

**MEMPHREMAGOG
CONSERVATION**

ENVIRONMENTAL LAND USE GUIDE



**of the
LAKE MEMPHREMAGOG
WATERSHED**

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ENVIRONMENTAL
LAND USE GUIDE
OF THE
LAKE MEMPHREMAGOG
WATERSHED

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Memphremagog-Conservation, Inc.
P.O. 384, Place d'Armes,
Montreal, P.Que. H2Y 3H1

Environmental Dimension Ltd.
434 St-François-Xavier
Montreal, P.Que. H2Y 2T3

COLLABORATORS

DIMENSION ENVIRONNEMENT LTEE PERSONNEL:

| | |
|-------------------|---|
| Project director | J.P. Lamoureux |
| Project manager | Pierre Legendre |
| Research | J.P. Lamoureux Serge Lanois Pierre Legendre |
| Cartography | Frédérique Tugault |
| Diagrams | Françoise Cartier Geneviève St-Pierre |
| Typing and layout | Ginette Richer |
| Editorial | J.P. Lamoureux Pierre Legendre |

OUTSIDE CONSULTANTS:

| | |
|---|--|
| Université du Québec à Montréal | Pierre Dansereau |
| McGill University | William Leggett |
| Ministère de l'Environnement du Québec | Tony Le Sauteur |
| Translation | G. Gordon Kohl J. Peter Weldon John C. Boynton |

CLIENT:

| | |
|---------------------------------|----------------|
| Memphremagog-Conservation, Inc. | G. Gordon Kohl |
|---------------------------------|----------------|

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1. INTRODUCTION

1.1 Memphremagog-Conservation, Inc. (MCI)

MCI is a private, non-profit organization, founded in 1967 and incorporated the next year. It pursues the following objectives:

- to preserve the natural resources of Quebec in order to improve the quality for the general benefit;
- to cooperate with other agencies in Quebec, Canada and the United States having similar interests;
- to promote:
 - a) air, soil and water pollution abatement;
 - b) the protection and conservation of plant and animal life;
 - c) the prevention and correction of problems caused by soil erosion;
- to carry out scientific research and provide educational services;
- to promote the adoption of laws and regulations for the protection of the environment.

The work of MCI is sustained through the voluntary contributions of over 1,000 members, both American and Canadian. It is in constant touch with the environmental authorities of Quebec and Vermont, as well as with representatives of the various federal agencies in Ottawa and Washington.

MCI is primarily interested in the pollution problems of the Lake Memphremagog basin. Since its beginnings, it has invested over \$200,000 in the realization of programs dealing with water quality. The anti-pollution by-laws in many parts of the Eastern Townships were prepared with the participation of MCI. Part of the cost of sanitary inspection in the municipalities surrounding the Lake was subsidized by MCI. At the outset of the 1970's, the first courses offered in Quebec in the field of sanitary inspection were given by the Quebec government in collaboration with MCI.

MCI, a founder of the "Federation of Associations for the Protection of the Environment of Lakes of Quebec" (FAPEL) in 1975, also participates in the Programme des lacs of the Direction de l'Aménagement des lacs et cours d'eau of the ministère de l'Environnement du Québec. Every summer since 1972 it has employed students in clean-up work and public education: known as the "MCI Patrol".

For a decade now, MCI has been actively engaged in the environmental aspects of land use planning and it was only natural that, with the advent of the MRC's, it became more closely involved in regional planning.

1.2 MRC de Memphremagog and the regional development plan

The Act respecting land use planning and development (Bill 125),⁽¹⁾ assented to on November 21, 1979, establishes the framework within which rules governing land use planning and development in Quebec are to be prepared and imposes on the regional municipal counties (MRC) the responsibility for their preparation and implementation.

In the autumn of 1980, the government undertook a tour of the regions of l'Estrie and of Mississquoi, during which concerned organizations (municipalities and local organizations) could explain their positions on the shape and representation of a future MRC in the Lake Memphremagog region. MCI presented a brief, prepared by the Centre de Recherche en Aménagement Régional de l'Université de Sherbrooke, entitled "The Lake Memphremagog Region and the Application of Bill 125". And in December 1981, the Quebec government created by decree the "Municipalité Régionale de Comté de Memphremagog". The territory of this MRC, as recommended by MCI, includes almost the entire drainage basin of Lake Memphremagog. Lake Massawipi and part of its basin are also included (fig. 1).

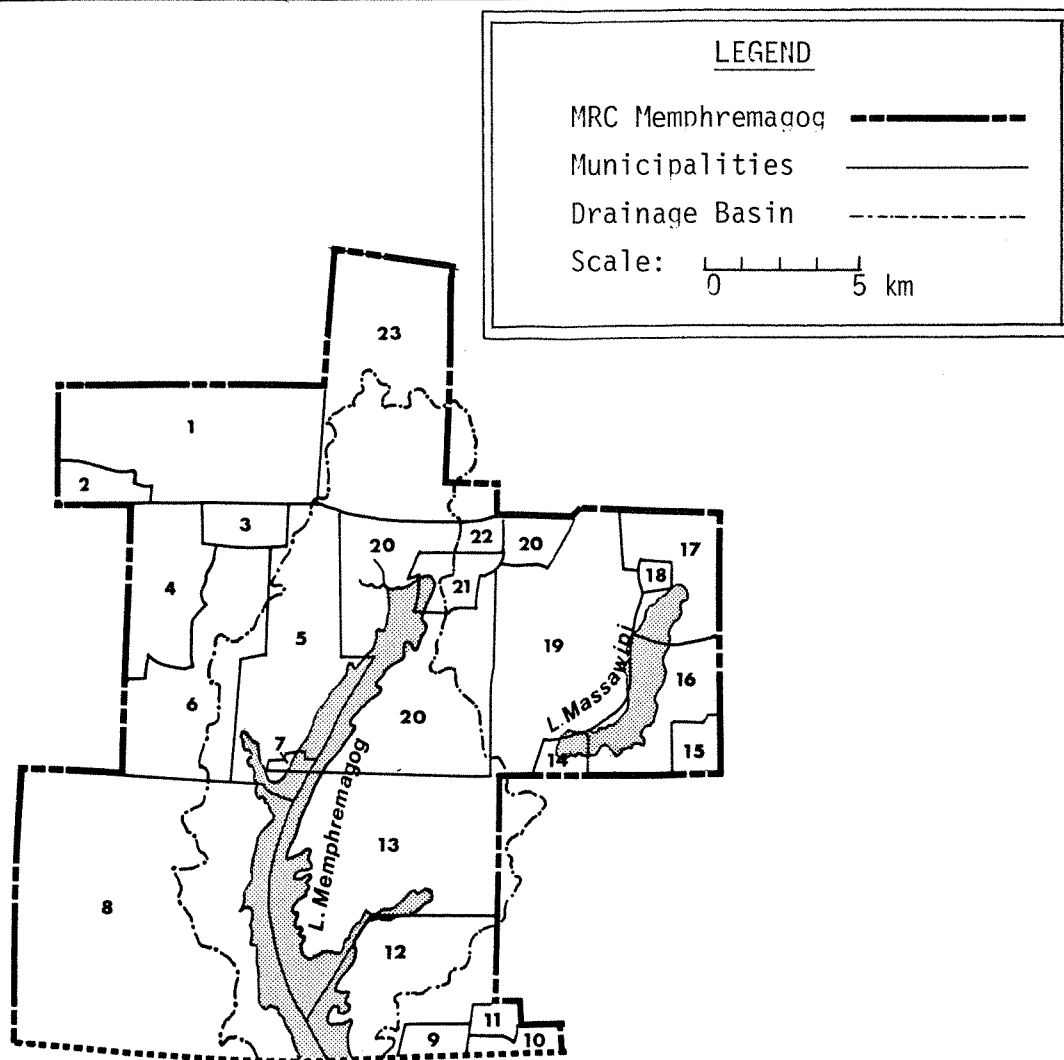
By the end of 1986, the MRC de Memphremagog must have adopted a development plan covering the overall development orientation and land use of its territory. Subsequently, each municipality composing the MRC will have two years within which to adopt an urban plan along with zoning, subdivision and building by-laws in conformity with the objectives of the regional development plan. Section 6 of the law provides that a development plan may include general standards which the zoning, subdivision and building by-laws must take into account. Throughout this process, the law provides for public consultation by way of public meetings.

