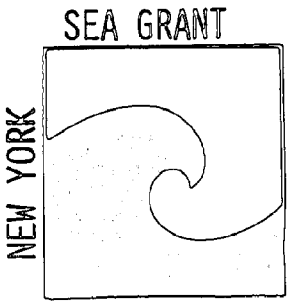

GREAT LAKES

MANAGEMENT PROBLEMS

SERIES

COASTAL ZONE INFORMATION CENTER

LAND MANAGEMENT IN THE LAKE ONTARIO BASIN

BY

JAMES M. WOLF

Cornell University
Ithaca, New York

NEW YORK STATE SEA GRANT PROGRAM

99 WASHINGTON AVENUE

ALBANY, NEW YORK 12210

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A Member of the New York State Sea Grant Program -
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FOREWORD

One of the major tasks before us as we move into the end of the present century is bridging the gap that persists between the generation of new knowledge at a rate unmatched in human history and the effective application of this knowledge to pressing social and environmental problems. As population grows, industry and agriculture expand and resource consumption increases, the residuals of production and consumption place ever greater stresses on the physical environment. Nowhere is this more evident than in the Great Lakes Basin.

We in North America have reached that point at which environmental quality has taken its place in the arena of public issues. Citizens are now applying pressures on their governments as a means of defending certain values that had lesser priority in earlier days. While recognizing that a beginning has been made, the facts of the matter are that we are not managing well our natural resources and that progress will continue to be slow and halting unless the requisite political will for some fundamental changes emerges.

There are a number of common factors that account for our inability to respond more effectively to the challenges to managing not only our water and land resources, but other social problems as well. A listing of a few of the more significant factors affecting resource management include: the diffused public interest; differing views about national priorities; inadequate legislation and enforcement; special interest politics; fragmentation of responsibilities within and among governments; and organizational jealousies. These elements operate individually and jointly in ways that seriously impede public programs that are designed to yield effective management of our resources.

There is, however, a more fundamental contributive factor and that is our failure to modernize the institutional structure. The institutional problem is defined as that of determining what kinds of government organizations are needed and how these organizations should be related to each other in order to achieve the most effective management of the natural resources of the Great Lakes Basin at the lowest possible economic, political and social costs. There is, of course, an existing institutional apparatus involving all levels of government in both Canada and the United States. This present structure, however, is not the product of any United States - Canadian long-term plan for the Great Lakes Basin. On the contrary, the

present mix of governmental departments, agencies, boards and commissions simply evolved over the years at a rate and to an extent that were determined by the changing limits of political feasibility in each country.

For the past two years, the Water Resources and Marine Sciences Center at Cornell University has been engaged in a series of studies of the institutional problems in the Great Lakes Basin. Perhaps the most important conclusion of our studies is that the present institutional structure for resource management in the Great Lakes Basin is inadequate and is in need of fundamental revision.

The Cornell project focusing on the institutional problems of the Great Lakes consisted of three related yet distinct research efforts.

The first commenced in early 1971 when a group of twenty graduate students representing a wide range of disciplines investigated the water and related land management problems of the Lake Ontario Basin. The approach of this graduate seminar was to attempt a comprehensive, multiple resource-use investigation which included an examination of the social, economic and political factors peculiar to the Lake Ontario Basin. The objective of the group was to consider the need for, and the formulation of an improved management scheme for Lake Ontario. A background report (350 pages) was prepared and a summary report, The Management of Lake Ontario - A Preliminary Report Proposing an International Management Organization was distributed to the Governors and Provincial Ministers Conference on Great Lakes Environmental Problems at Mackinac Island, Michigan in July 1971.

The summary report concluded, among other things, that the improved management of Lake Ontario (and by extension, all of the Great Lakes) would require either a substantial strengthening of the International Joint Commission or the establishment of an altogether new binational agency to supplant the former in the Great Lakes Basin. The report recommended a joint Canadian - United States study in this matter and, as an interim action, a reference to the International Joint Commission authorizing the Commission to establish on a trial basis a management office with rather extensive coordinative responsibilities for the water and related land resources of the lower lakes region.

The graduate student group sought, in effect, a strengthened binational apparatus, preferably one based on the existing International Joint Commission, authorized to carry out a surveillance and mediation function in the lower lakes.

Surveillance is defined in this instance as essentially an information collection, data interpretation and dissemination role. It is an activity concerned with problem definition. Surveillance includes a continuing responsibility to be aware of problems and alert to future developments. Mediation, on the other hand, encompasses the development of joint programs to attack common problems. It involves also the promulgation of regulations, schedules and uniform standards, along with appropriate means to secure implementation of those regulatory mechanisms.

While some consideration might be given to assigning a joint agency a third function - that of control, particularly in the cases of water pollution or air pollution control, that does not appear to be a feasible direction in which to proceed, at least at the present time. The governments will be better able to determine their positions with respect to vesting a joint body with an effective control function once the Great Lakes Water Quality Agreement signed by Prime Minister Trudeau and President Nixon in April 1972 has had time to operate and be evaluated.

The second phase of the Cornell project began in late 1971. In order to further test the tentative findings of the graduate student group and also to encourage a binational focus on the problem, plans were laid for a six-month seminar comprised of interested faculty from universities in Canada and the United States.

A Canada- United States University Seminar was formed by various faculty from some twenty universities and colleges in Canada and the United States. The Seminar met in three formal sessions during the period December 1971 - June 1972. Using the information and data assembled by the Cornell graduate student group as a starting point, the Canada - United States University Seminar took up the question of improving the two countries' capabilities for managing the water and related land resources of the Great Lakes. A principal objective of the faculty group was to produce a report which would promote discussion in both countries on the problems of the Great Lakes. Another purpose was to set forth in general terms the available alternatives for improving the management of the water and related land resources of the Great Lakes Basin.

A final report of the Canada - United States University Seminar has been written and the findings (1) indicate that there is a need for a modified international arrangement to cope more effectively with the existing and emerging resource-use problems affecting the Great Lakes Basin, and (2) present three alternative institutional approaches as possible guides for further discussion and debate in

Canada and the United States.

The third phase of the Cornell research effort on the Great Lakes Basin consisted of an attempt to develop further the idea of a binational management office with wide coordinative responsibilities for the Lake Erie and Ontario Basins. Concurrently with the Canada - United States University Seminar (December 1971 - June 1972), a second graduate student group at Cornell University investigated, under the guidance of Professors Leonard B. Dworsky, C. Donald Gates and David J. Allee, selected elements of a hypothetical joint management office. As part of this effort, ten graduate students completed seven theses for advanced degrees, together with three research papers on some facet of a joint regional management office.

The type of joint office conceptualized is one designed to carry out a coordinative role in the management of a wide range of resource-use problems. The list of such problems used in the investigation included: water quality; municipal/industrial water supply; agricultural water supply; lake level control; hydropower; flood control; navigation; shoreline erosion; fish and wildlife protection; water-based recreation; solid waste disposal; air quality; economic development; agriculture and transportation.

In our attempt to simulate a Great Lakes operations office jointly established and operated by Canada and the United States, we endeavored to examine a selected number of those problems which both the designers of such an office as well as those who are ultimately charged with its direction would be obliged to address.

An obvious initial consideration, for example, would be the structure and functions of a modified joint agency. This topic is dealt with in Natural Resources Management in the Great Lakes Basin by James A. Burkholder. A primary task of an operations office would be the collection, interpretation and dissemination of data and information pertaining to the Basin. This important area is treated in An Information System for the Management of Lake Ontario by Dale Reynolds. The role of public participation in the activities of the proposed Basin operations office is examined in detail in Public Participation in Water and Land Management by Arvid L. Thomsen. Demographic trends and problems are traced on a national scale and then examined with respect to the Lake Ontario Basin as a case study in Toward a National Population Redistribution Policy: Some Policy Issues by Lawrence W. Saunders. The problems of

water quality management of a lake basin are considered in Opportunities for Water Quality Management: A Case Study of the Lake Erie Basin by Ralph P. Meckel. Special problems of environmental quality management along an international boundary are the subject of Environmental Management of the Great Lakes International Boundary Areas: A Case Study of the Niagara Urban Region by Donald R. Kisicki. The opportunities and problems associated with Federal and state grants for wastewater treatment facilities are discussed in two case studies in Cost Sharing in Water Pollution Abatement Facilities - Some Economic and Political Consequences by James M. Foster. Land use management as an integral part of the overall planning process is the subject of a paper Land Management in the Lake Ontario Basin by James M. Wolf. In his paper entitled Management of the Biological Resources of the Lake Ontario Basin, Douglas M. Carlson provides a comprehensive survey of the fishery, recreational and wildlife resources of the Lake Ontario Basin. Finally, in his paper Management of Water Supply, Navigation, and Power Programs, Martin J. Murphy focuses on those water uses in the Lake Ontario Basin and the potential role of a joint operations office with respect to municipal water supply, navigation and hydropower in a new institutional framework.

These papers, of which this by James M. Wolf is one, are offered with the hope that they will contribute usefully to the improved management of the Great Lakes of Canada and the United States.

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Director,
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March 1973

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I INTRODUCTION

1) Background

In January 1972 a group of ten graduate students explored the possibilities of a joint Canada-United States office designed to carry out a coordinative role in the management of the lower Great Lakes. Each student investigated a selected element of a simulated operations office. The purpose was to examine in as much detail as time and resources permitted some of the principal tasks that such an office would carry out and to anticipate some of the significant problems and opportunities associated with those tasks.

Three objective functions of the Office were recognized:

Surveillance - information gathering and compilation; interpretation of data for planning purposes and decision making.

Mediation - establishment of standards; programs; priorities; financing.

Control - methods of implementation and enforcement.

Various aspects of the objective functions were covered in reports prepared by each participant. These included the following:

1) Institutional arrangements for resource management in the Great Lakes Basin

2) Public participation in resource management

3) Information systems

4) Cost sharing alternatives

5) Management of water supply, navigation and power

6) Management of the biological resources of the Lake Ontario Basin

7) Population alternatives

8) Land management

9) Environmental management of an international boundary area

10) Water quality management in the Great Lakes

As we developed our own topics, the linkages to the other participants and their areas became clearer. This perhaps set the keynote for the overall resource management problem. For management of Lake Ontario involves linkages in two directions--first, linkages between various resource uses, i.e. multi-resource management, and secondly, binational linkages to facilitate achieving resource management objectives.

2) Linkages and Objectives

This paper on land management in the Lake Ontario Basin has very obvious ties to other papers in the series. The need for adequate information exchange and for public and joint Canada-United States participation in the planning processes are becoming more apparent. The paper acknowledges the significant implications that population growth and distribution have upon the resource base. As an integral part of the planning process, land management is recognized as having tremendous impact upon water quality in the lake.

The objectives of this paper are to demonstrate the importance of land management in particular as it interacts with management of the lake. Basic to this objective is a physical and demographic delineation of the region. Concepts in land use planning will be covered. Particular attention will be paid to a case study of regional development in Ontario. Issues in land management will be discussed. Lastly, future human needs and their impact on land use trends will be explored.

