Policy	Description
<u>Ministry of the Environment</u> Water Management: Goals, Policies Objectives and Implementation Procedures	sets standards for water quality using federal standards as a minimum
<u>Ministry of Natural Resources</u> Lands Use Guidelines for the Cambridge District	implementation strategy for management of forestry, mineral aggregate, minerals and fossil fuels, wildlife, provincial parks, recreation and land administration
Fisheries Management Plan	implementation strategy for carrying out fisheries management
<u>Ministry of Agriculture and Food</u> Strategic Plan 1985 1990	outlines the mandate, goals, objectives and strategies for the agency in very broad terms
<u>Ministry of Municipal Affairs</u> Mineral Aggregate Resource Policy Statement	requires municipalities to protect aggregate extraction operations from incompatible uses
Floodplain Planning Policy Statement	requires municipalities to designate floodplains and flood prone areas in land use plans and zoning by-laws
Wetlands Policy Statement	requires that municipalities designate provincially and regionally significant wetlands in Official Plans
Regional Municipality of Waterloo Official Plan	sets out environmental policies that the area municipalities must conform to

Table 7.2 **Environmental** programs administered and implemented in Southern Ontario.

<b>Program</b>	<b>MOE</b>	<b>MNR</b>	<b>MMA</b>	<b>GRCA</b>	<b>OMAF</b>	<b>RMW</b>	<b>PI<sup>1</sup></b>
<u>Federal/Provincial</u>							
Soil and Water Environmental Enhancement <b>Program<sup>2</sup></b> (SWEEP)	<b>T<sup>5</sup></b>			A	L	-	
Ontario Soil Conservation and Environmental Protection Assistance Program II (OSCEPAP)				A	L	*	
<b>Tillage 2000</b>	F			A	L	*	
Municipal Industrial Strategy for <b>Abatement<sup>3</sup></b> (MISA)	L				A	*	
Canada/Ontario Flood Damage Reduction Program			A	L	A	-	
<u>Provincial</u>							
Rural Beaches Program		F		A		-	
Wetland Evaluation Program		L		A		-	
Small Hydro Projects Promotion		L				-	
Food Systems 2000					L	-	-
Land Stewardship Program				A	L	-	
Community Fisheries Involvement		L				-	
Community Wildlife Involvement		L				-	
Youth Fisheries Education		L				-	
River Basin Surveillance Networks	L			T		-	
Areas of Natural and Scientific Interest (ANSI)		L		T		-	
Carolinian Canada <sup>4</sup>		L		T		-	
Fisheries surveys/related projects		L		T		-	

Table 7.2 cont'd

- 1 MOE - Ministry of Environment  
MNR - Ministry of Natural Resources  
MMA - Ministry of Municipal Affairs  
GRCA - Grand River Conservation Authority  
OMAF - Ministry of Agriculture and Food  
RMW - Regional Municipality of Waterloo  
PI - Private Industry/Public
- 2 Federal involvement through the Department of Agriculture and Environment  
Canada
- 3 Federal involvement through Environment Canada
- 4 Involvement by the World Wildlife Fund of Canada, Nature Conservancy of  
Canada and the Natural Heritage League
- 5 L - Lead agency  
F - Funding  
T - Technical  
A - Advisory, demonstration and/or implementation  
\* - Participant in program

## 7.1 Evidence of a CEA Approach in Provincial Policies

The Ministry of the Environment's policy for water resources is the *Water Management: Goals, Policies, Objectives and Implementation Procedures* booklet (Ontario, Ministry of Environment 1978). This booklet outlines water management policy and objectives for maintaining surface and groundwater quality and quantity. It reflects some important components of a CEA approach to water resources in the policy statements on water quality.

The implementation of MOE water policies is based on Provincial Water Quality Objectives including criteria for drinking water quality and agricultural uses. Federal effluent requirements are taken as the minimum standards to apply in Ontario. Federal guidelines have been developed under the Fisheries Act (1971) for various industrial discharges.

With regard to the assessment of effluent discharges, the policy describes the use of appropriate site specific receiving water assessments as a means of determining effluent requirements. The assessment techniques recommended by the policy are the simple dilution formula for effluents that are highly treated and modelling for complex effluents that are not highly treated. "... a thorough receiving water assessment is required before the discharge of effluents containing toxic substances will be permitted". This assessment "...**should** include studies of the potential accumulation and concentration of substances in the environment..., synergistic effects with other substances and physical factors that may affect the environmental impact of contaminants" (Ontario, Ministry of the Environment, 1978, p.17). These statements suggest that cumulative effects must be assessed.

Although **nonpoint** source pollution is acknowledged in the policy as a contributing factor to water quality degradation it is not dealt with as part of the policy of water quality management for either surface or groundwater in a proactive manner. Control of **nonpoint** sources of pollution is only recommended if it is shown to cause or contribute significantly to violations of the Provincial Water Quality Objectives.

With regard to water quantity, the policy is "...to assist in maintaining or restoring water quality for the protection of aquatic life and recreation". However, the implementation procedures for the taking of surface water does not include the consideration or evaluation of effects on the natural environment resulting from water takings. The policy statements, therefore, show some examples of a CEA approach but in other areas, neglects to deal with them adequately.

**MNR's** Land Use Guidelines exhibit a number of the criteria for CEA implementation. They **recognize** the need for coordination between other agencies, municipalities and the public, they acknowledge and account for conflicts in resource uses between, for example, the designation of Environmentally Sensitive Areas and aggregate extraction areas. The Guidelines also were developed in consultation with municipalities, public interest groups and other agencies. Public involvement in the development of policies and programs is stressed.

The MNR Fisheries Management Plan addresses the need to take a broader perspective in managing the fisheries resource and this is supported in federal legislation that allows no net habitat loss as a result of development. The plan not only includes statements of how the legislation can be used and how the Ministry should be working with other agencies and municipal governments, it also describes an action



**plan to ensure** that the strategies are carried out, that staff are made aware of the existing legislation, policies and protection/mitigation technology. As well the plan calls for monitoring during and after construction to ensure that mitigation measures are carried out. This part of the plan also calls for public participation in enforcing the fisheries program. Liaison with MOE, **CAs** and municipalities are encouraged. In particular, the plan recommends that MNR conduct workshops with municipalities, provide detailed maps showing significant fish habitat and recommend timing for development in waterbodies in their area.

The Ministry of Agriculture and Food has recently published a Strategic Plan (OMAF, 1986) that outlines the mandate, goals, objectives and strategies of the agency for 1985-1995. The strategy reflects the recent addition of a Soil and Water Branch. by stating that "soil and water conservation and development will underscore each policy and program activity ..." (p.9). The policy is general in context but includes the recent change in philosophy within the agency from high productivity at any cost to the environment to the promotion of "sustainable" agriculture. The policy emphasizes that the Ministry must work cooperatively with other agencies, institutions, and the general public to encourage proper soil and water utilization.