It is within the context of this consultation process that MCI is approaching the MRC de Memphremagog.

1.3 The Environmental land use Guide

This Guide is addressed primarily to the representatives of the MRC de Memphremagog and the 23 municipalities which make it up. However, the information it contains may also be of interest to any group or individual interested in regional planning and environmental protection. Indeed, it is an attempt, above all, to bring together, in the form of a concise and handy document,

(1) S.Q. (1979), chap. 51



- | | |
|------------------------------|-------------------------------------|
| 1. Stukely-sud (SD) | 13. Stanstead (CT) |
| 2. Stukely-sud (VL) | 14. Ayer's Cliff (VL) |
| 3. Eastman (VL) | 15. Hatley (VL) |
| 4. St-Etienne-de-Bolton (SD) | 16. Hatley-ouest (CT) |
| 5. Austin (SD) | 17. Hatley (CT) |
| 6. Bolton-est (SD) | 18. North-Hatley (VL) |
| 7. Saint-Benoit-du-Lac (SD) | 19. Sainte-Catherine-de-Hatley (SD) |
| 8. Potton (CT) | 20. Magog (CT) |
| 9. Beebe Plain (VL) | 21. Magog (C) |
| 10. Rock Island (V) | 22. Omerville (VL) |
| 11. Stanstead Plain (VL) | 23. Orford (CT) |
| 12. Ogden (SD) | |

| | | | |
|------|---------|--------------|------------------|
| Key: | C: City | VL: Village | SD: Undesignated |
| | V: Town | CT: Township | |

Figure 1: The territory covered by the drainage basin of Lake Memphremagog is almost wholly located within the limits of the Municipalité Régionale de Comté de Memphremagog

essential environmental guidelines which, if applied, should ensure the ecological stability of the territory, that is, to maintain its standard of quality. The guidelines contained in the Guide are either of a general nature or more specifically applicable to certain circumstantial elements of the landscape (forests, agricultural land, vacation housing zones, etc.).

2.

SECTOR UNDER STUDY

The drainage basin of a lake is the area which receives all the rain waters ending up in the lake after run-off. It is thus logical that the control of the water quality of a lake depends on the rational development of its basin. In certain countries, such as France, the geographical unit used for regional planning is the hydrographic basin. For the same reason, the drainage basin of Lake Memphremagog, as delimited by the Direction générale des eaux of the ministère des Richesses Naturelles in 1978, constitutes the area to which the study is directed.

It should be noted that its vast American portion, not coming under the same jurisdiction, has been omitted. However, it should also be noted that the bulk of the guidelines will be equally applicable there. Moreover, the Vermont regulations already include a certain number of them.

3. MAIN FEATURES OF THE BASIN

Lake Memphremagog, one of the largest in the Eastern Townships, is situated some 130 kilometres to the east of Montreal. Elongated in shape, it spans the border separating Quebec from Vermont, on a north-south axis. Three quarters of the Lake are in Canadian territory, compared to only one quarter of the area of its water basin (fig. 2). Certain statistics indicative of the nature of the Lake are to be found in Table 1.

Some 26 tributaries supply the Quebec portion of the Lake. In addition to Lake Memphremagog, some fifteen lakes are located in the territory, including Lake Lovering which, with its 4.6 square kilometres, is the largest. The waters leave the basin at the northern limit of the Lake, flowing into the Magog River.

The drainage basin of Lake Memphremagog is situated in the physiographic region of the Green Mountains, one of the elements of the Appalachian massif. In its western part lies the Sutton-Orford chain of mountains. In the Eastern part, the land is more rolling and the only major topographical element is the escarpment of Bunker Hill.

Table 2 underlines the importance of the wooded part of the basin. The landscape quality is high, which favours the reputed recreational and tourism vocations of the Lake, which attracts more than 10 000 vacationists annually. The country residential and recreational zones occupy only 3% of the territory (excluding Mount Orford), but are almost entirely confined to the lakeshore. It is estimated that more than 1500 cottages ring the shorelines of Lake Memphremagog and about 600 the shores of Lake Lovering.

Agriculture is practised on about 14% of the surface of the basin, an impressive figure. This activity is declining, however, relative to vacation uses. The urban zones are found almost exclusively at the north end of the Lake: Magog and Plage Southière. Several hamlets are to be found, scattered around the territory, of which Georgeville, Fitch Bay and Austin are the best known.

Easy access to the region and its proximity to important urban centres (Sherbrooke, Montreal) is likely to increase the tendency toward the recreational development of the Lake Memphremagog drainage basin. However, the tourism potential of the Lake depends, for a large part, on the quality of its water. But this lake is already showing definite signs of eutrophication, that is, of premature aging, particularly in the south part of