II PORTRAIT OF THE REGION*

1) Physical

a) Dimensions Lake Ontario is the smallest of the Great Lakes. The lake has a surface area of 7600 square miles of which 3600 square miles are in the United States and 4000 square miles in Canada. There are 726 miles of lake shoreline. The Lake Ontario drainage basin consists of 15,200 square miles in New York and Pennsylvania, and 12,000 square miles in Ontario. Combined, the land and water portions of the basin occupy 34,800 square miles. Figure 1 shows the general geographic setting of the Lake. Figure 2 gives the boundaries of the drainage basin. It should be noted that although Ontario is small by Great Lakes standards, it still ranks among the largest fifteen lakes of the world.

b) Hydrology Lake Ontario is the most easterly of the Great Lakes. As such it is the last major lake of the chain and drainage from the entire Great Lakes Basin, (approximately 300,000 square miles), passes through the lake. Drainage from Lake Erie passes over Niagara Falls and into Ontario. The St. Lawrence River drains Lake Ontario to the ocean. Average inflow to the lake has been determined to be 202,000 cubic feet per second (CFS), while discharge from the St. Lawrence is about 232,000 CFS. Annual flow from this river and the Great Lakes system is the most constant of any hydrologic system in either country.

c) Landscape The land south of Lake Ontario is a region of low relief and rolling hills. This area contains some of the best farm land in New York State. The Appalachian uplands begin approximately thirty miles south of the lake, roughly along a line now occupied by the New York State Thruway. These uplands rise to form the southern boundary of the basin. East of the lake is the Tug Hill plateau, while northeast of the lake is the St. Lawrence-Champlain Corridor. The land north of the lake is low and rolling. The predominant physiographic feature in that area is the Niagara Escarpment.

2) Demography

In 1968 the population of the Lake Ontario Basin was 6.1 million, of which 2.3 million resided in the United States and 3.8 million in Canada.

In the United States, the population of the Buffalo urban area in 1970 was 1,335,000 while the Rochester area had 875,000. (The Lake

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*Much of the material for parts 1 - 3 of this chapter were taken from the reference by Dworsky, et al.

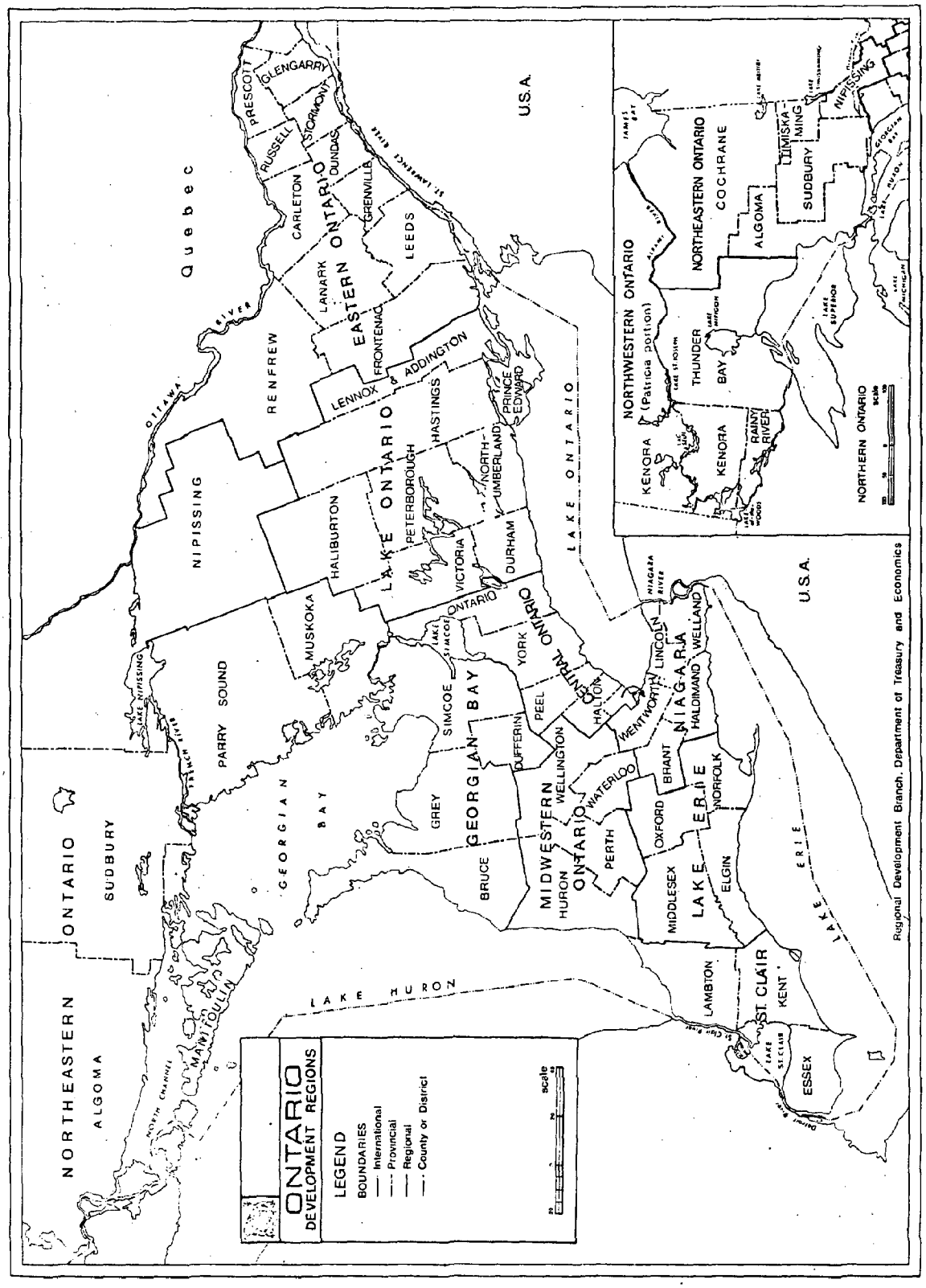
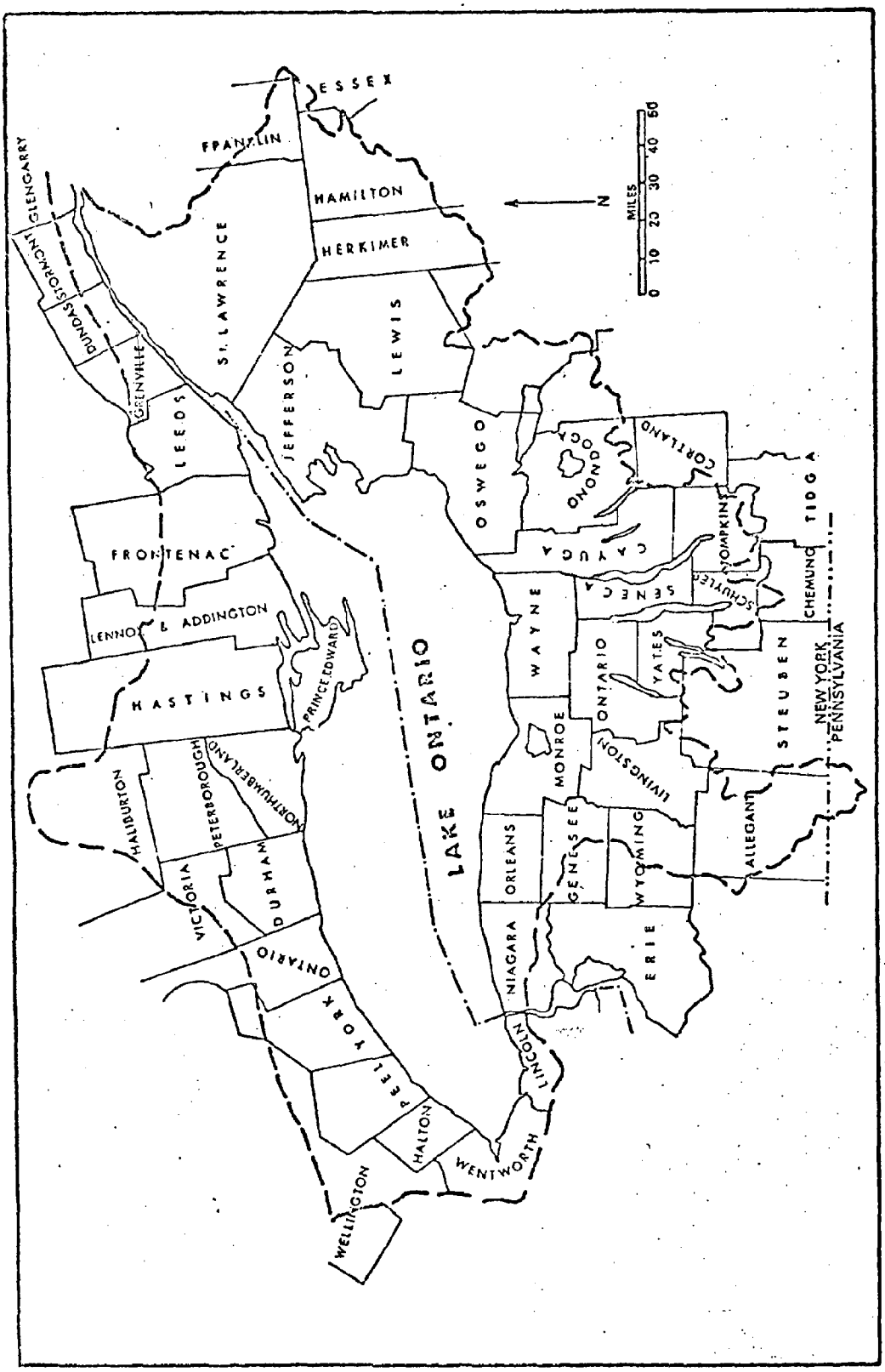

ONTARIO
DEVELOPMENT REGIONS
LEGEND
BOUNDARIES
International
Provincial
Regional
County or District
scale
NORTHEASTERN ONTARIO
ALGOMA
SUDBURY
NIPISSING
PARRY SOUND
MUSKOKA
HALIBURTON
RENFREW
PRESCOTT
GLENGARRY
RUSSELL
STORMONT
CARLETON
DUNDAS
GRENVILLE
LANARK
LEEDS
FRONTENAC
LENNOX & ADDINGTON
EASTERN ONTARIO
LAKE ONTARIO
PETERBOROUGH
HASTINGS
PRINCE EDWARD
NORTH-UMBERLAND
VICTORIA
DURHAM
YORK
PEEL
HALTON
METROPOLITAN TORONTO
GEORGIAN BAY
SIMCOE
GREY
BRUCE
DUFFERIN
WELLINGTON
WATERLOO
PERTH
HURON
MIDWESTERN ONTARIO
WENTWORTH
LINCOLN
NIAGARA
HALDIMAND
WELLAND
BRANT
OXFORD
NORFOLK
MIDDLESEX
ELGIN
LAKE ERIE
LAMBTON
KENT
ESSEX
ST. CLAIR
LAKE HURON
GEORGIAN BAY
Quebec
U.S.A.
NORTHWESTERN ONTARIO
(Patricia portion)
KENORA
THUNDER BAY
RAINY RIVER
NORTHEASTERN ONTARIO
COCHRANE
ALGOMA
TIMISKA-MING
SUDBURY
NIPISSING
NORTHERN ONTARIO
Regional Development Branch, Department of Treasury and Economics

Figure 1



Counties of the Lake Ontario drainage basin.

Figure 2

Ontario Basin contains other relatively large cities in New York State - for example, Syracuse. Due to their distance from the lake, they have not been included in this discussion.)

In Canada, the bulk of the population is concentrated in an urban arc called the Mississauga Conurbation which runs from Oshawa southwest to Toronto and Hamilton, thence east to Niagara Falls. Figure 3 is a map of this area. Population estimates, (1969) for urban Hamilton were 480,000; for urban Toronto - 2,316,000. Forecasts for 1976 project a population of 4.6 million.

The population is moving from the rural areas to urban areas, and in particular from the north and east to the southwest and into the Ontario Lake Basin. There are 12 counties in Ontario which have land in the Basin. In the period 1951-1961, all but three of these showed population growth rates above the provincial average. The pattern was similar in the period 1961-1966. More significantly, the counties of Halton, Peel and Ontario have shown population growth rates greater than 90% above the provincial average, while York and Lincoln have shown population gains in the range 30-50% above the average. These counties, Lincoln excepted, make up the heart of the Toronto Centred Region. Thus urban areas in the Canadian part of the Lake Ontario Basin are very rapidly expanding, and doing so at the expense of the adjacent rural areas.