In 1981, the provincial government required that all Conservation Authorities (CA) in Ontario produce planning documents as the basis for the allocation of funds. The Grand River Conservation Authority prepared an interim plan in 1982. The final planning document is scheduled for completion in late 1990. The focus of the interim plan is on flood management and planning with an emphasis on engineering structures. The plan that is being prepared now is focusing less on structural solutions and more on development solutions to minimize

flooding problems (B. Veal, **pers. comm.**, May, 1989). The GRCA is **recommending** that municipalities develop Master Drainage Plans in **conjunction with the** GRCA in order to minimize or prevent flooding as a result of development pressures along tributaries to the Grand River. Thus it appears that there has been shift in the previous policies that addressed only the symptoms of the problems (flooding) by a more proactive approach that is preventive. In addition, municipalities are being encouraged to require developers to submit and carry out stormwater management plans. These changes in policy appear to reflect an approach more indicative of a CEA than previously, however, the plan is not available for review.

Planning policies specifically related to regional municipalities under Regional Official Plans will be discussed in Section 8. Under the Planning Act, the Ministry of Municipal Affairs can develop policies related to the natural, social or cultural environment. To date, the Ministry has collaborated with MNR to develop three environmental policy statements that impact water resource management. Two of the policies have been promulgated while the Wetlands Policy statement is still in draft form. None of the policies have precedence over another or over other pieces of legislation. Conflict between any two policies will be resolved before the Ontario Municipal Board. In particular, the Pits and Quarries Control Act and the proposed Aggregates Act states that municipal by-laws, that could be developed as a result of these policies, do not take precedence over resource extraction. On the other hand, municipalities are required to conform to these policy statements by incorporating them into Official Plans and zoning by-laws.

The Wetlands Policy Statement is important because it **recognizes** that land use planning has an important role to play in the management of

water resources. In particular, the policy requires municipalities to consider development proposals on or adjacent to wetlands in light of additional development that may be induced. The draft policy is lacking **in a number of ways**, however, that limit its effectiveness to deal with cumulative effects. For example, it does not supersede the Drainage Act or any other Act, it allows previous land use designations to remain, and it requires that the policy be incorporated into the Official Plan only when the plan is reviewed. There are no requirements for monitoring effects on wetlands or for mitigating effects before, during or after construction.

The Flood Plain Planning Policy Statement is a response to the severe flooding that has occurred in watersheds such as the Grand River and a recognition by the federal and provincial levels of government that flood planning is imperative. It is a guide for municipalities to follow in designating floodplains and flood prone areas in land use plans and zoning by-laws and a means of ensuring that flood planning is coordinated between the Conservation Authorities and the municipalities. Although it attempts to prevent further development within flood prone areas it does not attempt to address the problems that exacerbate flooding such as urban development, loss of wetlands, etc.

The Mineral Aggregate Resources Policy Statement requires that municipalities protect aggregate extraction operations from incompatible uses and allows them to designate “influence areas” surrounding a pit or quarry. Municipalities are not allowed to restrict aggregate extraction but they can require further rehabilitation of pits and quarries based on Official Plan designated uses or in consultation with other agencies or to specify after uses for rehabilitated sites. The policy statement **recognizes** that other agencies also have interests relating to mineral aggregate

**resources. The municipality** is given a large amount of flexibility in **deciding how to review** development applications on aggregate land but **are not given the authority** to make the final decision on the use of that land.

The opportunities for implementation of CEA from the legislation have been utilized in a fragmented way in the agency policies. Although it can be seen that land use planning is beginning to play an important role in water resource management, the policies and legislation are schizophrenic in their empowerment of the planning legislation and policies.

Most environmental and planning policies do encourage interagency communication. In the interviews, respondents indicated that there are some formal and many informal liaisons with other agencies. All environmental agencies liaise with the Regional Municipality of Waterloo for plan reviews and are asked to comment on the GRCA Watershed Plan and MNR Land Use Guidelines. In particular there is evidence of interagency communication in the formulation of the planning policy statements and the Agricultural Code of Practice. The latter involved OMAF, MOE and MMA.

In relation to planning, there has been a recognition by MNR, GRCA and to a certain extent, OMAF, of the need to prepare planning statements to guide the direction of agency activities. The Land Use Guidelines prepared by MNR serve to illustrate that even within this agency there are conflicts in resource uses between, for example, promotion of aggregate extraction and preservation of wetlands. These issues have not yet been resolved. The GRCA appears to be heading in a new direction in its latest Watershed Plan. Whereas the Interim Plan was

geared towards the engineering solutions to watershed planning, the new plan apparently **recognizes** that there are alternate solutions and that the causes of water resource problems must be dealt with.

## 7.2 Environmental Programs

Recently in Ontario there have been a number of programs initiated that deal with water resource issues. Table 7.2 lists the programs and the agencies participating in each. In general, there are programs that have both federal and provincial involvement and there are those that are solely provincial in origin. Some of the programs indirectly relate to water resources while most have direct implications.

Some of the programs have incorporated some elements of a CEA approach. For example, programs initiated by OMAF are attempting to deal with the issue of **nonpoint** source pollution from agricultural activities. This agency concentrates its efforts on providing farmers with the resources to experiment with conservation techniques. The onus is given to the agricultural industry to continue to utilize these techniques when funding is no longer available. Many of the programs have been initiated only recently.

The long term success of the OMAF programs is difficult to determine at this point in time because they have been operating only for a short time and there have been no programs in the past that compare to them. For the most part they are educational and funding programs that are trying to prove to farmers that soil conservation, and water resource protection are economically feasible and beneficial. The programs are popular because the funding is readily available. No one knows if the

techniques practised as a result of the programs will be continued when the funding is exhausted or if farmers who did not receive funding will be converted to conservation **tillage** techniques and soil erosion control.

**The Municipal Industrial Strategy for Abatement (MISA)** is a recently initiated program administered through MOE with technical assistance from Environment Canada. The purpose of MISA is to reduce water pollution from industrial and municipal discharges by developing monitoring and abatement regulations. This program as it was originally envisaged does incorporate some elements of CEA. The original program included the evaluation of abatement regulations based on the assimilative capacity of the receiving stream. Adjustments could then be made to the abatement limits on a site specific basis. However, due to limited resources, the determination of assimilative capacities will not be carried out until after the abatement regulations have been developed. There are no details available for how or when site specific criteria will be set. The disadvantage of not developing the abatement regulations and assimilative capacity programs in parallel is that there may be a long lag time between the installation of the abatement regulations and knowledge of the site specific receiving water capabilities.