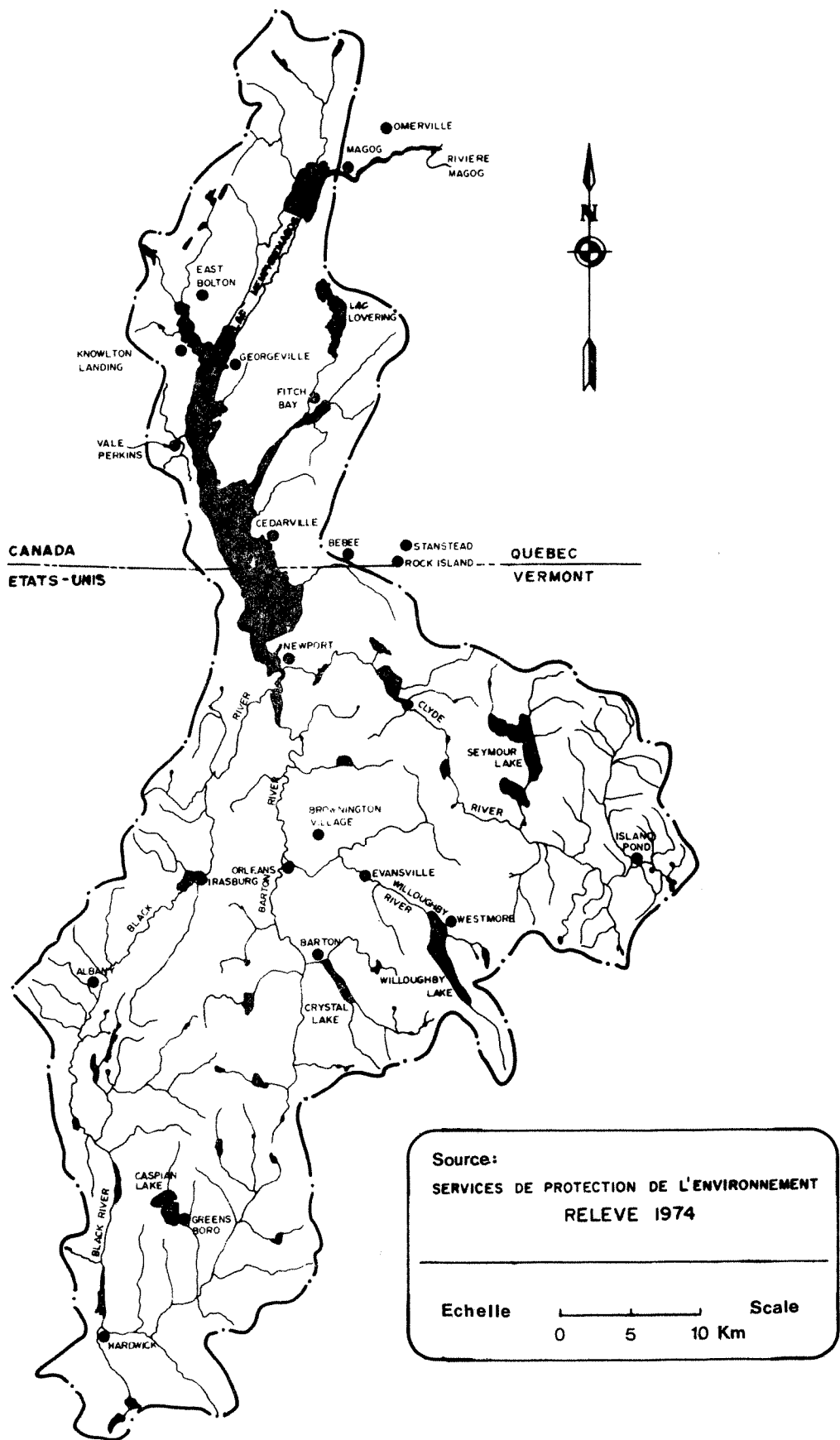


Figure 2: Three quarters of Lake Memphremagog are in Quebec, in comparison with one quarter of the area of its basin.

Table 1: Salient data of Lake Memphremagog/
 Dimension Environnement Ltée (1977),
 ministère des Richesses Naturelles (1978),
 Régie des eaux du Québec (1971) and
 Service de Protection de l'Environnement du
 Québec (1974).

| | |
|-------------------------------|--------------------------------|
| Maximum length | 53 kilometres |
| Maximum width | 4 kilometres |
| Perimeter | 121 kilometres |
| Total area | 102 square kilometres |
| Quebec area | 74 square kilometres |
| Maximum depth | 107 metres |
| Volume | 1.7×10^9 cubic metres |
| Renewal period | 700 days |
| Height above Sea level | 208 metres |
| Total area of drainage basin | 1,764 square kilometres |
| Quebec area of drainage basin | 433 square kilometres |

Table 2: Land use in the Quebec portion of the water basin of Lake Memphremagog/ministère des Richesses Naturelles (1978).

| TYPE OF USE | AREA Km ² | RELATIVE IMPORTANCE (%) |
|---|-------------------------|-------------------------------|
| Forest and woodlot | 311.0 | 71.9 |
| Old fallow land | 9.1 | 2.1 |
| Unimproved pasture and recent fallow land | 21.6 | 5.0 |
| Neglected hay and pasture | 10.6 | 2.4 |
| Field crops; rotation and permanent pastures | 49.0 | 11.3 |
| Producing orchards | 0.5 | 0.1 |
| Market gardens | 0.02 | - |
| Urban and para-urban uses | 5.8 | 1.3 |
| Recreation, vacation housing | 14.6 | 3.4 |
| Pits and quarries | 0.6 | 0.1 |
| Swamps, marshes, undeveloped and treeless peat bogs | 2.2 | 0.5 |
| Expanses of water | 7.9 | 1.8 |
| TOTAL | 433.3 | 100.0 |

the Lake: the result of the importance of agriculture in the American portion of the basin and of sewage disposal by the City of Newport. Although the physico-chemical quality of the water of the Lake is generally good, its load of nutrient matter is occasionally so high that it sometimes causes algal blooms, seriously affecting the esthetic quality of the water and discouraging its recreational use.

REFERENCES

- Dimension Environnement Ltée, 1977. Relevé de la végétation et évaluation du degré d'artificialisation du lac Memphremagog, secteur sud-est, municipalité de Stanstead, volume 1. Service de protection de l'environnement du Québec, Montréal.
- Ministère des Richesses Naturelles, 1978. Etude sectorielle du lac Memphremagog (calcul des apports en phosphore et inventaire des potentiels écologiques). Direction générale des eaux, Québec.
- Office de Planification et de Développement du Québec, 1978. La problématique de l'Estrie - Région 05. Collection: Les Schémas régionaux, OPDQ, Québec.
- Régie des Eaux du Québec, 1971. Etude de la qualité des eaux du lac Memphremagog - résumé de rapport. Publication no. 39A.
- Service de Protection de l'Environnement du Québec, 1974. Qualité des eaux du lac Memphremagog, étude complémentaire, SPE, Québec.

The first step in the process comprises the selection of types of terrain to which our environmental guidelines are to apply: nine types are important:

- forest:
this includes only real timber land;
- agricultural land:
meaning crops, pasture, horticultural production, orchards and fallow land, where agricultural activity has ceased but reforestation is not completed;
- vacation housing zones;
- recreation zones (parks, golf courses, campsites, etc.);
- urban and para-urban zones:
permanent residences, commercial zones, industrial parks and institutional zones;
- wetlands:
swamps, marshes and peatbogs;
- extraction zones:
active quarries and pits;
- sanitary dumpsites;
- roads, highways and autoroutes.

This selection is drawn mainly from the classification established by the Office de Planification et de Développement du Québec (OPDQ) and the ministère de l'Agriculture, des Pêcheries et de l'Alimentation for a map of land use on a scale of 50 000:1 prepared in 1977. We have followed this with a brief updating of these maps through interviews with municipal officers and local residents, on-site visits and a study of cartographic documents. However, the extent of the region under study, as well as budgeting constraints impose certain limits on the accuracy of this review. But this poses no major problems, since our work is essentially intended to serve as a point of departure in the development of adequate municipal regulation.

For each type of terrain, we have, through interviews and reviews of the literature, sought out the environmental guidelines recommended by experts in the field. The refinement of the body of guidelines was carried out within the context of the application of Bill 125. In addition, certain guidelines considered inapplicable for economical, social or political reasons, have been ruled out. Those which have been retained all appear to us to be realistic and applicable to the region.

The existing Quebec regulation in the field of regional planning is briefly described in the Guide.

Certain guidelines are applicable to the drainage basin as a whole, regardless of present or future uses. Others apply to particular sites and call for special attention of the part of the planner. Such, for example, is the case of the winter yards of the white-tailed deer and spawning grounds.

A map, included in the pocket of the Guide, provides a synopsis of the environmental guidelines applicable to the different types of land use.

5. JURISDICTION AND EXISTING LEGISLATION

The regional county municipality results from a restructuring of powers in the area of regional planning in Quebec. Thus, the preparation of a regional development plan has been delegated to the MRC, while local planning remains in the hands of the local municipalities, which must adopt an urban plan conforming to the objectives of the regional development plan. The MRC and the municipalities, once they assume their tasks, must still respect jurisdictional divisions and existing legislation in effect in the territories they must administer.