Most reports predict future population growth rates for the area at or above current trends. It appears likely that the rate of population growth on the Canadian side of the Basin will continue to exceed that on the U.S. side.

In Ontario, 7% of the population is engaged in agriculture. In the portion of the Basin in New York State only 2% of the population is engaged in farming. Yet about 1/3 of the population in the Basin, on both sides of the border, live in rural areas. Although there is a tendency for population migration from rural to urban areas, this may in part be due to an expansion of the urban centers to absorb rural lands by subdivision or other ways.

The high population concentration around the western portion of the lake, (from Oshawa to Rochester), places environmental stresses on the lake and upon the land in the area. These pressures will require action in land and water management in the years ahead. Chapter IV of this report deals with management issues and strategies with a focus on this portion of the Lake Ontario Basin.

3) Economic Environment

Employment trends are useful in describing the economy of a region. Buffalo and Rochester have been areas of slow growth as

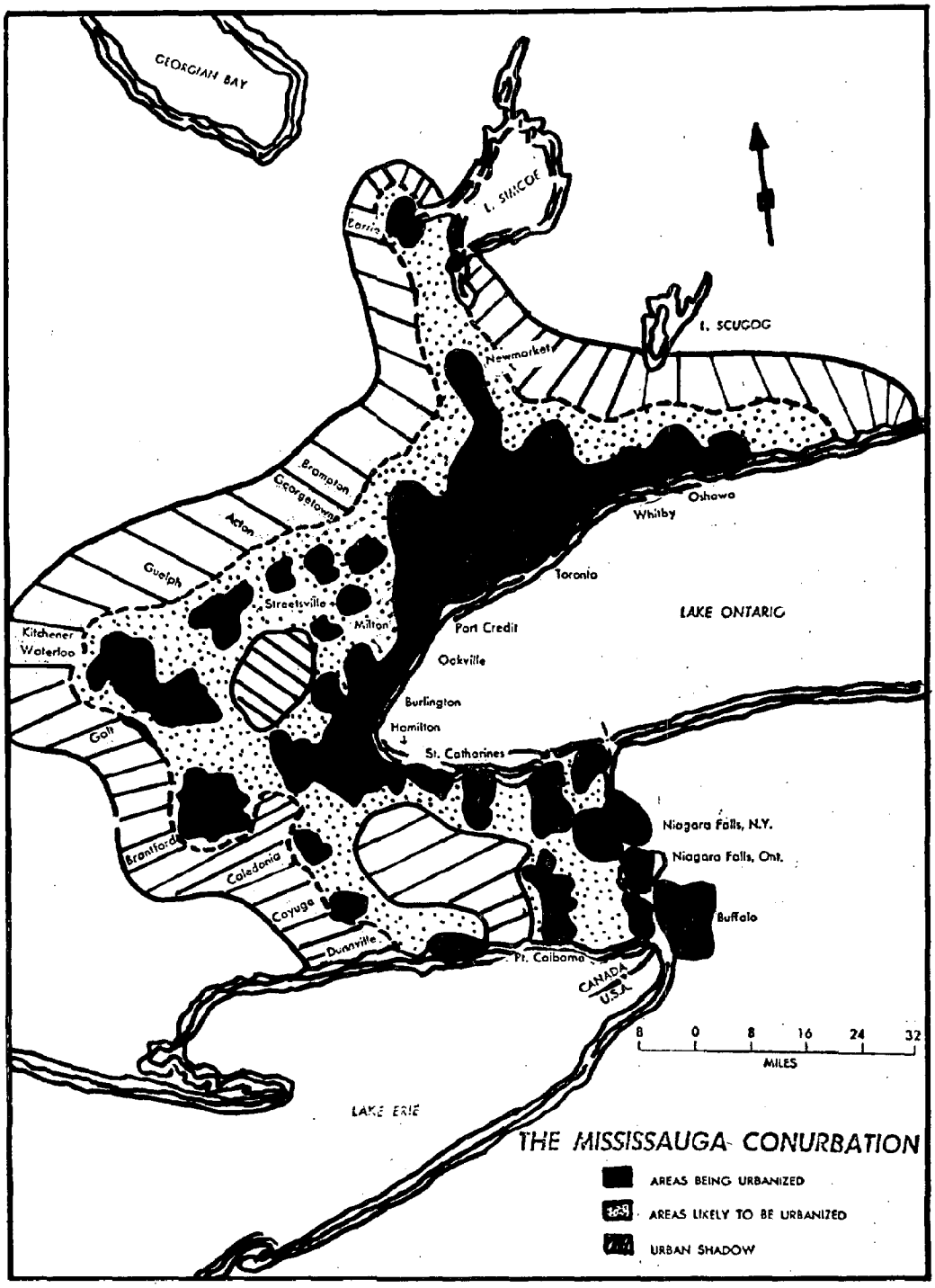

GEORGIAN BAY
L. SIMCOE
Barrie
L. SCUGOG
Newmarket
Brampton
Georgetown
Acton
Guelph
Oshawa
Whitby
Toronto
Streetsville
Milton
LAKE ONTARIO
Port Credit
Kitchener
Waterloo
Oakville
Burlington
Hamilton
St. Catharines
Galt
Niagara Falls, N.Y.
Niagara Falls, Ont.
Brantford
Caledonia
Cayuga
Dunnville
Buffalo
Pt. Colborne
CANADA
U.S.A.
8 0 8 16 24 32
MILES
LAKE ERIE
THE MISSISSAUGA CONURBATION
AREAS BEING URBANIZED
AREAS LIKELY TO BE URBANIZED
URBAN SHADOW

Figure 3

measured by national trends. Nevertheless, they command important positions in manufacture of primary metals, transportation equipment and photographic equipment, among others. The Buffalo-Niagara Falls industrial complex, strategically located between centers of primary production in the mid-west, and centers producing manufactured goods in the northeast, serves as a major transportation hub.

The Toronto region is the financial, manufacturing and educational center of Canada. Manufacturing is characterized by its diversity. The city is an important shipping center and transportation link. Hamilton is also a port and the Canadian center for the primary metals industry. Overall employment growth in the area exceeds the Canadian national average.

The Province of Ontario contains 36% of the population of Canada; it accounts for over 40% of the Canadian GNP. Industrial employment has increased by one-third in the last decade. Unemployment in 1970 averaged 4.3%, or 2% below the Canadian average. The Province is a leader in the Canadian economy.

4) LUNR Study

Background The New York State Land Use and Natural Resource Inventory (LUNR) has been established at Cornell University for the purpose of developing a land use inventory for the entire state. Information is stored in 51 categories of land use data obtained from air photo interpretation. Other types of data such as point data (e.g., numbers of installations) are also available and computerized for easy access and retrieval. Information from LUNR was used to determine land use patterns in the Lake Ontario Basin. For purposes of this study, the 51 categories of land use were combined into five uses:

Active agricultural;

Inactive agricultural;

Wood Land - Forest, public lands, outdoor recreation;

Water Resources - Ponds, rivers, wetlands;

Urban - Residential, industrial, commercial, utilities and transport.

Study Areas Two separate data compilations were made. The first was based on political boundaries. Data from nine complete counties were used to determine land use patterns. The second compilation was based upon physiographic boundaries irrespective of county lines. This area was bounded on the south by a line approximately 30 miles south of the lake, roughly along a line now occupied by the New York State Thruway. As pointed out earlier, this is an area of low relief and fine agricultural land. The two study areas

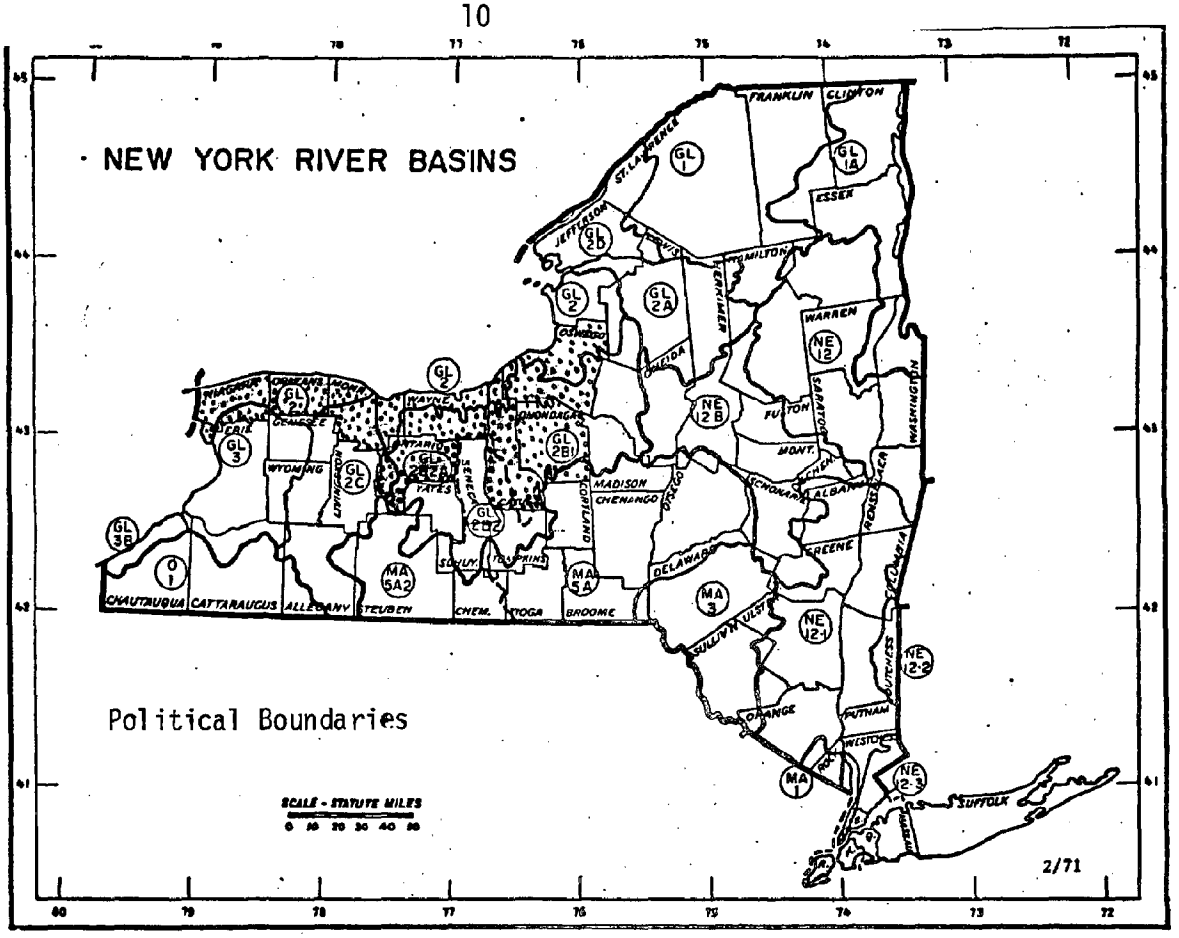
are shown in Figure 4. It should be noted that these areas exclude a large portion of the actual drainage basin where environmental stresses are apt to be less severe.

Results Land use patterns (percentage of the total area) in each study area are as follows:

	Political Boundary	Physiographic Boundary
Active Agriculture	39%	42%
Inactive Agriculture	14	15
Wood Land	30	24
Water Resources	11	9
Urban	6	10
	100%	100%

Conclusions The physiographic boundary area has a higher proportion of agricultural (active and inactive) and urban lands. It is likely that there is somewhat more conversion of agricultural land to urban uses within this area. The other area, containing more uplands, is marked by a higher percentage of woodlands and water resources.

For both areas it is illuminating to note the relatively high proportion of water resource lands. The rich endowment of water resources underlines the need for complementary and integrated land and water management planning for this region.