MOE conducts a provincial water quality monitoring network program for sampling major rivers on a monthly basis. In addition, the GRCA conducts continuous sampling at four points in the Grand River watershed to monitor water quality in relation to its reservoirs. The Ministry of Natural Resources maintains a data base of resource inventories including fish and wildlife, Areas of Natural and Scientific Interest, and wetlands. Although the Ministry admits that there are large data gaps in the available information, they are working to improve, for example, the fisheries inventories.

**MNR** Cambridge is presently developing a Geographic Information System (GIS). This system will enable the District office to accept plan review information from the Regional Municipality of Waterloo and conduct evaluations based on information stored in the GIS. The GIS offers an opportunity for other agencies to coordinate data gathering and monitoring to complement each other. It is too early to tell if this will occur.

Most programs address the need for interagency coordination and cooperation through the use of Steering Committees. The Rural Beaches Program, for example, consists of representatives from MOE, MNR, GRCA, the federal Department of Agriculture, OMAF, and the Regional Municipality of Waterloo. In addition, MOE is contributing funds to the **Tillage 2000** program in an effort to control **nonpoint** source pollution and improve the condition of rural beaches. Table 7.2 shows that there are a number of other programs where interagency cooperation occurs.

In summary, even though there is no explicit recognition of CEA in Ontario agencies, there is evidence that some cumulative effects problems are being addressed through various policies and programs. The effectiveness of these policies and programs have not been evaluated but interview respondents indicated that the impediments to successful implementation are related to poor interagency communication, no mechanisms for evaluation, and lack of adequate regional environmental data bases and monitoring programs.

## 8.0 THE ROLE OF REGIONAL -PLANNING IN CUMULATIVE EFFECTS ASSESSMENT

The Regional Municipality of Waterloo is considered to be progressive in terms of its environmental policies and programs and its interpretation of its mandate. As early as 1975, shortly after the Region was formed by legislation, a number of environmental policies were included in the formulation of the Regional Official Plan. In this chapter, the existing involvement of the Regional government in water resources will be examined based on the mandate and associated policies and programs of the Region. The Regional Municipality will also be evaluated in terms of its ability to contribute to a CEA approach to water resource management.

### 8.1 Environmental Mandate and Policies

The mandate for consideration of environmental issues in planning at the regional level is described in the Planning Act and the Regional Municipality of Waterloo Act. The provisions of both Acts have been described in Section Seven. At the Regional level the Regional Official Plan (**ROP**) is the document that describes in detail “the framework within which Regional Council makes decisions on the appropriateness of development proposals within the context of matters lying within its mandate” (ROP, 1985, p.1. 1). The ROP provides a framework for area municipalities to adapt their policies. Municipal regulations, and zoning by-laws may be stricter than those recommended in the Regional Plan but cannot be more lenient.



The **ROP** deals directly with environmental management in three categories of policies: Environmental, Rural Resource, and Utilities. The first **category**, Environmental, recognizes that the Region has a responsibility in planning land uses to acknowledge the hazards associated with development on flood plains, and the ecological significance of certain lands within the Region. The flood plain policies reflect the provincial Flood Plain Planning Policy Statement (Ontario, 1986) and GRCA Regulation **154/86** (Ontario, **1981**), on approving development within areas subject to flooding potential. Flood plain planning policies deal with the catastrophic or natural cumulative effects that occur in a watershed. In the Regional Official Plan, floodplains are **recognized** as an area where development should not occur except under specific designations called Special Policy Areas and thereby seeks to reduce the hazard of flooding on structures.

The designation of ecologically significant land and the need for land use planning to **recognize** this is embodied in the Environmentally Sensitive Policy Areas (**ESPAs**). These are areas that meet one or more of a number of environmental criteria or have been designated as being environmentally significant by another provincial agency. In this way the Region recognizes, for example, **MNR's** Areas of Natural and Scientific Interest, wetlands of provincial or regional significance, or features unique to the Region or province. The approval process for proposed development on or contiguous to ESPAs is provided in guidelines developed by the Region.

For developments proposed on or adjacent to the ESPAs, the Region may require and provide guidelines for an Environmental Impact Statement (**EIS**). Baseline data is compiled by the Region for each of the ESPAs and this is made available to the developer to prepare the EIS. If

baseline data is not available, the developer is required to provide it and this information is added to a **computerized** data base maintained at the University of Waterloo. The Region also takes advantage of its proximity to the University of Waterloo and Wilfred Laurier University by using research prepared by students or faculty on the designated sites and by commissioning status reports on the ESPAs **from** the university community. .

An Ecological and Environmental Advisory Committee (**EEAC**) is also established through the Environmental Policies. This is an advisory body to the Regional Committee of Planning and Development on matters of general environmental concern. It is a volunteer committee comprised of experts from various physical and biological disciplines as well as planning. Members are appointed for a three year term. EEAC reviews subdivision proposals that have the potential to impact on ESPAs, provides input in the preparation of environmental assessment reports prepared by the Region or area municipalities under the Environmental Assessment Act or other provincial legislation, and attempts to secure support **from** landowners for the management and/or preservation of ESPAs.

EEAC is presently commissioning a study that encompasses environmental management in a broader scope than ESPAs, a State of the Environment Report for the entire Region. The State of the Environment Report will utilize existing data and assess changes that have occurred in the Region over time. The Terms of Reference are not clear as to the end use of the data and information although it does indicate that major concerns will be **taken** to senior levels of government when it is completed.

The second category of environmental policy is Rural Resource. This policy recognizes that there are a number of competing resources within the Region and it attempts to prioritize them for the purpose of evaluating development proposals. The priority rankings for resources uses within the region are:

- 1) Environmentally Sensitive Areas
- 2) Agricultural land and farming
- 3) Forestry
- 4) Mineral Aggregate Deposits
- 5) Designation and Extension of settlements
- 6) Fish and Wildlife Resources

Development proposals are evaluated for impacts on the above resources and in the order of priority ranking. The list of resources and the ranking reflects a number of important factors. First, the Region gives high priority to the maintenance of areas of ecological significance. Second, the Region recognizes the planning of other agencies such as MNR. By **recognizing** MNR identified mineral aggregate deposits and incorporating them into the ROP, the Region is seeking to plan in a way that acknowledges and complements other provincial agencies. Third, aggregate extraction and forestry are given priority over fish and wildlife resources.

The third environmental policy is the Utilities category that includes the operation of facilities for water treatment and water supply, sewage treatment plants, waterworks, and solid waste management. These facilities must adhere to federal and provincial guidelines set out by the Ministry of Environment. There is a close liaison between the local MOE offices and the Engineering Department of the Region. The Planning and Development Department has little input into the planning or evaluation of proposed Utilities facilities or operations.