5.1 Federal Regulation

In the drainage basin of Lake Memphremagog, with the exception of certain wharves, no land is under federal jurisdiction. However, control of lake water levels is entrusted to Dominion Textile Inc., which operates a dam on the Magog River. This results from an international agreement made pursuant to the International Boundary Waters Treaty Act. (1)

5.2 Provincial Regulation

Ministère du Loisir, de la Chasse et de la Pêche (MLCP):

Mount Orford Provincial Park, in the north of the basin, comes under this ministry. This is a recreation park and the orientation of its development is the responsibility of the MLCP. Besides, under The Wild-life Conservation Act (2), the tributaries of Lake Memphremagog are "fish sanctuaries". Although this law protects the wild-life, it in no way controls the land use adjacent to the sanctuaries.

Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ):

The Act to preserve agricultural land (3) has established green zones in which controls are placed on land subdivision, activities other than agriculture and the cutting of maples, with a view to the promotion of agriculture. The Commission de protection du territoire agricole administers this legislation. The designation of green zones has already been made for the whole of the Lake Memphremagog basin.

(1) R.S.C. (1970), chap. I-20

(2) R.S.Q. (1977), chap. C-61

(3) S.Q. (1978), chap. 10

Ministère des Transports (MTQ):

The planning, construction and maintenance of most of the highways in the basin (including the Eastern Townships Autoroute) come under the Ministère des Transports. Some roads and highways are municipal or private.

Ministère de l'Environnement (MEQ):

According to the provisions of the Environment Quality Act (1), the promoter of a project likely to alter the quality of the environment must obtain prior authorization. Several regulations have been passed under this law, of which certain have a direct bearing on regional planning:

- Order-in-Council 2521-77, respecting quarries and pits, regulates the distance separating these sites from residences, lakes and water courses, ecological reserves, public thoroughfares, etc.
- Order-in-Council 687-78 (modified by the Decree 195-82) applies to solid waste disposal zones and regulates the establishment of sanitary burial sites in the neighborhood of airports, aquatic milieus and residential, commercial, institutional and recreational zones.
- Order-in-Council 4306-75, respecting liquid waste disposal, including the spreading of oil for dust control.
- Decree 1526-81, respecting animal products establishments, provides siting standards prohibiting the presence of an animal products building or a manure storage site at a certain distance from a water point.
- Decree 1886-81 deals in detail with the standards applicable when installing sewage collection and treatment systems for isolated residences.

5.3 Para-governmental or public service authorities

Certain authorities hold property rights in corridors intersecting the territory of the basin. Such is the case of Hydro-Quebec (power transmission lines) and Canadian Pacific (railroads). The planning, construction and maintenance of these corridors come under these authorities in keeping with the laws creating them.

(1) R.S.Q. (1977), chap. Q-2

6. ENVIRONMENTAL GUIDELINES

6.1 Environmental guidelines applicable to the basin as a whole

6.1.1 The Forestial Border

The land and aquatic vegetation of a lake or water course constitutes a major element of the landscape and, consequently, should be well-protected in the interests of tourism and vacationing. Besides, this greenery is not only ornamental; it is an integral part of the life of a lake. Aquatic plants produce the oxygen needed by the animals inhabiting the lake or water course. They are consumed by numerous organisms, while serving also as breeding grounds. Thus, the vegetation of the littoral and swamp must be preserved. Land vegetation surrounding a lake and that bordering each side of a water course make up the forestial border. Vegetation along the shores, through the shade it produces, prevents excessive heating of water and the roots, quite often abundant, bind the soil and resist erosion from waves, ice and run-off. This is why the borders of lakes and water courses must be protected at all costs.

6.1.2 Flood Plains

The meaning of flood plain, here, is the bed of a lake or water course at twenty-year flood levels.

Development on flood plains is always accompanied by damage, which occurs during their submersion by the flood waters. In order to limit the extent of the damage, one can resort to the construction of control and protection works, or simply compensate the injured parties.

But municipal regulation of the occupation of flood plains is a much less costly approach which, in addition, protects the quality of the environment. Actually, the flood plains function as a buffer zone between the aquatic and land milieus and are essential to the reproduction of many fish species. This function of a milieu which is periodically disturbed must be respected. Thus, the construction of any building and all filling or excavation works restricting the free circulation of flood waters, or actually destroying the habitat in these milieux, must be prohibited.

It may be recalled that Section 5 of Bill 125 requires the MRC's, in their development plans, to identify those zones where the occupation of the land is subject to particular drawbacks such as flooding.

6.1.3 Disposal of Waste Water

The direct release of waste water into the lake or its tributaries contributes an important amount of polluting organic matter, especially during the summer season. It is therefore essential that it be treated by adequate means, so that bacteriological contamination does not inhibit the full use of the water for drinking or bathing and that the load of nutrients does not accelerate the eutrophication of the lake.

Collective sanitary installations serve several localities in the basin of Lake Memphremagog. Such is the case of Magog, Plage Southière, Georgeville and Fitch Bay. The cases of the Centre Musical Orford, the Auberge Cheribourg and the Estremont development must also be included. A verification of the effectiveness of these systems may be called for in order to ensure an effective waste water treatment. Residences and farm houses which are not connected to these systems are obliged by regulation to be provided with an individual sewage septic system complying with the standards of Decree 1886-81. In certain circumstances, the construction of a common system could certainly prove to be of advantage. Thus, as recommended by an intergovernmental work group in 1975, the installation of collective treatment systems at Vale Perkins and Cherry River must be seriously considered.

REFERENCES

- Harvey, Bernard, 1970. Politique d'aménagement rationnel des zones d'inondation. Sous-ministre adjoint aux opérations centrales. Ministère de l'Environnement du Québec.
- Intergovernmental Working Group, 1975. Lake Memphremagog Water Quality Management Plan. Report to the Lake Memphremagog Committee.
- Service de Protection de l'Environnement du Québec. Mon lac. Direction générale de la nature. Programme des Lacs, Montréal.

6.2 Forest Zone

The importance of the forest zone within the basin of Lake Memphremagog is undoubted since it occupies close to 70% of the surface of the territory, representing around 31,000 hectares of forest, mostly deciduous. Certain shorelines, as well as most islands, are still wooded.

If Mount Orford Park is excepted, the forest belongs to many small landowners who exploit it for occasional income. These forest operations, then, are almost always small-scale, excepting certain cases where the cutting rights are sold to contractors.

In view of the region's vocation for tourism and the presence of thousands of summer vacationers in the immediate vicinity of the lakes, forest operators have an obligation to respect the quality of the environment in the collective interest. In order to stop the deterioration of the shorelines, to minimize the effects on the ecological balance of cutting activities and to preserve the natural heritage of the region, it is essential to respect certain rules.

6.2.1 General Recommendation

The trees covering the forest floor dispose of a large amount of the rainwater they receive by transpiration. Heavy cutting over large areas radically increases the speed of the runoff in a watershed. Erosion and sedimentation increase with the increase in the flow of the watercourses, throwing the aquatic milieu out of balance. Where the natural drainage is inadequate, heavy cutting -- particularly clear cutting -- often raises the water table close to the ground level, thereby modifying the vegetal cover and the subsequent regeneration of the site, sometimes with adverse effects.

These consequences can be minimized by restricting clear-cuts to narrow bands or small patches or by practising some form of partial cutting at frequent intervals. Partial cutting, practised throughout the rotation can increase the yield of forest products by as much as 100%.

The regeneration of cut-over areas, by natural or artificial reforestation, should be included in the forest management plan.

6.2.2. Restrictions applied to cutting

Research has shown that the cutting of brush along water courses or around a lake results in a pronounced exposure to sunlight, followed by an increase in the water temperature and a decrease in the available dissolvable oxygen. The quality of the habitat greatly suffers as a result.

Additionally, this phenomenon is often accompanied by a destabilization of the banks, which promotes the separation of particles of the talus which accumulate on the bottom.