NEW YORK

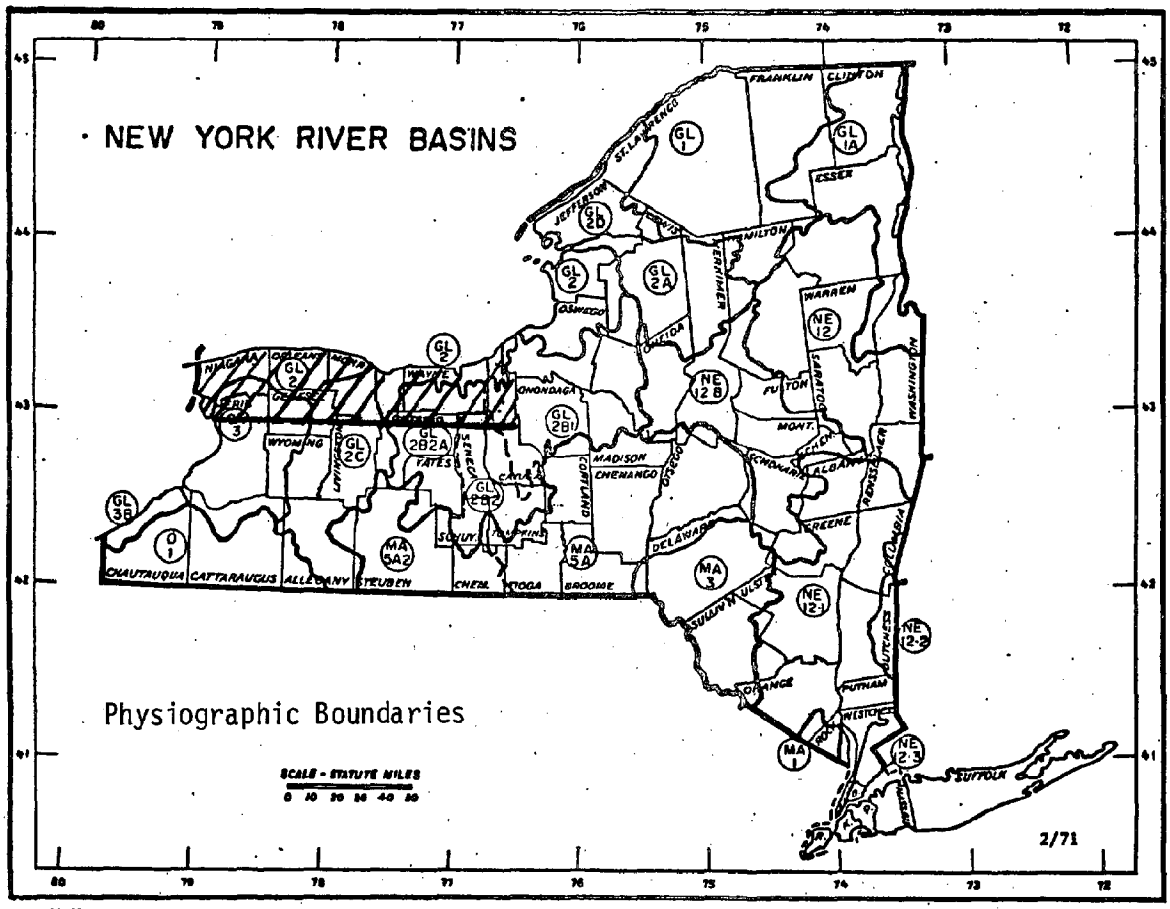


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Figure 4

III LAND USE PLANNING - CONCEPTS AND INSTITUTIONS

1) Land in Historical Perspective

It has been said that "the land-tenure system of the United States has undergone fewer changes since the establishment of our government than our Federal Constitution has." (Harris, p. 278) In the United States and Canada, this system has evolved slowly but continually, not through statutory enactment, but rather through common law and judicial decisions. In brief, our land-tenure system defines the relationship between man's use and control of, and his rights in the land.

The rights in the land reflect a distribution between the individual's rights and public rights (as exercised by the government). On the surface it may appear that governmental rights in land held in fee are minimal, but let us recount these rights which are historically vested in the people. These rights form the basis for increased government action affecting man's use of the land. Future action will in fact be vital to the very preservation of the land as we know it today.

Probably the most far-reaching public power is the police power. This is the power to "regulate individual activity in the interest of the safety, health, morals and general well-being of the whole population." (Clawson, p. 66) Inasmuch as this power is contained in somewhat loosely worded language, and because it is subject to periodic reinterpretaton, it is the public power with the widest scope.

A second broad public power is that of eminent domain. This power enables the government, (subject to "due process" and "just compensation"), to take over privately held property for purposes of public use such as highways, urban renewal and public housing. It is only in the past several decades that the power of eminent domain has been taken to include the latter two uses specified above. (Clawson, p. 66)

We are all familiar with the power to tax. This is also a vested public right in the land. Although originally conceived as a revenue raising device, this power has evolved into a regulatory tool as well. (Harris, p. 280)

Many now consider the power of the purse, or the spending power as a fundamental public right in the land. It is clear how government spending for services such as schools, transportation and utility services, parks... affects land utilization.

Perhaps the most basic public right in the land is that of escheat. In the absence of private ownership, rights ultimately rest with the public. This is merely a reflection of the full circle, - which began with government control of the land, which then permitted private ownership, and which in the absence of said ownership provides for land reversion to the public.

These five rights form the legal basis for public rights in the land. The extension from the basic land rights has been visually traced in Figure 5 showing a time line of increased government authority in dealing with the land. Parallel to the increase in government authority are changes in human values. During the first two-thirds of the 20th Century these rights were called upon to provide the legal framework for public activity in the area of resource conservation. This activity and these bases will presumably be widened in the future in scope to encompass environmental protection. As population increases while the earth's resources remain fixed or diminished, public action for the protection of the environment becomes increasingly essential. But government activity alone is not sufficient. What is needed is public awareness of the problem, a public desire, then a sustained commitment to keep the land habitable for generations to come.

2) Current Concepts in Land Use Planning

The objective of land use planning is to facilitate the most efficient use of the land for society, and the economy as a whole. Efficiency criteria can be gauged in terms of the four evaluation criteria established by the Water Resources Council, namely, regional development, national economics, social well-being, and environmental protection. Often the desires of the individual run counter to the aims of society. It is the job of the land planner to reconcile the individual's goals with the long range goals of society.

We have suggested that individual commitment, not government regulation is the long range solution to protecting the environment. Nevertheless, it is government action (spurred on by a small nucleus of concerned individuals) which sets the pace for current activity in land use planning. The tools which are available to the land use planner take two forms - incentive and restraint. Proper use of these devices allows the land planner to become engaged in a broader activity known as regional planning. Both New York and Ontario are involved in regional planning. However, the effectiveness of their planning is somewhat restricted by a lack of specific land planning devices available to, or used by, these governments. Let us briefly explore some of the current concepts available to the land use planner as a means of setting the New York and Ontario situations into perspective.

Effective zoning dates from 1926 in the historic Village of Euclid vs. Ambler Realty Co. (272 U.S. 365, 1926) decision in which the Supreme Court "strongly affirmed the power of a municipality to regulate use of private land, under defined conditions and with proper procedural safeguards." (Clawson p. 93) The decision was an outgrowth of the public police power through the common law of nuisances. Thus zoning was initially established as a restriction rather than as an incentive. A recent decision by the New York State Court of Appeals has widened the scope of zoning beyond that initially implied in the Euclid decision. The court held that "Zoning is not just an expansion

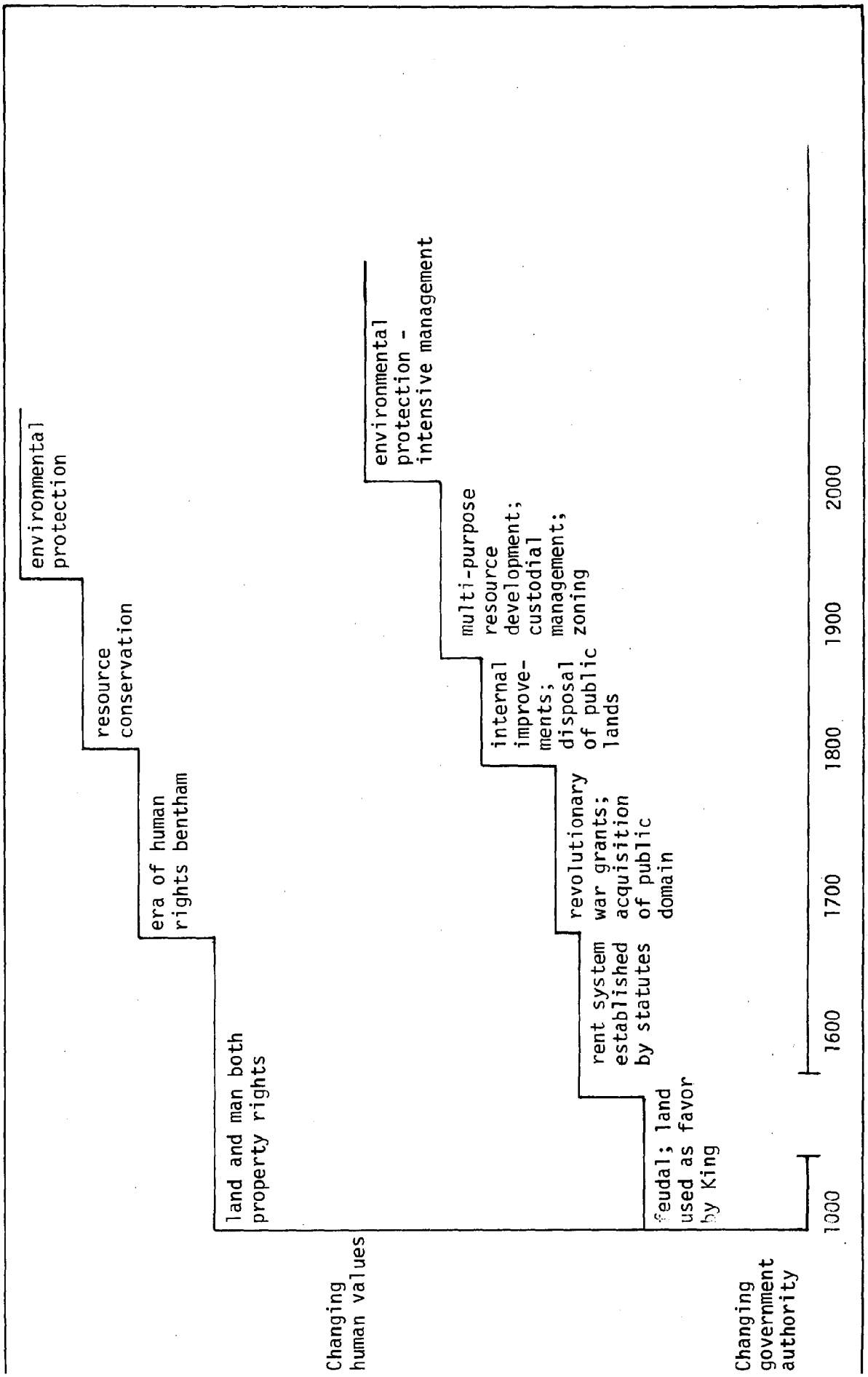
environmental protection
resource conservation
era of human rights bentham
land and man both property rights
environmental protection - intensive management
multi-purpose resource development; custodial management; zoning
internal improve-ments; disposal of public lands
revolutionary war grants; acquisition of public domain
rent system established by statutes
feudal; land used as favor by King
Changing human values
Changing government authority
1000
1600
1700
1800
1900
2000

Figure 5

of the common law of nuisance. It seeks to achieve much more...zoning can be a vital tool for maintaining a civilized form of existence only if we employ...all the other professions concerned with urban (or land) problems.[1] (Parenthesis supplied) Zoning, which at first took the form of restrictive convenants can now be used as incentives to foster planning. For example, positive zoning techniques became requisite to providing directed growth in problems of urban renewal, traffic congestion, commercial development, rural-urban demands on the land. The effect of this approach is one of "creating community benefits rather than preventing individual harms..." (Mandelker in Marcus & Groves, p. 16) The effect of broader zoning techniques can be viewed in terms of recent legislation in several states.