It is in the Utilities category, however, that there is the potential for the **Region to become** involved as a proponent in the assessment of the impacts of major public facilities under the Environmental Assessment Act. **In the event** that a Utilities project is valued at over \$2.7 million the Region is required to prepare an environmental assessment under the Environmental Assessment Act. Thus, the Region can become involved in the assessment of large projects that may have cumulative effects. If an environmental assessment document must be prepared, the Engineering Department coordinates the preparation of a report that is usually carried out by consultants in accordance with MOE guidelines. The effectiveness of the EA process has been discussed previously and applies in this case.

Recent Utility projects that have been prepared by the Region include the Waste Management Master Plan and siting of a landfill, expansion of sewage treatment plants and the Mannheim Recharge Project. The latter project is an attempt by the Region to secure an adequate and safe supply of drinking water by augmenting the dwindling groundwater resources in the urban **municipalities** of Waterloo and Kitchener.

The Mannheim Artificial Recharge Project has been selected **from** a number of water supply options as the best means of achieving additional potable water in the Region. The project, however, has not undergone a formal environmental assessment under the Environmental Assessment Act. An interim report outlining the costs and benefits of supply options has provided a cursory overview of the potential environmental impacts from existing information and data (Dillon, 1985). That report recommended that detailed information be provided in a subsequent report that has never been prepared.

The Dillon (1985) report did not investigate the potential secondary and long term impacts associated with the proposed development on aquatic habitat and water quality in the Grand River. In addition, the Waterloo Sewage Treatment Plant is undergoing major expansion to accommodate additional volumes of sewage and to upgrade the treatment to a tertiary level. The location of sewage treatment plant discharges in relation to the water intake area for the Mannheim Project and the implications of the water intake for aquatic biota and drinking water quality downstream have not been addressed at the present time.

There is no monitoring of the Grand River at the present to establish baseline information on water quality specifically for this project nor are there plans by the Region for a monitoring program to determine the short or long term consequences of this project although agencies such as the GRCA have expressed concern over potential sedimentation of the river (C. Bauman, pers. comm., May, 1989). Even so, the project has been approved and is presently in the early stages of development.

## 8.2 Regional Liaison With Environmental Agencies

The Planning Act (**sec.50(3)**) requires that the Region liaise and communicate with other provincial agencies on a regular basis for the purpose of obtaining comments on proposals for subdivision. In fact, many provincial agencies have departments that deal exclusively with reviewing municipal plans for conformity with agency mandates and policies (MNR, MOE, OMAF, GRCA). Development proposals are assessed by each agency separately. In addition the Region interacts with environmental agencies by participation in the following ways:

Technical Liaison Committee. This committee has **representatives** from the local plant operations and regional Water Resource Assessment Unit of MOE; regional **MNR** office; and the Planning and Development, Engineering, and Finance Departments of the Regional Municipality of Waterloo. The Committee meets on a quarterly annual basis to discuss problems and proposed undertakings relating to water supply and treatment. Subcommittees are formed to explore technical problems.

- The GRCA General Membership consists of representation from 16 residents from the Region including council members, regional staff and residents.

Other interactions with environmental agencies for the purpose of program implementation are described in Section Seven.

### 8.3 Requirements for CEA Implementation at a Regional Level

Both Regional and Municipal planners have indicated that a cumulative effects assessment approach is extremely relevant to their work and applicable to implement at a Regional level. On the one hand, the Regional level provides a sufficient scale to understand local issues while, on the other hand, it provides an overview of a number of municipalities. The planners indicated that, in terms of water resource management, the Region can only be part of a hierarchy of management at which the GRCA is most logically the main organizing agency. The Region, however, influences water resources through the above mentioned projects and through its ability to control and manage land use and development.

Interview respondents were asked what role regional planning should **play in environmental** management. The following is a list of responses that indicate how regional planning could increase their role in environmental management and planning:

- become more involved in community planning particularly in the rural areas
- become more involved in environmental education of the public
- the Regional Planning and Engineering Departments should integrate their activities. For example, the Planning and Development Departments should be more involved with the environmental assessment of public projects
- coordinate and integrate policies with other agencies
- administer provincial programs relating to water resources
- develop more intensive environmental policies
- maintain environmental planners and/or an environmental health department
- set up a system to supervise development construction and to monitor effects before, during and after construction

Although some respondents expressed that the Region is playing an appropriate role now, the majority of respondents indicated that the region could increase its commitment to environmental issues. The need for environmental planners at the regional level was expressed as a basic need because agencies do not feel that municipal planners or politicians always understand the environmental implications of development.

#### 8.4 Summary of Opportunities and Limitations

The Regional Official Plan (**ROP**) provides an opportunity for the Region to create environmental policies that incorporate elements of CEA. If the ROP supports CEA then programs and implementation will be able to follow. The incentive to include the consideration of cumulative effects in planning through the ROP must be explicitly required through legislation. The Regional Municipality of Waterloo is considered one of the more progressive regional governments, and has

interpreted and **utilized** its mandate with regard to environmental issues to the maximum. There are, however, many regional governments and municipalities that are not so supportive of environmental issues. Without the requirement for consideration of cumulative effects in decision-making, the incentives to do so are nonexistent.

In order to carry out a CEA approach the regional and area municipalities require political commitment and public support. In addition, staff are required not only to review development proposals and to liaise with appropriate agencies but to supervise construction activities in rural and urban areas. The lack of supervision during construction and monitoring is a major deficiency in the existing development process. Without supervision, conditions of approval cannot be monitored and the projects cannot be assessed for impacts they create or with regard to the best mitigating techniques to implement. The need for environmental supervision during construction of all types of major and minor projects has been identified by Mutrie and Mulamootil (1979).

The departments within the region need to cooperate better. For example, environmental assessments for public work projects are carried out by private consultants under the supervision of the Engineering Department. A study team is set up with representatives **from** all departments, however, both regional and area municipality planners expressed a concern that there is not enough input and regular liaison on these projects or on daily activities.

Planners need to be more aware of the context in which developments are assessed. Even though traditional single use zoning has become more flexible in terms of allowing spot amendments and development agreements, the planning legislation does not allow for more creative types of development control such as those that assess the capability of



the land for development and the suitability of the development for the area in which it is proposed. Other problems with the plan review and approval process relate to the review of development plans by other agencies.

Environmental agencies have commented that it is difficult to respond effectively and efficiently to plans of subdivision for two reasons. First, the total turnaround time for the subdivision approval process is thirty days. This sometimes leaves little if any time for site visits and evaluation must be based on existing information. Second, agencies do not have an adequate number of staff to adequately assess projects. Therefore, although there may be input from a number of agencies on plan reviews, the quality of the input may be low. In addition, the magnitude of the impact of individual developments on the environment may be underestimated by the case by case assessments and by the review of development plans by agencies in isolation of other agency's comments.