To prevent these consequences while preserving intact the beauty of the natural shoreline, no cutting should be carried out in the forestial border of lakes and water courses, that is, for a lake, within a 300-meter-wide strip measured horizontally from the shoreline (1) and, for a river or a stream, within a 75-meter or 50-meter-wide strip, respectively, along each shoreline. Within the forestial border, the only acceptable activities are the recovery of trees which have fallen into the water and sanitary cutting, that is, the removal of trees that are dead or damaged by fire, insects, fungi, etc. In the forestial border, the construction of forest roads must be banned, except when necessary to cross a water course. In such a case, the road must be perpendicular to the water course and the operator must, without delay, see to the installation of a bridge or culvert so as to prevent any machinery from repeatedly fording it.

As in the case of the banks, the forest vegetation on very steep slopes must be preserved to ensure the stability of the terrain and avoid the formation of gullies. This is why no cutting, other than sanitary, should be carried out on slopes of more than 25°. Wherever the slope is between 15° and 25°, no clear cutting should be done, and any activity should be restricted to selective cutting, to ensure the permanent protection of the site against erosion. It is proper to harvest only a proportion of the trees of the stand lot so that the crown cover will continue to extend, uniformly and constantly, over at least 60% of its area. The crown cover of the forest may be defined as the vertical projection of the ground surface occupied by the leafy part of the trees standing more than 5 meters high.

No specific prescription is applicable to cutting where the slope of the terrain is under 15°. However, the barring of the soil implicit in the construction of forest roads, may bring serious erosion problems and, for this reason, it is important to limit the location of these roads to slopes of less than 8°.

In order to preserve the visual quality of the landscape, no forest cutting should be done within a 15-meter-wide band on each side of roads, highways and railroads.

(1) The shoreline corresponds with the point where natural vegetation passes from a predominance of aquatic plants to a predominance of land plants.

As will be seen later, to protect the white tailed deer, the forest operator should likewise take certain precautions when cutting in their winter yards.

Figure 3 shows, schematically, the essentials of the recommendations applicable to the forest milieu.

REFERENCES

Ministère des Terres et Forêts, 1977. Guide d'aménagement du milieu forestier, Groupe de planification sectorielle, Québec.

Ministry of Natural Resources. Design Guidelines for Forest Management. Hough, Stansbury and Associates Ltd., Toronto, Ontario.

Vermont Agency of Environmental Conservation. Guides for Controlling Soil Erosion and Water Pollution on Logging Jobs in Vermont.

6.3 Agricultural land

Within the drainage basin of Lake Memphremagog, some 11% of the territory in 1977 was used for agricultural production (field crops, rotation and permanent pastures, orchards and market gardens). The sector also included much fallow land (7.1% of the whole), testifying to a certain drop in the incidence of this activity. Some attribute this phenomenon to the fact that the region is relatively ill-adapted to agriculture, owing to the unevenness of the terrain and the thin soil coverage. According to the Conseil Régional de Développement des Cantons de l'Est (CRDCE), the yields observed in the Magog-Orford zone are lower than the average for the Estrie economic region. The steady demand for land resulting from the growth of secondary housing is causing the abandonment of farms; in the view of the CRDCE, the future of agriculture in the region appears to be somewhat precarious. Nonetheless, in 1978 there were still 95 livestock farms in the basin. Cattle breeding dominates, but there are some very large chicken farms to the east of Lake Memphremagog, between Magog and Georgeville.

It cannot be denied that the practice of agriculture often affects the quality of the environment negatively: soil erosion, buildup of sedimentation, pollution of waters from fertilizers, pesticides and farmyard waste. The municipal legislator could, nonetheless, decrease the impact of these factors by way of adequate legislation.

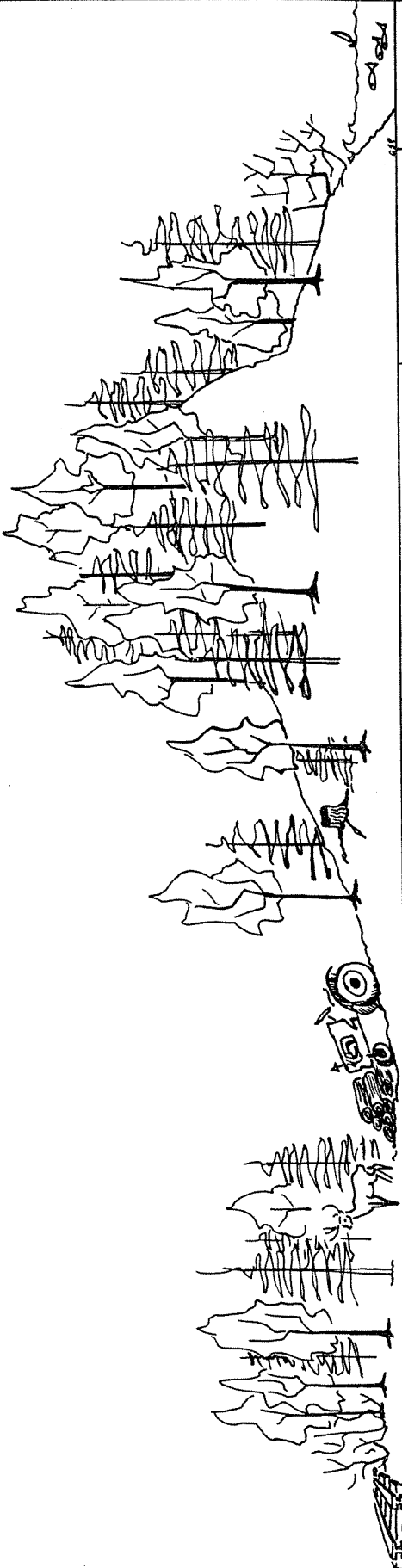
| | | | | | | | | | | | | | | |
|--|--|------------|--|---|--|------------|---------------------------|---------------------|------------------------|-------------|------------------------|-------------|---------------------|----------------------------|
| | No cutting | No cutting | No clear cutting; selective cutting only | Forest roads on slopes less than 8° | Random cuts of 1/2 hectare maximum | No cutting | | | | | | | | |
| |  | | | | | | Highway or Railroad | 15 meter band | Deer Winter Yard | Slope < 15° | Slope of 15° to 25° | Slope > 25° | Forestial border | Lake or Water Course |

Figure 3: Forest cutting must be subjected to certain guidelines, which will depend on the nature of the site.

6.3.1 Agricultural Erosion and Pollution

The plants which cover the ground protect it against the erosive action of the rain and the sapping action of the run-off. Once laid bare, the ground becomes very vulnerable.

In the long term, erosion quite simply carries off the soil and, in the least damaging cases, seriously decreases soil fertility.

In the short and medium terms, the materials removed by erosion are carried off to the rivers and lakes, greatly changing the nature of the milieu. The quantity of oxygen available in the water for living organisms drops, turbidity increases, and the gravel of trout spawning grounds is covered over, etc. Bodies of water are contaminated by pesticides or runoff from excessive fertilizer applications, which hasten the aging process strikingly. The erosion of agricultural lands must constantly be kept in mind.

6.3.2 Maintenance of a buffer Zone

On land under cultivation, in order to filter the surface drainage and collect its burden of sediments, a band of vegetation 10 metres wide, measured from the shore line, must be maintained along the shores of lakes and water courses. In the case of a cultivated field extending to the water's edge, a buffer zone, in the form of a 10-metre-wide shore-line band, must be reforested.