Three states have enacted legislation which estabish statewide land use regulations.[2] In 1961 Hawaii passed legislation which led to a classification of all land into four districts, agricultural, rural, urban and conservation. This was done to provide ordered growth in a situation where land speculation was (and still is) rampant. Under the law, land in a certain category can only be used for certain prescribed uses within that category. Vermont (1970) established an environmental board which passes on all major proposals for development in the state as well as for any development above an elevation of 2,500 feet. Maine (1970) has developed similar controls with a strong bent toward preservation of the environment.

Some states have established land use controls over selected areas in their states. At least ten states have set controls over development in coastal areas, wetlands or shorelines. California has passed legislation affecting development in San Francisco Bay and has joined with Nevada to regulate development in the Lake Tahoe Basin. New York has created Special State Commissions under the Office of Planning Services (OPS) which are charged with reviewing all development plans for the Hudson River Valley, and the St. Lawrence-Eastern Ontario region. These commissions serve as watchdogs for development inconsistent with public uses of the land. In addition, New York has begun the process of planning for development in the Adirondack Park area by creating land use plans for this unique area. In Canada, Ontario has enacted legislation designed to protect the Niagara Escarpment against development by speculators, mining, etc. The types of development encouraged include agriculture, parks and recreation. Certain parcels along the escarpment have been earmarked for provincial purchase.

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[1] Udell V. Haas, 288 NYS 2d 888, 893, 21 NY 2d 463 (1968).

[2] See Bosselman and Callies, The Quite Revolution in Land Use Control, a comprehensive study of the subject prepared for the Council on Environmental Quality.

Recent legislation has been enacted in a number of states which provide for agricultural land preservation in the face of rising taxes and increased land speculation. In California, the Wilkenson Act provides a different tax basis for land set aside from development. Under the provisions of the New York State Agricultural Districts Law (1971) farmers may receive shelter from land taxes based on potential for development.

While this discussion has centered upon zoning as a tool in land use planning, other public actions to control land use should at least be mentioned. Beuscher considers slum clearance as the "most dramatic modern illustration of land use control through public acquisition" (p. 515) Acquisitions of land for public purposes will become increasingly important under the concept of eminent domain as demand for public uses of the land, e.g., highways, parks, power projects,..., becomes magnified.

Under the spending power, various grants-in-aid affect land development. For example, eligibility for VA or FHA housing loans may only be available for homes meeting lot size and neighborhood standards (p. 563 Beuscher). In order to obtain matching grants for urban renewal or open space acquisitions, certain federal criteria must be met. The Model Cities Program relies heavily on this concept of regulation through the spending power. Public policy toward provision of services such as water systems, sewage treatment, highways, ..., will also greatly affect land use planning.

Some individuals consider taxation to be "the most effective exercise of the police power" (Seligman in Beuscher p. 565) In recent years it has shifted from a revenue raising device to a regulatory power. We have already touched upon lowered land tax assessments in return for agricultural zoning. Oil and mineral tax depletion allowances have obvious implications on land use. In Mississippi, Alabama, Louisiana and Vermont, statutes permit tax exemptions as a means of attracting industrial development. Other states favor parklands and timber uses through tax exemptions. (See Beuscher for a more complete account)

It is clear that the land planner has today a number of regulatory devices available to him. The basis for these devices has evolved from simply "harm preventing" to promoting the "greatest social good." Through the planning process, government can show that the regulations are necessary to accomplish desired social objectives. Regional planning which will rely on the regulatory devices of the land planner will also contribute to an expansion of the rules under which the planner operates.

3) Regional Planning

Regional planning has been defined as "the process of preparing, in advance and in a reasonably systematic fashion, recommendations

as to policies and courses of action to achieve accepted objectives in the common life of urban or regional communities." (Woodbury in Ackerman, p. 66).

The key phrase in this definition is "in advance." Planning means foresight, not simply taking action to correct mistakes. Planning should be initiated preferably when the slate is clean--when problems don't presently exist - so as to obviate potential problem areas before they develop.

Another key word in the definition is "systemetic". Planning is an integrating process which draws on inputs from a variety of disciplines. Since planning can have far-reaching effects on people and resources, planning input should include insofar as possible, a consideration of the indirect consequences of choosing particular courses of action. For example, what would be the full range of effects of transporting northern California water to the Los Angeles area? In addition to encouraging industrial and residential development, would the result be to worsen the smog problem and make commuting even more of an intractable problem? In other parts of the country, for example, in the Great Lakes Basin, we must turn the question around, how will land use planning affect the water resource?

Effective regional planning requires broad planning objectives, including livability, efficiency, amenity, flexibility, resource optimization and public participation (Woodbury in Ackerman, p. 68-79). A plan to include the governmental functions of surveillance, mediation and control is required to meet these objectives.

Planning for a region is in phases. In the first phase of the planning process, goals are often defensive, i.e., they are designed to prevent further deterioration of the inner city or permanent damage to the environment. The plight of the cities is a well-known and studied phenomenon. It includes traffic congestion, air and water pollution, unplanned development, deterioration of housing, decline in the quality of services, erosion of a sense of civic responsibility. Goals here arise pragmatically from the real problems besetting the area. (Gertler, p. 396) Planning tools at this stage include, but are not limited to, development schedules, urban renewal, subdivision control, designation of land uses, establishment of greenbelts.

A second phase involves regulation of land use. Also considered here is actual planning and design for lands in order to limit subdivision growth and to avoid urban decay. It is noteworthy that, in the United States, three states, Maine, Vermont and Hawaii have passed legislation designed to regulate land use.

A third phase provides for long-range planning for the optimal use and development of the resources of an entire region. The objectives here are optimize human benefits over a specific region as well as to provide for environmental protection.

The key to the final phase is broader levels of optimal planning. Although local land use planning is a step in the right direction, it is inadequate to meet problems confronting the province, state or nation. An interregional development framework is needed to meet national goals. The challenge here is a willingness on the part of the individual regions to forego certain prerogatives for the benefit of an interregional effort to meet planning objectives.

Systemetic planning in time and space thus goes beyond geographic and political boundaries for solutions. Just as southern California has looked beyond the Tehachapis for solutions to its water problems, full management of the Great Lakes Basin requires commitment and action from Canadian and U.S. interests. Let us now examine the structure of land planning in the Lake Ontario Basin with specific reference to planning in Ontario and the Toronto Centred Region.

4) Regional Development in Ontario

a) Background In Ontario during the sixties and early seventies, three trends have called for organized planning efforts: First, there has been an increasing tendency for migration to urban centers. Accompanying this familiar migratory pattern is the equally familiar unplanned urban sprawl. The Toronto Centred Region now extends westward towards Hamilton and Waterloo, and eastward toward Oshawa. The trend is dismally familiar, choice farm land is transformed into suburbs, forests are destroyed, open pit mines and quarries scar the countryside and the air and water resources of the region are left polluted.

b) Structure A regional approach to these and related problems in Ontario was deemed appropriate. The basis for a broad planning approach was established through the Federal Planning Act of 1946 which outlined procedures and regulations to be followed. In 1966, in a program known as "Design for Development, Phase I," John Robarts, Prime Minister of Ontario, stressed the belief that "regional plans and priorities should always contribute to the total environmental development and economic performance of the (whole) province" and that "regional development policies are...aspects of a broader provincial growth policy." (See A Strategy for Southwestern Ontario Development, p. 1)

Under the program Design for Development, the Province of Ontario took on responsibility for developing official plans into which local governments would have maximum input. This intent was strengthened in "Design for Development, Phase II" initiated in 1968. In this phase, guidelines were established on the provincial level. Local governments were required to develop plans in accordance with the Provincial Design for Development.

Under Design for Development, provincial regional plan determination is in three phases: (1) data gathering; (2) development of regional plans; and (3) implementation of the above through local and provincial coordination of on-site development. Phase (3) may be termed the "action" or "mediation" phase.

The Regional Development Branch of the provincial government was given responsibility for planning development and guideline determination for the province. The Branch is within the Department of the Treasury which is expectedly indicative of how close provincial planning is tied to the purse strings. The Branch acts as an administrative focal point providing coordination between the various governments and governmental agencies concerned with regional and local development.

Unlike intergovernmental endeavors in the United States, federal hegemony is absent. While establishment of priorities and major funding decisions may lie at the cabinet level (federal), operational guideline determination and approval will be found at the provincial level.

Figure 6 is an organizational chart for the regional development program. It should be noted that a reorganization of the Provincial Government is presently underway.

c) Objectives "A Strategy for the Southwestern Ontario Development" (p. 14-15) spelled out the following objectives for development of the region:

1) Economic growth should be based on private industrial development which combines regional diversification with subregional specialization;

2) urban growth should be decentralized in growth nodes so as to maintain economies of scale and at the same time limit sprawl;

3) a transportation system should be established which links the urban centers. The transportation system should in part shape future development not simply respond to past requirements;

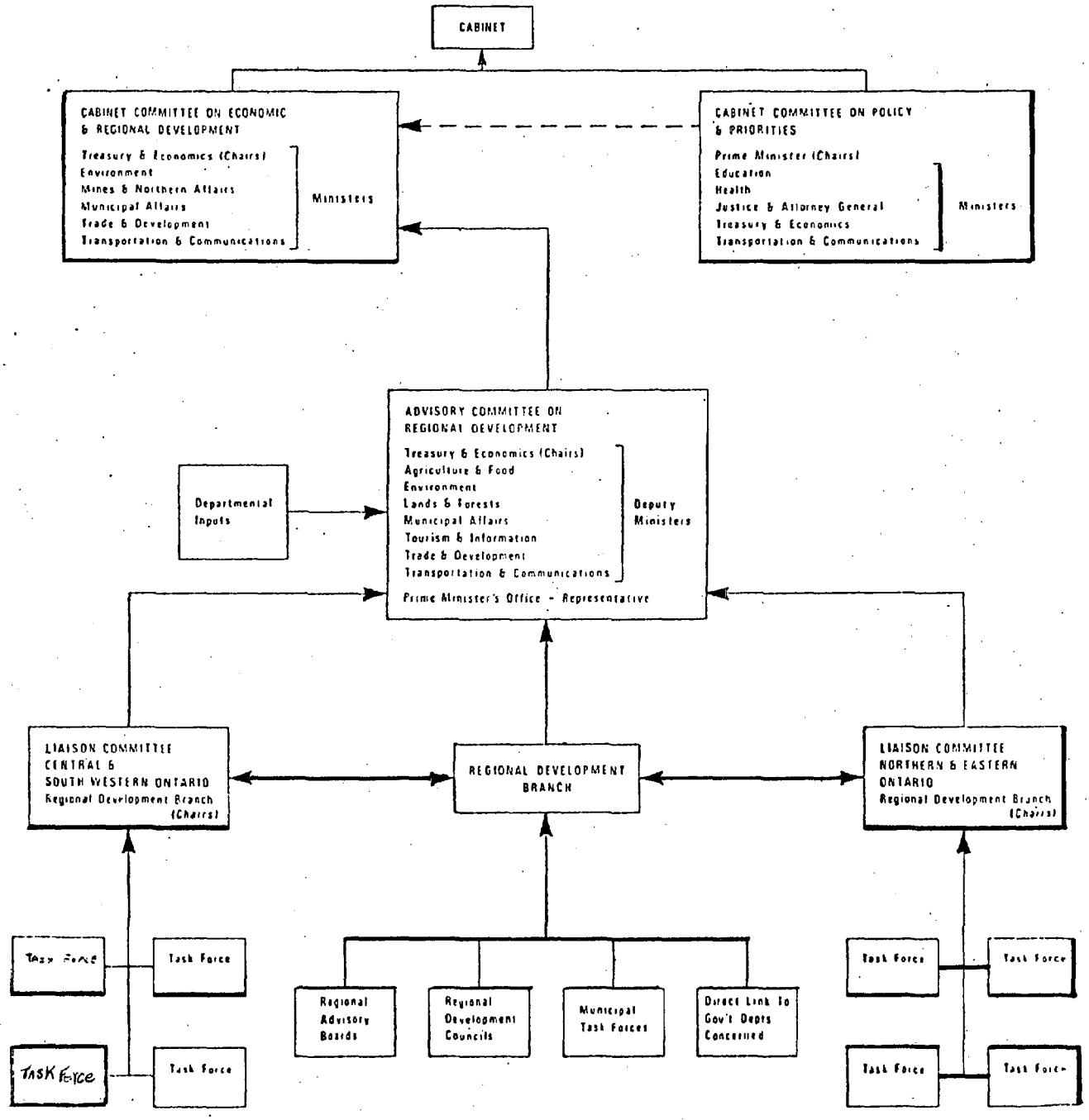
4) environmental protection is necessary for the region's shorelines, escarpment and prime agricultural lands;

5) flexibility; and

6) encouragement of local participation at each stage of the planning process.

d) Surveillance Initially, ten economic regions were delineated in Ontario for purposes of data collection or surveillance. These regions conformed to existing administrative boundaries. Here the intent was to take advantage of data gathered previously. Later, ten regional plans were deemed too many for purposes of planning coordination, (i.e., some fluidity was to be gained if regional size within Ontario was increased), and the number of regions was reduced to five.