The policies implemented and drafted under Section 3 of the Planning Act have the potential to contribute to a CEA approach but do not address environmental degradation in a proactive way. They tend to address the symptoms instead of the causes. The Floodplain Planning Policy, for example does not **recognize** that flooding can be exacerbated by existing and proposed development adjacent to watersheds especially in urban areas. Therefore the flooding policies that the Region must implement through the legislation only deal with hazard prevention they do not address the more fundamental question of how to minimize stormwater runoff into watercourses. The Region, however, has recently begun communication with the GRCA to develop Master Drainage Plans. This is an attempt to anticipate flooding problems that could occur as a

result of development on tributaries to the Grand River.

Another example of the piece meal approach to environmental management is the designation of ESPAs. While this is a significant achievement in any municipality and a necessary component in a CEA approach, the present program deals with only one aspect of environmental management. By only focusing on isolated pieces of land, the context in which the environment is enclosed tends to be overlooked. By assessing ESPAs on an individual basis, the same problems occur here as for full environmental assessments under the EA Act. Projects are approved and pieces of the ESPAs are degraded on an incremental basis that may not appear significant in the short term but are significant over the long term.

The initiation of the present State of the Environment Report is a step in the direction of a CEA approach because it is an attempt to understand the past and present environmental status of the Region. There is, however, no clear indication how the information will be utilized when it is compiled.

In the implementation of environmental policy, the Planning and Development divisions play a major role in the review and approval of subdivision plans, rural land severances and zoning by-laws and thus, to a large extent can control the impacts of private industry and development. Many of these developments have the potential for cumulatively affecting the quality and quantity of the aquatic environment through increased stormwater runoff, environmental degradation during construction, fragmentation and destruction of valuable ecological habitats, etc. The Region has the potential, through conditions of approval to require environmental assessments, and

mitigating measures during and after construction. It does not have the ability, however, to control the type of development that will occur in area municipalities. This is set out in area municipal official plans and the tone of these plans reflects the commitment of those local politicians and planners. Industrial development, in particular, is the responsibility of the area municipalities and the regional government has no authority, in the Region of Waterloo to regulate the types of industries that locate there.

The basis for a CEA approach is evident in the Region of Waterloo and in the area municipalities. Planning is being given more responsibility for environmental management through Section 3 of the Planning Act, and environmental agencies are working on a regular basis with the Region to review development proposals. The existence of environmental policies in the Regional Plan, and the Ecological and Environmental Advisory Committee are evidence that the Region is aware of the need to consider environmental issues in decision-making. Presently, however, the full potential for the region to participate in environmental management has not been fully realized. This is in part due to the fragmented nature of water resource planning in Ontario with no clear mandate for any agency, confusion over the role of planning in environmental management, and the lack of a model to follow. The Region's participation in a CEA approach is necessary if environmental degradation is to be arrested and/or controlled. Its effectiveness depends on changes beginning with the legislative basis for environmental management in Ontario.

## 9.0 CONCLUSIONS

In this study, the present status of water resource planning in Ontario was documented with regard to the feasibility of implementing CEA. Criteria were developed from the literature as a basis for the assessment of feasibility. The following is a discussion of the capability of the province of Ontario to implement CEA given the existing institutional and legislative base for the province and the criteria. In particular, the present and potential role of regional planning in environmental management is discussed.

### 9.1 Feasibility of CEA Implementation in Southwestern Ontario Based on Criteria For Implementation

#### Commitment to Implement

Presently, there is some indication in policies and programs being developed by provincial agencies, **CAs** and the Regional Municipality of Waterloo that environmental issues are being considered and that there must be better coordination between agencies especially with regard to water resources. There is some evidence that agencies are communicating and interacting for the purpose of program implementation but existing communication does not appear to be completely effective in dealing with water resource problems. Often cited by respondents was the need for better communication and the existence of protectionist attitudes especially related to water resource management issues. Provincial agencies were careful to define their role in water resource management, however, the municipalities admitted that it is difficult to determine where the responsibilities for one agency stops and another begins.

Part of the problem with confusion of the limits of responsibility and subsequent protectionist attitudes stems from what Dorcey (1987) refers

to as the lack of foresight about the direction that water resource management should be taking. The present debate over the role of the Conservation Authorities is an example of these protectionist, short-sighted attitudes. The Task Force recommending changes to the role of the **CAs** is composed of representatives **from MNR**, MMA, OMAF, MOE, Ministry of Tourism and Recreation, and the Ministry of Treasury and Economics. The recommendations of the Task Force instead of seeing a broad and coordinating role for the **CAs** in water management, has narrowed the responsibilities to that of water quantity management. If these recommendations are accepted by the province, the **CAs** potential role in CEA will ultimately be reduced as will their effectiveness.

There is, therefore, no concept of how water resources should be managed in an integrated and coordinated way. Each agency attempts to protect their mandate, however broad and vague, to the detriment of the environment. There is evidence that the GRCA and the Regional Municipality of Waterloo are beginning to work together to resolve urban problems that result in flooding and water quality degradation through the development of Master Drainage Plans and stormwater management plans.

#### Legislative Base

The need or requirement to address cumulative effects is not explicitly addressed in any environmental or planning legislation in Ontario. The legislation is primarily enabling, it enables the Minister of the agency to issue licences, and permits; to grant approvals based on specific conditions; to require any additional information the he/she may consider necessary to obtain approval; to enter into management agreements; to develop policies and programs; to prohibit activities not considered in

the best interest of the province; and to exempt certain classes of projects or activities from the legislation. The legislation is extremely broad and vague and this leads to problems in interpretation.

The legislation for water resources in Ontario is fragmented and responsibility is divided among MOE, MNR, OMAF, the Conservation Authorities (CA) and the regional and local municipalities. In particular, the **CAs** are given overlapping responsibilities for water resource management. This is counterproductive in that it creates confusing and overlapping mandates in which no one or everyone takes responsibility.

Ontario does have the potential given its “enabling” type of legislation to incorporate CEA. However, without explicit reference to the need for this type of approach, regard for cumulative effects is left up to the discretion of the an agency’s Minister. There can be no consistency in this type of approach since a Minister’s commitment to incorporate consideration of cumulative effects will depend on political trends and public pressure which tends to wax and wane. What is needed, it is suggested, is an explicit requirement for CEA; a clear definition of what is meant by it; clarification of who should carry it out and who bears the cost of collecting data and coordinating information requirements.

Responsibility for CEA is something that must be addressed in the legislation. This requires that a lead agency be identified and that responsibility be assigned to various agencies, municipalities or private industry for carrying out various components of a CEA for all types of cumulative effects problems from large proponent driven projects to non point sources of pollution and urbanization. As mentioned earlier, there is no clear cut formula for **alotting** responsibility. In relation to the Ontario case study, however, there emerge some possibilities for the role

of regional government and the Conservation Authorities in the coordination of a CEA approach with assistance and resources from other provincial agencies.