6.3.3 Avoidance of cultivation on slopes

Erosion works in the direction of the slope. The faster water flows down the slopes, the greater will be the erosion. Long and steep slopes consequently do not lend themselves to cultivation. Cultivation must be avoided wherever the slope is greater than 10^0 ; these slopes should, instead, be reserved for pastures or orchards, which do not call for the soil to be exposed on a regular basis.

6.3.4 Tilling across the slope

On ploughed land, each furrow left by the plough is a miniature ditch carrying the run-off waters. When the furrows are orientated in the direction of the slope, there is no obstacle to the increasingly rapid flow of the water. That is why, at the bottom of slopes that descend to a river or lake, the furrows should be perpendicular to the slope over a width of at least 20 metres, measured from the 10-metre shoreline band. In the case of row crops (corn),

the rows should be orientated in the same manner as the furrows. Crosswise cultivation is an operation essential to the protection of the quality of the environment, even though, on narrower plots of land, this obviously presents certain inconveniences.

6.3.5 Pesticides

As mentioned earlier, it is essential not to spread pesticides within the forestial border of lakes (shoreline band of 300 metres), rivers (shoreline band of 75 metres) and streams (shoreline band of 50 metres).

Figure 4 summarizes the guidelines applicable to agricultural zones.

REFERENCES

Agriculture Canada, 1961. Soil Erosion by Water. Canada Department of Agriculture, Publication 1083, Ottawa.

Conseil Régional de Développement des Cantons de l'Est, 1976. Le plan de développement et d'aménagement de l'Estrie-Zone Magog-Orford (huitième cahier). CRDCE. Sherbrooke, Québec.

Ministère des Richesses Naturelles, 1978. Etude sectorielle du lac Memphremagog (calcul des apports en phosphore et inventaire des potentiels écologiques). Direction générale des eaux, Québec.

6.4 Vacation Housing

6.4.1 Protecting the Lake

With a view to the protection of the border of lakes, a certain number of precautions are to be taken. Particularly:

- no highway should be constructed less than 300 metres from the shoreline;
- the layout of highways and roads should be determined according to the local topography, in order to cause a minimum of change to the natural landscape.

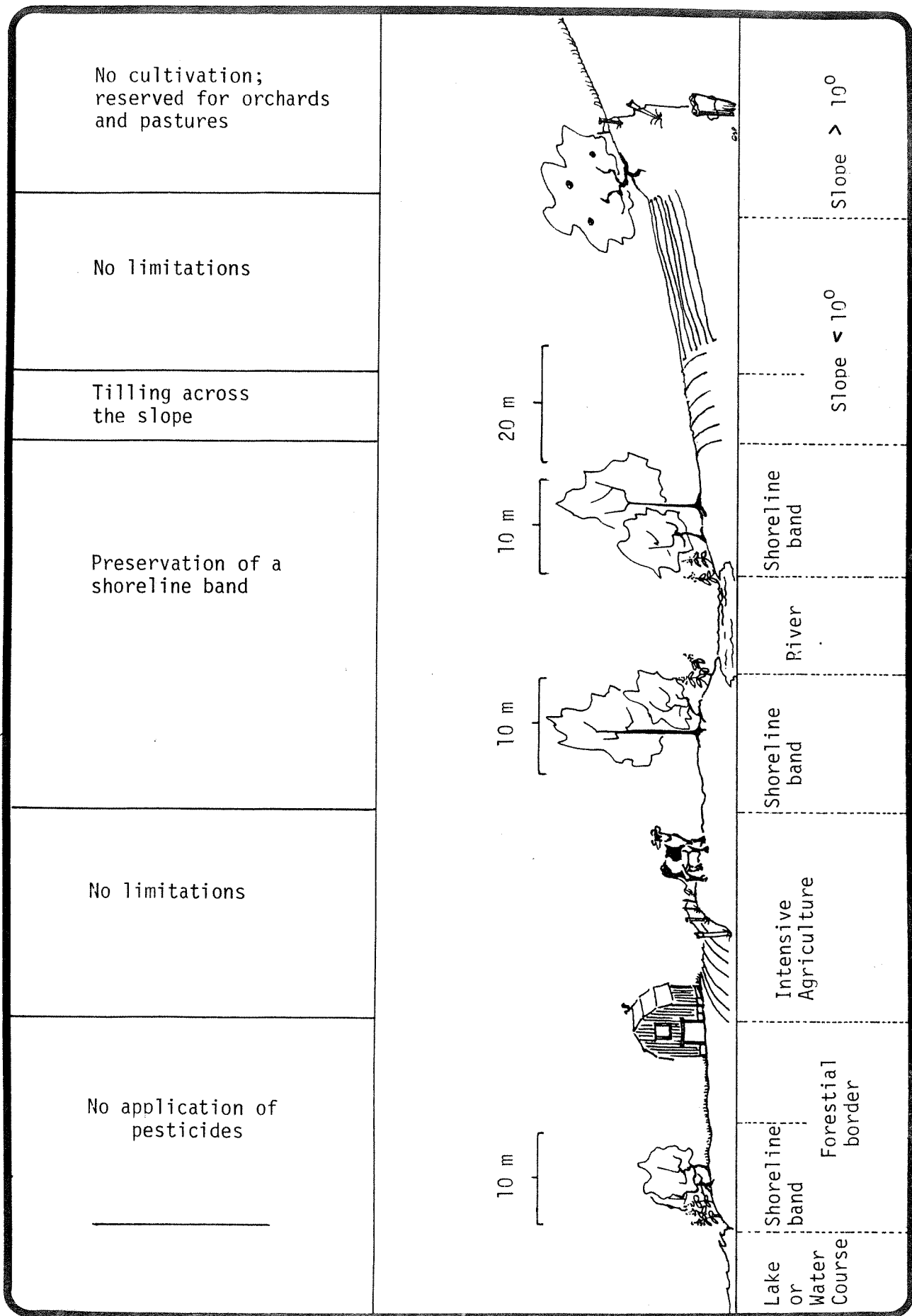


Figure 4: A minimum of precautions must be taken when developing agricultural land.

6.4.2 Selection of Appropriate Vacation Areas

There is one fundamental condition which must be respected in order for an area to be considered appropriate for vacation housing: the feasibility of installing lawful sanitary units, in the absence of a sewage system. Therefore:

- the water table and the rock must be at least 1.5 metres below ground level;
- the soil must be sufficiently dry and permeable to permit water filtration;
- the texture must be coarse enough (loam, sandy loam, loamy sand, sand, gravel);
- the slope of the land must be less than 15° and, ideally, less than 8°.

6.4.3 Zoning

The zoning of the periphery of a lake is an operation essential to the protection of its quality. Lack of precaution in this regard always has deplorable consequences. It is the forestial border of a lake or water course which constitutes the critical sector. In the case of a lake, the forestial border measures 300 metres in width right around the perimeter; in the case of a river or stream, the border assumes the form of a band, of 75 metres width in the first instance and 50 metres in the second, on each shore. This border should include:

- a protection zone, kept entirely in its natural state, representing at least 25% of the area of the forestial border;
- a cottage zone, which should not exceed 50% of the area of the forestial border;
- a communal zone (commercial vacation centers, hotels, restaurants) which should not exceed 10% of the area of the forestial border;
- a zone accessible to the public, which should not exceed 15% of the area of the forestial border.

When it is possible, cottages should be built in clusters, rather than laid out lineally.

6.4.4 Characteristics of Secondary housing lots

6.4.4.1 Lot size

Unserviced lots should measure at least 3,600 square metres. The area of partially serviced lots should not be less than 2,000 square metres and, of fully serviced lots, not less than 1,125 square metres. Figure 5 shows the proper layout of a waterfront lot.