Figure 6
ORGANIZATION
REGIONAL DEVELOPMENT PROGRAM



In 1967, the Regional Development Branch commenced systematic data accumulation so that trends could be established. Sixty-three indicators of social and economic change were analyzed for the period 1951 - 1966.

It may also be noted here that a land inventory (similar to New York State's LUNR) has been established by the Agricultural Department in Ottawa under federal-provincial agreement. The intent is to use this information for gross land use planning in each province. Initially the Canada Land Inventory is looking at four criteria: (1) agriculture; (2) recreation; (3) wildlife; and (4) forestry. Eventually the inventory will be computerized for easy access and retrieval.

e) Control Enforcement of guidelines rests with the province. Enforcement is based upon the concept that development within approved areas will be guaranteed government supported services, (e.g., main access roads, utilities, schools, transportation facilities...), while development outside of approved areas will have no such guarantees. Primary control is thus established through the public spending power, though direct enforcement (police power) is also a possibility through existing law. Under such a situation, a developer might be denied the right to dispose of sewage, to bring in water, or to build high-rise. Injunctions, though rarely used, are also a possibility. Local appeal of provincial determinations is possible through a federally-appointed panel of arbitrators.

In reality the control function appears to be less firmly established in Canada than in the United States. The application of positive zoning has not been widely carried out, nor are there land use enactments other than the one cited regarding the Niagara Escarpment. Taxation has not been used as a regulatory device nor are there provisions for agricultural assessments.

In spite of these limitations, the action phase of the planning process has been initiated for the Toronto Centred Region, an area encompassing a 90-mile arc around Toronto. This region contains over half of Ontario's population and occupies a pivotal position geographically within the province. Let us examine the status of planning for this area.

f) Mediation

Principles

1) There should be linearity, or alignment, between growth nodes to facilitate major transportation links and allied services.

2) There should be a functional utility between urban and rural areas. Each has a contribution to make to the other. For example, one serves as a cultural source, the other as a source of outdoor recreation. Economically, complementary products are produced.

3) There should be linked sub-centers within the Region. This will foster decentralization.

4) There is need for open space land areas of recreation.

5) Resource conservation, of land, air and water is a necessity. (MacNaughton - pp. 4-6)

Goals

First	To encourage all parts of the region in the achievement of their overall potential, insofar as such encouragement is consistent with overall provincial development.
Second	To preserve the unique attributes of regional landscape.
Third	To minimize the urban use of productive agricultural land.
Fourth	To minimize pollution of water and the atmosphere.
Fifth	To encourage and maintain a pattern of identifiable communities.
Sixth	To provide the best possible accessibility for the movement of people and goods.
Seventh	To provide essential transportation, water and sewer facilities at minimum cost consistent with overall benefit.
Eighth	To maximize opportunities for using specialized services and facilities.
Ninth	To develop the region in a manner consistent with the needs arising from long term population trends.
Tenth	To develop the region in a manner consistent with the needs arising from social, economic, and technological changes.
Eleventh	To develop the region in a manner that provides flexibility for meeting future needs.

(MacNaughton, pp. 607)

Design

Three concentric zones have been delineated: (see Figure 7).

Zone 1. A lakeshore urbanized area. This is centered about the present metropolitan area.

Zone 2. A commutershed. The policy here is to retain a premium on open space, recreation and agricultural lands.

Zone 3. A peripheral area.

Provisions (as yet undefined for various reasons), have been made for a Parkway Belt system and for recreation areas. The unique feature of the Parkway Belt system is the concept of maintenance of wide corridors of open land, to provide transport and/or utility services and also to prevent communities from growing together into urban sprawl. The corridors will also serve as environmental buffers, to diminish noise and diminish adverse visual impact.

Status

Affirmation of principles of the Toronto Centred Region have been made as recently as April 1971. "The government has decided to endorse the principles of this basic plan as the guideline for provincial decision-making in the Toronto-Centred Region" (McKeough, p. 2).

g) Summary In summary, regional development in Ontario as evidenced by planning for the Toronto Centred region has begun. Much surveillance has been completed; mediation has been initiated. The fact that there is a plan - with general governmental and public support- speaks well for the process.

Three areas of potential weakness are noted:

1) While planning is integrated from a regional standpoint, it is not integrated from a resource standpoint. This is essentially a land plan. Regional planning should encompass land, water, and air planning.

2) As yet there has been little need for control. Ontario hopes that regulation can be effected through the public spending form of regulation, i.e., incentives. It is doubtful if this will be adequate.

3) The tempo of deleterious change in populations, urban sprawl, loss of agricultural lands, environmental damage calls for plan implementation at an early date. There is an urgent need to get on with the task.

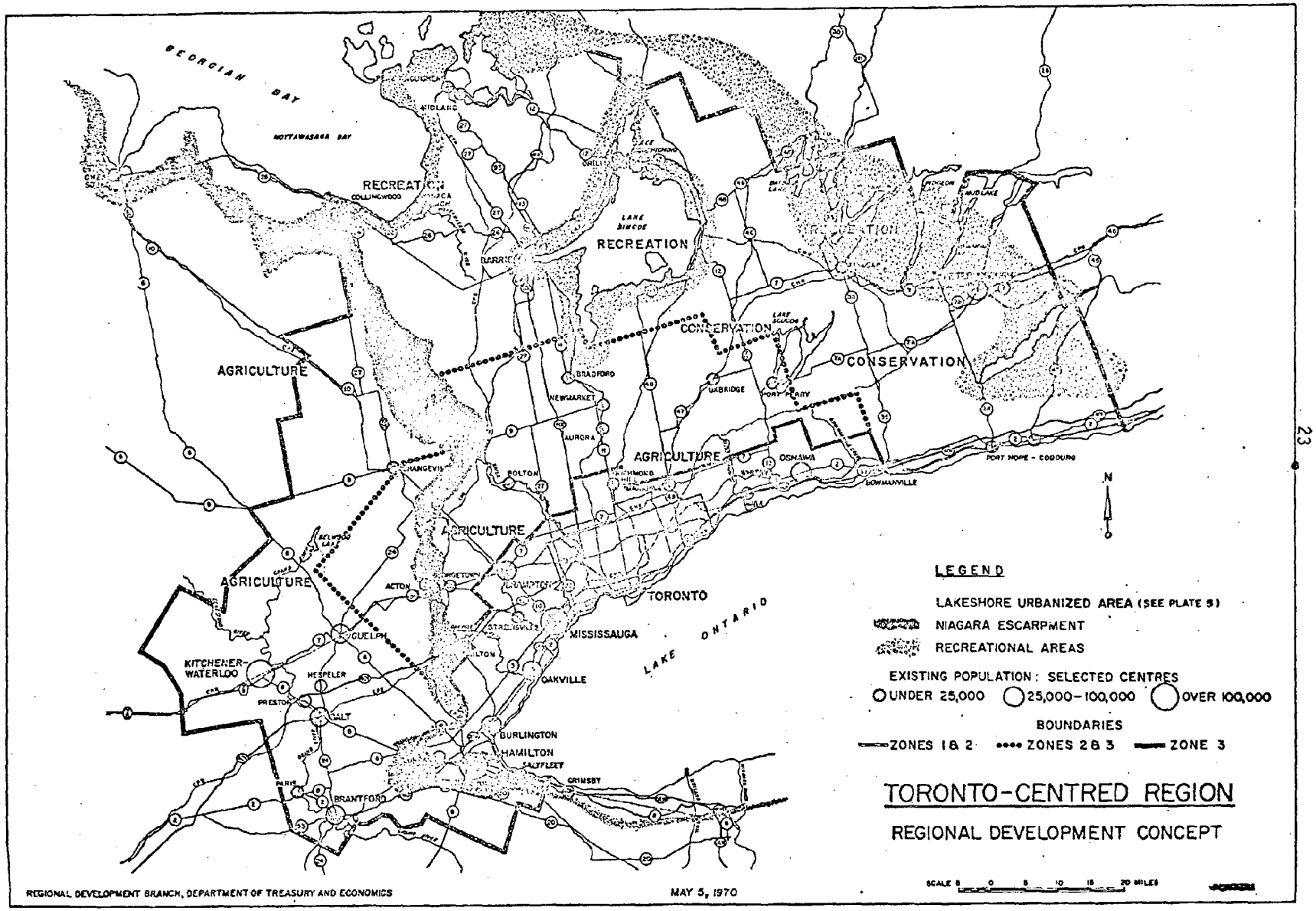

GEORGIAN BAY
NOTTAWASAGA BAY
RECREATION
COLLINGWOOD
BARRIE
LAKE SIMCOE
RECREATION
CONSERVATION
LAKE SCUGOG
CONSERVATION
AGRICULTURE
BRADFORD
NEWMARKET
UXBRIDGE
PORT PERRY
AURORA
AGRICULTURE
OSHAWA
PORT HOPE - COBOURG
BOWMANVILLE
KLEINBURG
BOLTON
AGRICULTURE
AGRICULTURE
ACTON
GUELPH
TORONTO
MISSISSAUGA
LAKE ONTARIO
KITCHENER-WATERLOO
HESPELER
PRESTON
CAMBRIDGE
OAKVILLE
BURLINGTON
HAMILTON
GRIMSBY
BRANTFORD
N
LEGEND
LAKESHORE URBANIZED AREA (SEE PLATE 5)
NIAGARA ESCARPMENT
RECREATIONAL AREAS
EXISTING POPULATION: SELECTED CENTRES
UNDER 25,000
25,000-100,000
OVER 100,000
BOUNDARIES
ZONES 1 & 2
ZONES 2 & 3
ZONE 3
TORONTO-CENTRED REGION
REGIONAL DEVELOPMENT CONCEPT
SCALE 0 5 10 15 20 MILES
REGIONAL DEVELOPMENT BRANCH, DEPARTMENT OF TREASURY AND ECONOMICS
MAY 5, 1970

Figure 7

IV ISSUES IN LAND USE REQUIREMENTS

1) Land Use Requirements - Urban Areas

a) Ontario In 1964 there were approximately 200,000 acres of built-up land in the Basin and adjacent to the lake, excluding areas such as Guelph and Barrie. The population density was 8,200 persons per square mile. (By way of comparison, the west side of Manhattan Island has a density of 160,000, while the density in an area zoned for acre lots would be about 1000). The gross residential area was estimated at about 120,000 acres. By the year 2000, land taken up for residential areas alone will total 260,000 acres. This does not include non-residential intensive uses such as transportation links, parks, industrial sites, shopping centers, and institutions.