The legislation presently requires that proponent driven projects be assessed on an individual basis. This does not reflect the context in which development occurs and the need to assess projects within an overall planning framework. There is reference in some pieces of legislation to coordination of plans with local municipality plans but municipal by-laws are not given priority over resource extraction or agricultural activities.

Some of the legislation is conflicting with others. To carry out a CEA approach to water resources, this conflicting legislation must be resolved and changed to reflect common provincial objectives for environmental management.

#### Public Involvement

Public involvement is being encouraged through environmental and planning policies and programs. MNR, for example, stresses public involvement and public education in many of its programs and in the formulation and development of its land use guidelines. Likewise, the GRCA stresses the need to educate the public with regard to conservation issues. The Regional Municipality of Waterloo is required through regulations to give public notice and to inform the public about proposed changes in the Official Plan document and about reviews of Official Plans. Although there is no requirement for public education regarding conservation issues by the municipalities, the Regional Municipality of Waterloo has taken on the role of educating its residents about waste recycling and water conservation. Planners at the Region felt

that there should be a larger role for the Region in providing this function.

The effectiveness of the public participation that is required by the Planning Act and through such legislation as the Environmental Assessment Act has been **criticized** (Grima, 1985). Although it is not possible here to discuss in depth the criticisms of public participation in Ontario, it seems clear that the mere requirement of the activity does not ensure that it is implemented in a way that is effective, efficient or fair.

#### Knowledge of Cumulative Effects

Awareness of cumulative effects problems exists in Ontario, albeit in an “intuitive” way. For example, few of the respondents had knowledge of the CEA concept or any of the legislative requirements and research in the U.S. Also, few of the respondents were aware of the agency that is presently supporting background documents on CEA in Canada, the Canadian Environmental Assessment and Research Council. All of the respondents identified, however, cumulative effects types of problems that they are trying to resolve.

There is also an awareness that cumulative effects problems require interagency cooperation and this is reflected in some environmental planning policies. However, the amount of formal liaison between agencies is low and primarily geared toward the implementation of specific projects. Informal liaison occurs almost solely with the municipalities for the purpose of plan reviews and subdivision approvals. The effectiveness of this interagency communication has not been assessed.



**Intra** agency communication was not explicitly evaluated, however, the municipalities, in particular, expressed concern that engineering activities that impact on the environment are not integrated with planning activities. Regional engineers are responsible for municipal development while the planners are responsible for private development. It was also obvious through the questions regarding policies and programs, that staff within the same agency dealing with water resources are not familiar with the specifics of programs or research being carried out by their agency. Thus, there must be improvements made to the communication between and within environmental agencies and Regional planning.

#### Industry Cooperation

Cumulative effects are not restricted to public works projects. The legislation, however, exempts private industry from the Environmental Assessment Act and agricultural activities from all environmental legislation and regulations. Without a consistent approach to environmental management that includes both the public and private sectors, environmental degradation and cumulative effects problems will continue. This does not mean that regulation is necessarily the key to management of cumulative effects, merely that there must be a recognition of the need to address both types of activities.

#### Scientific Analysis

There are few explicit references to cumulative effects problems in the programs and policies reviewed by this study. Although almost all respondents felt that their agency was conducting research that implicitly **recognized** the cumulative effects issue, none could give examples of research explicitly directed towards resolving cumulative effects problems.

**The International Joint** Commission on the Great Lakes was cited as an **agency that has** increased the awareness of ecosystem type problems. When one respondent in MOE was asked whether this awareness has been translated into day to day activities, he replied that it has not. MNR has probably come closest to an ecosystem approach in its fisheries management plans. Fisheries, especially at the federal level through the Fisheries Act, has been **recognized** for some time as a resource that requires an ecosystem level of knowledge and management.

MOE regularly conducts assimilative capacity studies in the Grand River to determine its capacity for accepting treated sewage. There is no such study or model, however, that is used to determine the impact of other development and non point sources of pollution in the river. The Rural Beaches Programs monitors the water **quality** downstream of agricultural activities for the purposes of controlling bacterial contamination on beaches, however, this study is carried out only in certain areas of the river where problems at public beaches have been identified.

There are no uniform regional environmental data bases. Most agencies and municipalities do have computerized systems for storing data but they are not necessarily compatible. **MNR** Cambridge District is presently developing a GIS that will utilize information from municipalities and will be able to match Regional municipal plans to a computerized mapping system and identify potential conflicts with proposed development and MNR activities and resources. The Regional Municipality of Waterloo maintains a computerized data base for the Environmentally Sensitive Policy Areas (ESPA). This is an excellent reference for the **ESPAs**, however, the Region does not maintain a data base for overall environmental quality within the Region.

**Water** quality monitoring on a monthly basis occurs along the rivers in the Waterloo Region by MOE. In addition, specific programs carry out monitoring usually for the duration of the program. The GRCA collect water quality samples for MOE and obtain results from that agency for their uses and maintain water quality data at that office. **Elkin** (1987) identified the lack of information about the past and current environment in the Regional Municipality of Waterloo as a major problem. He suggested updating the State of the Environment Report on a regular basis using standard indicators of environmental quality. The Ecological and Environmental Advisory Committee is presently commissioning such a study.

The Environmental Assessment Act has not been successful in ensuring that monitoring occurs for projects given approval under that piece of legislation. Although monitoring can be required as a condition of approval, there is no evidence that monitoring is ever carried out since there is no mechanism in place for reporting back to the Ministry on compliance. Likewise, the approval of municipal developments plans does not require monitoring of large projects before, during or after construction and the Region has no means of knowing whether projects are creating negative impacts.

#### Planning for Development

A number of recent developments within provincial agencies and municipalities suggest that municipal planning is being considered an important component of environmental management. Planning, in general, is being carried out by the Ministry of Natural Resources and the Grand River Conservation Authority. Municipal Plan Reviews are an integral part of the GRCA, MNR, MOE and OMAF responsibilities. All agencies must review Regional subdivision plans, severances and Official

Plans. Hence, theoretically, all plans are assessed for their capability with respect to each agency's resources or interests. This creates a problem, however in that each plan is assessed and reviewed individually and thus the cumulative effects of a number of plans are not assessed. As well, each agency reviews a plan in reference only to the resource of interest. The whole picture, therefore, is seen only by the municipal planner who can be assumed in most cases to have little or no knowledge of the environmental implications of development.

The Regional Official Plan includes many important aspects of environmental management including the designation of **ESPAs**, hazard areas, and flood prone areas. There is not, however, a clear relationship between the development and growth potential of the Region and the environmental policies. Industrial growth for example, is not addressed in the Official Plan for the Regional Municipality of Waterloo. Industrial development is considered to be an area municipality concern, however, the type of industry and its related water needs and discharges influence environmental quality in the Region as a whole.