6.4.4.2 Clearing the lot

One of the main practices that seriously affect the quality of the environment in a vacation setting is removing the trees. In order to protect the quality of the local landscape, at least 60% of the area of the lot must be kept in natural vegetation. This vegetation should cover:

- a band having a minimal width of 3 metres on the sides and rear of the lot;
- a band at least 10 metres wide along the shore.

Access to the lake or water course, through the 10-metre shoreline band should only be provided by a single winding passage not more than 5 metres wide on a slope of less than 15°. When the slope is greater than 15°, there should be no clearing whatsoever, with only a stairway being built down to the water.

The road leading from the highway to the cottage should have a maximum width of 5 metres.

6.4.5 Development and miscellaneous works

In order to ensure the protection of the quality of the environment in the vacation housing sector, it is essential, at the time of the planning and execution of any development or work on the banks, to respect the following principle:

- recourse to any excavation, dredging, levelling or filling must be absolutely avoided.

All boat shelters should be of the open type, that is, without opaque walls and, if possible, without a roof, and be built on piles or posts, or take the form of a floating platform.

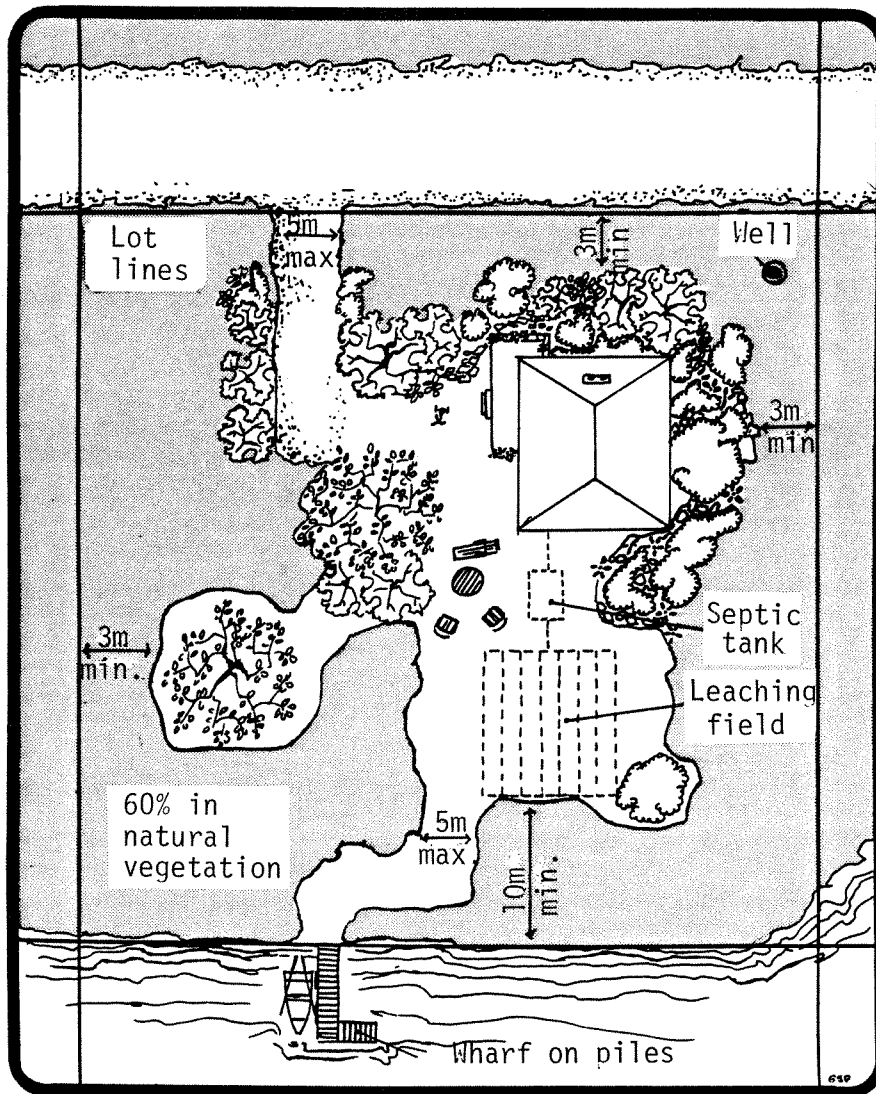


Figure 5: The layout of a waterfront lot should follow certain norms aimed at maintaining the ecological balance of the aquatic milieu

In the same way, wharves should be on piles or posts, or be composed of a floating platform.

Retaining walls and similar shoreline "protection" works should be prohibited in the case of undeveloped lots. When a lot has already been developed and, in the process, certain errors have been committed giving rise to erosion, the necessary remedial works must be approved individually by the ministère de l'Environnement.

Certain precautions concerning the use of boats must likewise be taken. In particular, no motor boat should be used on a body of water of less than 20 hectares in area. On expanses of 20 to 80 hectares, only electric motors or internal combustion motors of less than 4 HP should be used. Finally, whatever the area of the body of water, the speed of boats should be less than 8 kilometres per hour (a speed which does not produce a wave) when:

- closer than 60 metres to the shoreline;
- in channels leading from a lake into a bay of the lake;
- near boats that are immobile or moving at slow speed;
- closer than 30 metres to sailboats, canoes, other small boats, water skiers and swimmers.

REFERENCES

Anonyme, 1980. Normes et politiques concernant la villégiature aux abords des lacs et des cours d'eau dans la province de Québec. Dimension Environnement Ltée.

FAPEL, 1978. Projet de réglementation quant à l'usage des embarcations motorisées sur les lacs du Québec.

6.5 Recreation zones

Mount Orford Park is a provincial park which has been designated for intensive recreation, operating the year round. Its 58 square kilometre-area makes it the largest recreation zone in the basin. There are facilities for camping, bathing, alpine and cross-country skiing, hiking, golfing, boating, picnicing and nature interpretation. While the development of this park does not fall under the MRC de Memphremagog, its influence on tourism and recreation must be taken into account when making the regional plan. Other recreation sectors of the basin may of course be controlled to a certain extent by the MRC.

Alpine Skiing

A ski centre is located on the north slope of Owl's Head Mountain. Cleared slopes may cause soil erosion, particularly during snow thaws and heavy rains. To avoid large quantities of sediment reaching the water, the clearing of slopes must never take place within the forestial border of a lake (300 metres), a river (75 metres) or a stream (50 metres).

Golf Courses

In addition to that of Mount Orford Park, there are two courses in the basin: those of the Hermitage Club, to the south of Magog, and Inverugie, at Georgeville. Considering the impressive volume of fertilizers employed in the care of greens and fairways, the establishment of new golf courses within the forestial border of lakes and water courses should be prohibited. Existing courses should be reforested over a width of at least 10 metres, along the shores of lakes and water courses, leaving the necessary openings.

6.6 Urban and Para-urban Milieus

The urban and para-urban milieu covers only 1.33% of the area of the drainage basin of Lake Memphremagog. This is relatively small, but the concentration and intensity of human activities going on there often have a marked impact.

The surface drainage water in the urban milieu may cause serious pollution problems, mainly because of the large volumes of hydrocarbons and oils spread on streets and parking lots. In the urban setting, the surface water collector systems should be planned in a manner that provides for a degree of purification. In winter, the snow in the streets contains certain pollutants, such as oils and de-icing salts. When the snow is removed in the urban setting, it should be assured that the dumpsite is not located in the forestial border of lakes and water courses, so as to avoid their contamination in the spring.