Projected urban land use requirements to the year 2000 have also been made by MTARTS (Metropolitan Toronto and Region Transportation Study) for a region encompassed within a 60-mile radius from downtown Toronto. This area includes Guelph and Barrie but excludes St. Catherines and Niagara Falls. The results of these studies are briefly summarized in Table 1.

Table 1

	Built-Up Area (Acres)	Density (Persons/Sq. Mile)	Residential Area (Acres)
Low Density Assumption-2000	592,000	7,000	403,000
High Density Assumption-2000	412,000	10,000	223,000
1964	220,000	8,200	123,000

b) New York Allee's report projects urban land requirements for the following counties: Niagara, Erie, Wyoming, Orleans, Genesee, Wayne, Livingston, Monroe, Ontario, Yates, and Seneca. For projection purposes, these counties are taken to be representative of the Lake Ontario Basin area. For the 20-year period 1965-1985, requirements in acres are as follows: housing - 63,000; commercial and manufacturing - 19,000; other - 18,000. The derivation or original uses of this land is predicted to be as follows: openland - 59,000; cropland - 36,000; woodland - 5,000.

c) Observations It can be noted that over half the built-up area will go for residential uses. Typically, streets and highways rights-of-way

take up about 1/5 of the developed land, and commerce and industry, utilities, institutions, ... occupy another 1/10 to 1/5 of the land.

Zoning ordinances may in the future push minimum lot sizes to larger acreages. This will lead to lower densities and higher land use requirements. Even under extreme conditions, (low density assumptions), availability of land will not present a barrier to urban growth in the Basin in the foreseeable future. To the year 2020, more than 3/4 of the land will still be vacant or in parks. Core areas will of course have a very high percentage of developed land.

Despite the fact that there is ample physical space for urbanization, the costs associated with one type of development versus another must be evaluated on economic, social and preservation bases.

2) Conversion of Rural Land to Urban Uses

a) Introduction On the fringe of present urban areas, rural land, (agricultural, wooded and open), will be converted to residential and industrial uses. Some of this land will have a high production potential as measured in economic terms. Loss of this land will be in response to a higher marginal utility of the land for urban purposes. Loss of prime agricultural land, though perhaps unfortunate in many ways, will not result in a loss in total farm production. The slack will be taken up elsewhere. Loss of forested land will be offset by replanting in or exploitation of other areas. However, the value of rural land in the vicinity of cities is not to be measured in economic terms, but rather in their location in time and space when used in conjunction with planned development.

b) Causes of Change in Land Usage

Land Speculation

With increasing urban sprawl, land values on the periphery will continually increase, driven upward in value by the activities of speculators and land developers. The number of acres converted to urban uses is less than the conversion out of active agriculture. This implies land available for recreation, preservation and open space, but it also reveals the speculative pressures on the land. Urban growth in New York State has required some 10,000 acres of cropland annually. At the same time, land speculation has idled several times this figure of productive agricultural land in premature anticipation of urban development. (In New York State, some 200,000 acres are removed from active agriculture each year, the majority going to recreational activities.)

When projections are made for future land requirements for urban purposes, high and low figures are often given. Assuming a single

projected population figure, the difference in the land requirements can be considered to be the land idled by speculation.

Assessed Evaluation and Taxation

One of the undesirable effects of urban growth on the rural countryside has been the increase in the assessed value of the rural land as a result of reassessment of the land potential for suburban development. In a study involving some growth centers in the Lake Ontario Basin, Hind-Smith noted that agricultural land in urban shadow areas had assessed evaluations 40-60% greater than the farmland outside the shadows. Rural lands adjacent to new subdivisions will generally be taxed more heavily than in the past. For example, farmland may be taxed by a public service district for improvements such as sewer, water, lights and non-farm drainage. Under the provisions of the New York Agricultural Districts Law, farmers may band together to seek tax shelter from these types of taxes. They are also entitled to apply for agricultural value assessments on their land and thus exclusion from assessments based upon potential for development. (Farmers not in Agricultural Districts may also obtain agricultural value assessments by entering into contract yearly to keep their land in farming for a period of 8 years.) This legislation recognizes speculative pressures and inequities in land assessments and offers alternative actions to individuals affected. Similar legislation may be needed in Canada.

Higher taxes and speculation combine to idle thousands of acres annually in the Lake Ontario Basin. These financial pressures are engendered by urban sprawl. In this respect, urban growth accelerates the conversion of rural land to non-rural uses. Land is placed on the market in response to financial pressures which are in turn caused by urban growth. The process feeds on itself.

In a study of the Niagara Fruit Belt, Krueger has traced the detrimental effect of these pressures on prime agricultural land. In the future it will become increasingly important to protect such land, to ensure its ability to compete, and to retain its present character so that the undeveloped land will serve as a source of enjoyment and recreation for rural and urban dwellers alike.

c) Measures of the Conversion of Rural Land to Urban Uses Several studies in the United States and in Canada have quantified the trade-offs between growth of urban areas and loss of rural land. The methodology for this type of study was pioneered by Donald J. Bogue, who posed the question, "...how many acres of land are removed from agricultural production per 1000 population increase?" The answer to this question might be sought in one of two ways: (1) Determine population growth and growth of urban areas; and (2) determine population growth and loss of land in non-urban uses. Although it may seem indirect, the latter approach is preferred in that it underlines the

impact of urbanization upon potential loss in food production and also the social impact due to loss of open spaces. Simply, Bogue and others have noted population growth from one census to the next and have related it to loss in acreage of agricultural, open, and forested land in the vicinity of metropolitan areas.

One may rightly ask if a direct cause and effect relationship exists? Certainly not all the exodus from the farming scene is directly related to urban growth even in areas adjacent to cities. Some farms are no longer operated because they are simply uneconomical. But it has been shown that the greatest loss of farmland is closest to the central city and the loss decreases as the distance from the core increases. Clawson, et al., have shown that for every two acres withdrawn from rural use, only one goes into development. A primary cause of this is the speculative pressures on the land applied in an economic sector where returns are only marginal. Also, one might add to this the effect of rapidly rising property taxes in rural areas adjacent to the cities. Thus, although there are other factors contributing to conversion of rural land to non-rural uses, the most likely cause, in and around growth centers, is urbanization and industrial growth and the pressures created by them.

Ontario

In Canada, Crerar has made a study of the loss of farmland associated with population increases of major metropolitan areas. Table 2 presents a portion of his findings obtained for the years 1951-1956.

Table 2

Metropolitan Region	Loss of Farmland (Acres) per 1000 population increase
Ottawa	1001
Quebec	1000
London	458
Winnipeg	383
Toronto-Hamilton	382
Montreal	374
Windsor	192

For example, in the Toronto-Hamilton area, 382 acres of land were converted from farmlands to non-rural uses, commensurate with a population increase of 1000 people. The acreage loss including forested and open land would be in excess of this.

The question then arises as to how much of the loss of farmland is actually required and how much can be considered waste? Crerar (p. 131) states that Vancouver has planned for growth at the conversion rate of "108 acres per 1000 population increase under what are considered to be very generous planning standards." If these standards are to be applied to the Toronto-Hamilton region, 2.74 acres are wasted for each acre consumed. The effect upon agriculture in the area and upon Canadian agriculture as a whole is apt to be sizable.

Ralph Krueger has made a well-known study of the effect of urban encroachment upon the Niagara Fruit Belt. This is that sector of the Province of Ontario on the western shore of Lake Ontario. He notes a recent acceleration in the retirement of this land from agricultural purposes. This could be especially damaging in that the area accounts for 25% of the gross value of Canada's fruit production. (The area accounts for 80% of Canada's grape acreage, 60% of the peach acreage, and 50% of the plum, pear and cherry acreage.) Alternative production areas are scarce or nil. Alternative measures are to import fruit from the United States.

The phenomenon of urban development encroaching on agricultural land cannot be viewed in purely economic terms. To do so is to give undue weight to the economic gain resulting from the advent of urban and industrial development in a given area. Other important values are those of preventing unplanned growth, of insuring open space, and of making cities livable. Moreover, if urban growth could be planned, there would be provision for complementary agricultural and metropolitan sectors, leading to economic and social advantages for people in both.

The reasons given for conversion of land in the Niagara Fruit Belt are similar to those given for other areas. Increasing property taxes and soaring land prices combine to induce the farmer into selling his land. Land price increases can in many cases be attributed to speculation. With this in mind, even the progressive farmer will be reluctant to make improvements (say new trees) on his land with repayment perhaps five years hence. He may opt to sell his land, or simply to sit tight. Consequently, a side effect of speculation may be a decrease in overall productivity.

As yet there is no legislation designed to relieve farmers in Ontario of the price-cost squeeze. Nor do farmers seek this. Growers are in general opposed to provincial planning which might in some way limit their right to sell their land for a high price. Some have proposed land use legislation to relieve growers in the area of the financial pressures presently exerted. If planned growth is to take place, this may be a necessity.

New York

A study has been done in New York State by Allee, et al., which follows the Bogue approach and parallels Crerar's work in Canada.

Allee surveys past trends in population growth and demand for developable land and uses these to develop land use projections for 1985 based upon the rate at which rural land was in the past converted to urban uses.

The basic premise in the methodology, that demand for developable land will continue as it has in the past should be questioned. Future trends may favor apartment dwelling near the place of work or recreation. This will in part be influenced by commuting times and distances. These trends, if they materialize, will increase population densities and may reduce the requirement for land conversion.

Allee's study presents figures for the conversion of land for selected areas in the state including Buffalo and Rochester. The coefficients derived represent the amount of rural land in acres which were required to support conversion from a rural to an urban use, given population changes for the period. Coefficients for 1951-1966 for 78 sample towns surrounding Buffalo, Rochester, Syracuse, and Albany were as follows:

		Acres per 1000 population increase
New Use (demand)	Housing	114
	Commercial and Manufacturing	37
	Other	42
		193
Original Use (supply)	Open land (rural non-farm, idle)	100
	Cropland (active agriculture)	81
	Woodland	12
		193

Since more cropland surrounds Rochester than the other three cities, the rate of conversion of cropland would be expected to be greater for that city. Similarly, if the area between Buffalo and Rochester were to go urban, it might require a higher percentage of cropland than the figures above would indicate.

Unfortunately, Allee's study does not indicate the amount of land converted from active agriculture or woodland to openland, and thus not used for development. This would be an indirect effect of urban growth, and an indication of speculative pressures. The amount of land idled in this manner can thus be thought of as a measure of speculation for a rural area surrounding a growth center. Figures which Crerar cities for Canada include this component, (idled land). Thus, the coefficients are higher.

d) Future Trends in Urban Growth Projections into the future generally allow for high and low density residence assumptions. Neither assumption denotes anything with regard to the quality of the living

environment. People's preferences in the future may favor, to a greater extent, apartment or high density living areas surrounded by open spaces, in contrast to the present pattern of homes on individual parcels of some fraction of an acre each.

Allee's work, supported by others, indicates that smaller cities consume more land on the urban periphery than do larger cities. Stated in another way, this means that as population increases, smaller and smaller increments of land will be required to support the population growth. This hypothesis, coupled with the high density living preference just mentioned, indicates that one should not project land use trends forward without first considering the decreasing successive requirements for land as the urban population grows. Here it might also be added that if, in time, a circular growth center doubled its radius, the area contained would be quadrupled. Thus, a 100% increase in the radius of a city will allow for a 400% increase in the carrying capacity of the land for urbanization, other factors being equal.