The Official Plan and associated policies only address the symptoms of environmental problems, not the causes. Again there is no direct correlation between the increase in urban and industrial development and the resulting impacts of increased flooding, reduced infiltration of precipitation to aquifers and subsequent water quality degradation in tributaries and the Grand River. Most studies on environmental quality in the Region or the watershed concentrate on the quality of the major rivers. There are, however, many smaller tributaries that influence water quality. The GRIC study (1982) identified the protection of the headwaters of these areas as being of paramount importance. There must also be management and control of pollutant loadings downstream of the

headwaters as well.

**Although the Region** is working with the GRCA to develop stormwater management guidelines and Master Drainage Plans, the density of housing continues to be low in the urban areas with single family residential houses on small lots contributing to urban sprawl, reduced infiltration, increased runoff and hence flooding problems.

The provincial government is giving municipalities increasing responsibilities to manage environmental resources through the policy statements issued through the Planning Act. There are, however, no resources available either in increased funding or expertise to carry out these functions. Regional governments at the present must rely on provincial agencies and GRCA for assistance in assessing and evaluating development. In addition, the provincial agencies do not have the resources to adequately assess proposed development plans. The responsibilities being given to municipalities with regard to environmental policies must be reinforced with adequate resources both within Regional government and within reviewing and support agencies before cumulative effects problems can be adequately dealt with.

#### Guidelines for Implementation

There is no explicit recognition of cumulative effects problems in the Region of Waterloo or in provincial departments, therefore, there are no guidelines in place for its implementation. Both Regional Official Plans and provincial legislation are vague and do not provide the incentives or the requirements for consideration of the problems of cumulative effects.

## 9.2 Conclusions

Although cumulative effects have not been explicitly **recognized** and dealt with in an organized manner in Ontario, there **are** some examples of how these types of problems are being addressed. In particular, there is a need for a more coordinated approach for water resources planning and management. The main deterrent to this at the present time is the lack of one lead agency to organize a workable system. Efforts to address cumulative effects problems, are therefore ineffective due to protectionist attitudes and the lack of clear and common objectives for water resource management.

What emerges from an analysis of the environmental agencies and the Regional planning is the potential role that these agencies could play given that responsibilities are clarified and common objectives are agreed upon. It is clear that for water resources the watershed is the appropriate regional scale at which to carry out planning and management. In Southern Ontario, the watershed planning agencies are firmly established. The recent review of the **CAs** is an opportunity for the **CAs** to demand a more appropriate role in water planning and management. Within the watershed, Regional government has a complementary role to play in the coordination of municipal development. This requires, however, improved communication within the Region, between planners and engineers, and between environmental agencies.

Efforts to reduce cumulative effects problems will not be successful until all provincial agencies **recognize** the need to integrate and complement legislation, policies and programs. If these are conflicting, and many are, there can be little advancement in the resolution of cumulative effects problems.

There appears to be a shift in philosophy towards an ecosystem approach to **planning but it** has not yet -begun to manifest itself in implementation. More effort needs to be directed towards programs that complement common objectives. Given the information available, the implementation of a CEA approach requires legislative changes to make the assessment of cumulative effects a requirement for proponent driven activities and to reduce conflicts in environmental management; changes in the responsibilities of environmental agencies; and commitment in the form of increased resources.

Realistically, there is the potential for the Conservation Authorities to take a more effective role in CEA given the ongoing review. If the role of **CAs** are reduced, as the Task Force recommends, the opportunities for creating a workable CEA approach **.will** be lost and the management of water resources will become regressive. In addition, for cumulative effects to be addressed under the present system requires that there be many informed and knowledgeable people at all levels of government who have a commitment and will to resolve cumulative effects problems.

Municipalities are being given increasing responsibility for implementing environmental policies yet the effectiveness of planning or managing the environment is severely reduced by the lack of environmental expertise within municipalities or the resources to obtain them. In addition, review agencies who are relied on for expertise are also inefficient due to insufficient resources to adequately assess development proposals.

The Regional Municipality of Waterloo illustrates some of the problems that can be expected in trying to implement a CEA approach given the existing state of legislation, policies and programs. The Region is unique

in terms of its commitment to environmental issues. In addition, all Regional governments in Ontario are mandated by separate legislation so each one's responsibilities will differ slightly. Each Conservation Authority also interprets their mandates slightly differently depending on the characteristics of the watershed and the management needs. These inconsistencies do not necessarily create difficulties in implementing CEA because each cumulative effects problem is also unique and requires individual treatment. The main problems in implementing a CEA approach are the conflicting legislation, and the lack of clear responsibilities for water resources.

In summary, the feasibility of implementing a CEA approach to water resource planning and management in Southern Ontario is extremely limited at present although there are some opportunities for improvement. Without the realization of the need for an integrated water resource strategy, however, the present limitations cannot be overcome. The province must take a more proactive stand to encourage and promote integrated environmental planning and management. This does not mean that economic development must be sacrificed to the environment. It does mean that a more consistent approach be applied to decision-making based on knowledge of the past and present environmental conditions and on capability and suitability of land to sustain development.



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## APPENDIX A QUESTIONNAIRE FORMAT

### CUMULATIVE EFFECTS ASSESSMENT AND REGIONAL PLANNING QUESTIONNAIRE

The following questionnaire is divided into a number of sections based on the type of information required. Please focus your answers to questions in Sections I and II on water resources and, where applicable, using the Region of Waterloo as an example. All of your answers will be considered confidential and you will not be quoted directly unless you consent.

#### Part Cumulative Effects Assessment (CEA) and Environmental Management

1. Are **you** familiar with the concept of Cumulative Effects Assessment? If so, how?
  - a) reading/literature
  - b) conferences
  - c) workshops
  - d) discussions/professionals
  - e) this survey
2. Please describe briefly your definition of CEA.
3. From your present understanding of Cumulative Effects Assessment do you think that it is an implementable concept? Why or why not?
  - a) workable
  - b) not workable
  - c) workable but requires a lot of research
  - d) no comment
  - e) not enough information
4. How relevant is the CEA concept to your agency's work? Why or why not?
  - a) very relevant to all of agency's work
  - b) relevant for certain divisions
  - c) not relevant
  - d) no comment, not enough info.

How relevant is the CEA concept to your division? Why or why not?

5. In your opinion, should this agency adopt a CEA approach? Why or why not?
6. If your agency was to adopt a CEA approach how would your division participate? Give examples.
  - a) no **participation**
  - b) policy formulation
  - c) programs
  - d) research
  - e) coordination
  - f) funding
  - g) field implementation
  - h) other (specify)
7. Would CEA implementation require changes in your division? If yes, what would these changes be?
8. What factors would limit your agency's ability to participate in CEA?
  - a) lack of political commitment
  - b) lack of management support
  - c) lack of expertise
  - d) lack of funding
  - e) lack of personnel
  - f) other

Do you consider these limitations to preclude the participation of your agency in CEA?