Although the urban growth process actually requires less and less land per capita increase in population, urban growth pressures accelerate the conversion of land from rural to non-rural uses. The effect of this phenomenon can be to remove many thousands of acres from economically productive purposes. Some of this land will in the future be bought by local governments for purposes of creating permanent open space land. In Massachusetts, the city of Lincoln has found it cheaper to buy up vacant land for green belts rather than pay for the services that new houses on the land would require.

e) Conclusions - Urban Land Use Requirements and Land Conversion Issues Figures have been presented which highlight past trends and project future requirements for land in the Lake Ontario Basin. Urban demands for land will increase requiring removal of land from agricultural purposes. Much land will be idled in response to speculative pressures coupled with high taxation and poor economic returns. There will be ample rural land to permit unrestricted development. This is wasteful. If provision is made to purchase idled land to be set aside as open space land, urban sprawl will be contained and the quality of life for society will be enhanced.

3) Impact of Land Use Trends on the Environment

a) Water Both urbanization and intensive agricultural production contribute to potential water pollution hazards. Intensive agricultural activities, for example feedlots, can lead to excessive concentrations of pollutants in ground waters or to odor and manure disposal problems. Excessive use of fertilizers or pesticides can be a problem since the ultimate sink for water-entrained pollutants from the Basin is the lake itself.

It is impossible to legislate lake pollution standards without first establishing land use controls. The necessity for such control is becoming more widely understood in the United States and in Canada. Unfortunately, other public priorities, particularly in the United States, have retarded needed action in this area. Nevertheless, the 1972 Canada-U.S. Great Lakes Water Quality Agreement may promote eventual joint, coordinated efforts in land use management. This is an essential goal because land use cannot be separated from the management of the water resource (Lake Ontario).

Viewed from the perspective of the total lake environment, as a resource for recreation, fisheries, navigation, municipal use, and so forth, we must be alert to the stresses imposed by dense population centers adjacent to the lake. Prudent management of the land is the only effective solution to protection of the water resource.

b) Land Where intensive agricultural operations exist adjacent to urban areas the environmental stresses may become particularly acute. This may be partially offset by the desirability of having open spaces adjacent to urban areas. There is much that technology and education can do to minimize potential problems.

This is not to say we should become complacent on this issue. Some of the best scenic areas are developed and spoiled with little regard for public access and use by future generations.

Due to migration into the area, population will increase. There will be increased need for land and water-based recreation facilities and for other amenities which must be provided within the context of regional planning for the area. This dictates a higher degree of land management than that existing today.

V THE LAND AND THE FUTURE

1) Urbanization

For the purposes of this report, urbanization includes the following land uses:

1) Housing

2) Industry, manufacturing, warehouses

3) Commercial districts, shopping centers, and retail businesses

4) Recreation facilities, parks

5) Street and highways, parking facilities

6) Transportation facilities - airport, railroads

7) Utilities - power lines, water and sewage facilities and transmission lines

8) Institutions - universities, hospitals

Additional examples of land indirectly affected by urbanization are the following:

1) Undeveloped subdivisions - land subdivided but as yet not developed;

2) non-farm ownership of rural land, i.e., ownership for speculative purposes;

3) farmland for sale for urban purposes; and

4) assessment of farmland on the basis of potential for development.

Areas in these four categories are sometimes called "urban shadow land."

In the future, the trend toward complete urbanization will be countered in part by a concern for the environment. As in an ecological chain, the balance is a precarious one. Certain types of development will irrevocably set into motion the urbanization of an area. For example, a proposed trunk sewer line running the length of the Niagara

Fruit Belt area would seal the fate of that region. The same cannot be said of a major transportation route, e.g., the Queen Elizabeth Way. Main roads which link large commercial centers do affect the economy of the region they traverse. But they may affect it in ways that do not necessarily result in urbanization.

2) Open Space Concepts

Why should areas in the Basin and elsewhere be spared from complete urbanization? Phrased another way, one might ask, what is the value of open space land?

a) More People - More Leisure The United States will have more than 300 million people by the year 2000. Rochester and Buffalo will grow by more than 200,000 and 300,000 people, respectively in the next 15 years. The Mississauga complex is expected by some to increase by 1.5 million people in the next 15 years. These larger populations coupled with more leisure time will surely spell more use of recreational facilities. Simply maintaining the present ratio of recreational acreage to population will not suffice to accommodate recreational demand because people will (presumably) have available more leisure time. The pressures will be great for placing large areas into recreational use. The National Recreational Association which formerly recommended at least 10 acres of metropolitan park space per 1000 population, now suggests a minimum of 15 acres.

b) Concern for the Environment This concern has been growing among citizens of both countries. There is a strong movement to reserve lands within urban areas for conservation purposes. Cited are areas such as creeks and flood plains (both for scenic values and to reduce the need for expensive flood control projects). Urbanization threatens not only scenic areas but it also endangers the existence of wetlands. The wetlands are major sources of food and are breeding grounds and the favored habitat of an enormous variety of birds, fish and other wildlife. These land areas are generally low-lying and historically cheap in land market value. They offer the builder certain cost and location benefits for development which are frequently in direct conflict with ecological concerns. If used intelligently, they can serve as recreational areas or as physical barriers to unrestricted development.

c) Pollution Control Open space land may ameliorate pollution of two types. Visual pollution, a resultant of unplanned urban and suburban development, can be prevented or reduced by leaving certain acreage undeveloped to serve as barriers to unrestricted growth and also perhaps as transportation and utility corridors. Physical pollution of the land and the lake may perhaps be lessened by reduced density of urban populations. There is a growing awareness on the part of concerned citizens that in the future there will be a difficult

trade-off between absorbing the externalities of pollution and paying the high costs of keeping open space land out of private hands. In addition to ensuring a future adequate supply of recreational opportunities, the public may demand appropriate control over urban sprawl and other forms of pollution.

3) Mechanisms to Counter Urbanization

Actions have been initiated on both sides of the border to thwart complete urbanization. In New York, Agricultural Districts legislation provides an opportunity for agricultural land to remain competitive in the face of speculation and soaring assessments. It is precisely this question of "rent" - that is, economic return from the land versus speculation and taxation which exercises the major control over changes in land use patterns. Agricultural Districts are a mechanism to supress speculation and taxation based upon potential for development. No doubt the New York approach will undergo many adjustments over time in order for it to become and remain an effective counterbalance to speculation and taxation. What is important, however, is that it is a start.

Ontario has developed a somewhat different approach. Design for Development is a regional planning program reflecting current thinking concerning economic and social growth in the province. As pointed out above, DFD has established provincial guidelines to be enforced at local levels in order to achieve balanced growth commensurate with planned urbanization incorporating open space and corridor concepts.

DFD is a dynamic process involving continuous re-examination of objectives and means to help secure and maintain a desirable standard of living for all Canadians. As in the case of New York's Agricultural District legislation, it represents only a beginning. And like the New York mechanism, it reflects a consensus on the part of politicians that planning for growth is an absolute necessity for the years to come. One can be sure that political interest in the planned growth process will expand, not diminish, in the future. (One can also cite recent land use control legislation in Hawaii, Wisconsin and Vermont.)

Unfortunately, broad scale regional planning in New York State has not proceeded as rapidly as in Ontario. In 1973, Ontario has the goals but lacks effective means of achieving planned growth. New York has codified one means, but her planning processes lack the scope of those evidenced in Canada. It would seem that both New York and Ontario would stand to gain from a joint review of each other's experiences to date in the matter of land use control.

What can be done to make land planning more effective?

1) Improve the skill of planners through research and education.

2) Institutionalize the planning process at all government levels - organize for broad scale regional planning.

3) Sharpen surveillance systems to give better information re: economic analysis, ecological impact, human desires.

4) Provide enforcement mechanisms such as voluntary conservation agreements, land use zoning, control over public improvements, pricing of public services, changes in tax laws, purchase of open space land.

5) Make the financial commitment to achieve these ends.

4) Proposed Binational Approach to Land Use

One might raise the possibility that planning goals and mechanisms might be made uniform or at least compatible over the land area in Canada and the United States within the Lake Ontario Basin. No doubt there would be considerable international hurdles to overcome. But the areas of commonality between the two countries and provinces (states) stand out. If such an arrangement could be made to work anywhere in the world, it would seem that it could be made to work here. The effort required to bring it about would be prodigious, but the rewards would be great. Open land in New York could be held in trust for urban centers in Hamilton, and Toronto. The Niagara Fruit Belt area in Canada could continue to be a preferred cite for tourism from both sides of the border. Wilderness areas north of Toronto would continue to be protected for citizens of both nations. Growth centers such as Buffalo and Toronto might somehow be made more available to citizens of the other country as centers for commerce, culture, education and housing.

A comprehensive, binational development plan is needed to optimize land planning around Lake Ontario. Political realities make international land regulations unlikely. However, the Great Lakes Water Quality Agreement has placed an interesting new dimension on international cooperation for water pollution control. Since water pollution is intimately tied to land use, there is reason to believe that cooperation, coordination and standards can be discussed, fostered and eventually adopted with respect to use of the land.

VI DISCUSSION

1) Conclusions

The pressures for development around the lake will increase in the future. Private housing has and will continue to exercise the greatest demand on lake shore property. With increasing affluence, our nations' populations will demand more recreation areas for their leisure time. In addition to housing and recreation requirements, industrial and municipal requirements will sustain the present pattern of exploitation of the land and water resources about the lake. Industry will be attracted and held by water transportation facilities. Electric power producers will be attracted by the availability of vast amounts of water for cooling purposes. But cities and industries can no longer continue to regard the lake as a sink in which to dispose of their wastes.

What is called for is multi-resource management. Multi-resource management of the water places heavy emphasis on the land. There is need to view all water resources from the perspective of the land and to manage the land resources from the perspective of the lake. The value of the land for social and economic activity is strongly influenced by the benefits afforded by the lake-navigation, recreation and natural beauty, among others. Thus, the land must be managed to control or eliminate the pollutants and to promote in general, the quality of life.

Since land from two nations fronts on the lake, joint management becomes essential not only for the lake itself but also for the land resources in both countries which affect the lake. The precedent for binational cooperation in lake management has been established by the 1972 Water Quality Agreement. This type of cooperation, both in concept and administratively, may be extremely important as a model for international cooperation for resource management.

Beyond national control and international agreements, there is a basic need for increasing public participation at all levels of the decision-making process. The most important benefits of participation are apt to be reflected in changes in human values as these affect the environment.

The prediction can be safely made that society, both rural and urban, will be concerned enough to insure a heritage of rural, urban-open space development. In the future, as leisure time presumably increases, there will be more time available for participation in local and community government. Some of the individual participation will be directed toward developing a desirable quality of life for the generations to come. This will inevitably involve improving the planning processes relating to the use of our land, water, and air resources.

2) Summary

1) The Lake Ontario region, especially in Canada, is one of dynamic economic and population growth.

2) Growth will create new dimensions in environmental stresses on the land and water resources. These stresses can adversely affect the quality of life in the Basin.

3) Water management is inexorably linked to land management in the Basin.

4) Land planning is essential to achieving an acceptable package of resource controls.

5) There exists a gap between availability of land use controls and their exercise to promote integrated resource management.

6) To date, there has been a notable lack of effective, joint planning goals, surveillance and action between the United States and Canada.

7) There is need for joint Canada-U.S. consultation on land use controls in order to facilitate the achievement of agreed-upon water quality standards for the lake.

3) Recommendations

1) Binational cooperation should be strengthened to foster management goals for the region.

2) There is need for establishment of a joint information gathering system, first to gain insight into problems, and secondly to reinforce existing bilateral cooperation.

3) Future recommendations for water resource management in the Basin should be closely tied to management practices on the land.

4) There is a need for a comprehensive and binational land use system to prevent indiscriminate land use, to save fragile lands and to support unique productive lands.

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