9. A) Based on the enclosed list of cumulative effects problems in Canada Table 3.1) has this division identified any of these problems in relation to its working mandate? Which ones? #1, #2, #3, #4, #5, #6, #7, #8, #9, #10, #11, #12, #13, #14, #15, #16
  - B) If** more than one problem has been identified, which problems are given priority? Why?
  - C) How are these problems being addressed?
  - D) What obstacles have been encountered in trying to address these problems?
  - E) Are these problems being adequately addressed using existing approaches? If yes, how is the success of these approaches



measured?

10. Does your division presently conduct or contribute to CEA either explicitly (through the recognition of **CEs** and thus through research/policy formulation/programs aimed directly at resolving CE problems) or implicitly (you have not identified **CEs** but are already trying to resolve CE problems through existing research/policies/programs). Explain.

## Part II Regional Planning

Regional planning has been proposed by a number of researchers as a potential mechanism for implementing a CEA approach. The first questions refer to regional planning in general while the latter questions refer to regional planning in the Region of Waterloo specifically.

1. A) Is regional planning a part of the structure of your agency?  
B) If yes, how are the regional boundaries of your agency defined?  
C) Do these boundaries coincide with other jurisdictional boundaries?  
If yes, how?
2. Would CEA be a useful **approach\process** to use in environmental planning in regions? Why or why not?  
  
What kind of region would be the most appropriate context in which to implement CEA?
3. Major developments initiated by government agencies may be assessed under the EIA Act. For development projects initiated by your agency/division are these developments assessed
  - individually or in association with similar development within the region?
  - over what time frame are impacts considered?
  - over what geographic scale are impacts considered?
  - are spin-off effects considered (economic, social, environmental)?
4. Minor activities that do not require a formal EIA may have cumulative effects depending on a number of factors such as location in relation to other developemnt, sensitivity of the surrounding environment to change, and growth inducing actions

(encouragement of other development). Does your agency require environmental assessment of minor activities?

If so, what kind of assessment is required?

5. A) Do you expect an increase in development in the Region of Waterloo?

B) What kind of development do you expect?

- a) residential
- b) industrial
- c) commercial
- d) all three

6. In your opinion, should regional government (Regional Municipality of Waterloo) play a role in environmental management? why or why not?

7. What role do Waterloo Region planners play in environmental management now?

8. What role should Waterloo Region planners play in environmental management? Explain.

9. Does your agency presently have a working liaison with the Regional Municipality of Waterloo? Explain.

### PART III AGENCY QUESTIONS

1. What legislation does this branch/division of your agency use?

2. What is the agency's official mandate?

Is the working mandate different than the official mandate? How?

3. List the policies and programs of you branch/division of the agency that address water related environmental problems (If your agency has brochures that describe these policies and programs, please include).

4. A) How successful are these policies/programs at addressing environmental problems? Explain.

B) Are any of these policies/programs in conflict with those of other agencies? Explain.

C) Do any of these policies/programs complement those of other agencies? Explain.

5. Describe present liaison mechanisms with other agencies for the implementation of environmental policies /programs.
  - a) consultation,
  - b) advisory,
  - c) cooperative programs
  - d) committees
  - e) other
6. Does your branch/division maintain an environmental data base?
  - What data are recorded?
  - What time frame does this data collection represent?
  - How are the data used?
  - How and from what other agencies are the data obtained?
  - Who has access to the **data**?

Part v          Regional Municipality of Waterloo

1. Does the Regional Municipality of Waterloo have long term environmental goals and specific objectives? If yes, explain and give examples.
2. How do you know if the goals have been reached? Is there a system in place that allows you to monitor the environmental quality of the Region?
3. What environmental problems have been identified in the Regional Plan?
4. How are these problems reflected in policies?
5. How are these policies reflected in daily planning activities?
6. A) Does the Region employ an environmental planner? Why or why not?
  - b) Who is responsible for reviewing development applications for environmental implications?
  - C) What is the environmental background/experience of the planner/staff member/committee who reviews development applications?

D) What other agencies review development applications?

7. What influence or impact does the Engineering Department have on environmental problems?
8. What influence or impact does the Development Department have on environmental issues?
10. What influence does the Planning Department have on environmental issues?
11. What influence do Regional Councillors have in the consideration of environmental issues within the Region?
12. How often are amendments made to zoning?
13. Have environmental problems affected planning in the Region?  
Explain
14. What strategy is used to plan for areas where intense development occurs or can be expected to occur in the future?

## APPENDIX B LIST OF INTERVIEW RESPONDENTS

### Ministry of Environment

Mr. Peter Dennis, Water Quality Policy Coordinator  
Mr. Mel Plewes, Environmental Assessment Branch, EAPIP Project Manager  
Mr. Alan Buck, Ontario Hydro, EAPIP Project Coordinator  
Mr. Boris Boyko, Director, West **Central** Region  
Mr. Stan Irwin, Chief, Water Resources Assessment, West Central Region  
Mr. Fred Hicks, Planning Officer, Cambridge District Office

### Ministry of Natural Resources

Mr. John Slot, Resource Management Planning Specialist, Environmental Assessment and Planning Division, Toronto (declined an interview because he did not consider CEA to be a relevant concept to this division of MNR)  
Mr. Art Holder, Regional Director  
Mr. Jack **MacFadden**, Cambridge District Manager  
Mr. Ted Harvey, Resource Liaison Officer, Cambridge District

### Grand River Conservation Authority

Mr. James Bauer, Chairman  
Mr. Eric Lemp, Director of Planning  
Mr. Nick Oldfield, Director of Land Management  
Mr. Tony Smith, Director of Water Resources

### Ontario Ministry of Agriculture and Food

Mr. Glen Thompson, Agricultural Representative, Waterloo Region  
Mr. Vem Spencer, Director, Soil and Water Management Branch  
Mr. Howard **Nodwell**, Associate Director, Extension Department  
Mr. Donald Dunn, **Foodland** Preservation Branch (declined a formal interview but discussed the topic by telephone)

### Regional Municipality of Waterloo

Mr. Ken Seiling, Chairman  
Ms. Sally Thorsen, Commissioner of Planning and Development  
Mr. Frank Watty, Director of Planning  
Mr. Paul Mason, Director of Development

City of Kitchener

Mr. Brock Stanley, Director of Planning

City of Cambridge

Ms. Wendy Wright, Commissioner of Planning and Development

City of Waterloo

Tom Slomke, Commissioner of Planning and Development