✓ 6.7

Wetlands

Wetlands (swamps, marshes, peat bogs) constitute a natural resource of great value. Although they are not always appreciated by the general public,

- they play a role in the regulation of the water regime; by acting as a sponge, wet zones mitigate the effect of droughts and floods;

- they improve water quality by acting as nutrient traps;
- they often serve as spawning grounds for warm water fish (pike, perch, etc.) and as feeding, nesting, rearing or rest areas for ducks. Hunting and fishing are practised in this kind of terrain;
- they furnish a habitat favourable to a certain number of rare plants and animals. They are therefore an important element in the ecological diversity of a region.

Because of their great value, all the wetlands of the Lake Memphremagog drainage basin should be declared natural preserves.

The wet zones appearing on the map were established by interviews and analyses of cartographic documents. In order to detail the importance of these zones and determine their exact limits, a further study should be undertaken.

In addition, any works which risk provoking a change in the habitat (drainage, excavation, dredging, filling, diking, shore-line retainment works, etc.) as well as the deposit of waste materials on wetlands must be prohibited.

REFERENCE

Ontario Ministry of Natural Resources, 1981. Towards A Wetlands Policy For Ontario. Discussion paper, Toronto, Ontario.

6.8 Pits and Quarries

Several pits are located in the approaches to the Cherry River, in the north of the drainage basin. Some granite quarries are to be found close to the American border.

The opening of new pits and quarries in Quebec is governed by Order-in-Council 2521-77 under the Environment Quality Act (1).

(1) Within the meaning of this Regulation, the place where open-pit extraction of non-consolidated mineral matter (including sand and gravel) from a natural deposit is considered as being a pit.

However, in view of the particular recreational and tourist calling of Lake Memphremagog and its basin, the following supplementary guidelines should be applied in order to fit the Regulation into the regional context.

As stressed by FAPEL (Federation of Associations for the Protection of the Environment of Lakes of Quebec), the exploitation of a pit in a stream, river, lake or marsh should be prohibited. Again, the increase in highway traffic, the production of a large amount of dust, the release of sediments into the surface waters and the destruction of the beauty of the landscape are some of the factors rendering the operation of quarries and pits risky in the midst of a tourist region. The statutory distance for the operation of quarries and pits should be 300 metres from a lake, 75 metres from a river and 50 metres from a stream. In this way, the natural character of the forestial border of lakes and water courses will be preserved.

REFERENCE

FAPEL, 1980. Mémoire présenté au ministère de l'Environnement du Québec concernant le règlement relatif aux carrières et sablières.

6.9 Dumpsites

Under Order-in-Council 687-78 respecting the management of solid waste (Environment Quality Act), all the dumps in the administrative region of l'Estrie must after December 1st, 1980, conform to the norms of the Ministry. Within the confines of the basin, only one solid waste burial site exists, located north of Lake Lovering in the Municipality of the Township of Magoq.

Order-in-Council 687-78, now amended by Decree 195-82, sets several standards for the establishment of a site for the treatment or disposal of solid wastes, notably as concerns the forestial border of lakes and water courses. Because of the tourist value of the region, the MRC should be vigilant in the enforcement of these standards. As far as the burial of septic tank solids is concerned, the standards section of the Quebec ministère de l'Environnement is in the process of preparing a directive which will govern the selection of dump sites. Until it is issued, the disposal of septic tankage is subject to the authorization of the Regional Director of the MEQ, pursuant to Section 6 of Decree 1886-81 under the Environment Quality Act. Whatever the circumstances, no solid waste or septic tankage treatment sites should exist within the limits of the forestial border of a lake or water course.

6.10 Roads, Highways and Autoroutes

The construction, repair and maintenance of highways and autoroutes falls under the ministère des Transports. It is the same for most of the unnumbered highways although, occasionally, the municipality or the owner assumes responsibility for certain access roads.

In a general way, and whenever possible, no highway or road should be constructed wherever the slope is greater than 80°. The contribution of sediment to lakes and water courses is greater still if there is no buffer zone in place to filter the surface drainage. This is why no highway should be laid out in the forestial border and no road should be constructed at less than 30 metres from the shoreline of a lake or water course. In a case where it is necessary to cross a water course by bridge or culvert, the structures must be designed to permit the free passage of fish and flood waters.

The banks must be stabilized (by regeneration of vegetation or rip-rap) on completion of the work. At the point of crossing, roads and highways must be perpendicular to the water course for a distance of at least 30 metres on either side of the water course so as to minimize the erosion of banks and shorelines.

Again, ditch waters should never flow directly into a lake or water course but should, instead, be directed across sectors covered with vegetation for at least 15 metres back from the lake or water course.

The spreading of oil or calcium chloride to settle road dust is a common practice, especially in vacation areas. However, these substances should never be allowed to reach the water. Consequently, no anti-dust treatment should be applied in the forestial border of a lake or water course, that is, within less than 300 metres of a lake, 75 metres of a river and 50 metres of a stream.

The same precautions should be taken with road salts in the winter. The use of an abrasive material, like sand, is to be preferred. Finally, it should be added that Order-in-Council 4306-75, adopted under the Environment Quality Act, sets standards for dust-control oils in respect of the application time table (from May 1 to November 1), the maximum quantity of oil which may be spread (1.25 litres per square metre of highway) and the physico-chemical characteristics of the oil.

REFERENCES

Megahan, W.E., 1977. Reducing Erosional Impacts of Roads in "Guidelines For Watershed Management". FOA Conservation Guide. Food and Agriculture Organization of the United Nations, Rome.

Ministère des Terres et Forêts, 1977. Guide d'Aménagement du milieu forestier, groupe de planification sectorielle, MTF, Québec.

6.11 Sites to be protected

6.11.1 Winter Yards of the White Tailed Deer

The region of Lake Memphremagog is known for its abundance of white tailed deer. The climate of the Eastern Townships and the state of maturity of its forests are among the number of factors leading to this situation. Whereas white tailed deer range individually between spring and autumn, they herd at the outset of winter in "yards", where they find shelter and sustenance. When the snow cover becomes critical (around 50 cm), the deer take refuge within mixed and evergreen stands, where the snow is lighter and movement easier. The winter yard must also provide adequate feed. In winter, the white tailed deer feeds mainly on deciduous growth, such as maple, cherry, poplar and willow.

Under these conditions, it is clear that forest operations can change the quality of this habitat. Large-scale clear cutting must be stopped. Paradoxically, the complete absence of forest cutting can be quite as injurious. Old coniferous forests make good shelter for the deer, but they lack in nourishment. The improvement of the quality of a winter yard lies, therefore, in the careful harvesting in evergreen stands and in the controlled re-growth of the intolerant deciduous trees (paper birch, poplar, red maple, etc.)

The opening up of new areas, whether for residences or simple cottages, gradually reduces the deer yards, as disturbance of the animals by dogs and snowmobilers increases. In the yards, we must therefore:

- prohibit any use which could bring about the destruction of any part of the habitat. Only light improvements (i.e. cross-country ski trails) should be authorized;

- control forest operations so that the areas of cuts do not exceed 0.5 hectares; each deer yard possessing its own characteristics, a special management and development plan should be developed in collaboration with the experts of the MLCP.

The map shows the location of all the deer yards listed by the MLCP from the aerial inventory of 1978. As the deer yard is an unstable entity, their locations are approximate. The best that the municipalities can do is to designate general areas where human intervention is to be controlled to a certain degree: Bullis Point, Magoon Point, Georgeville, Vale Perkins, St-Benoit-du-Lac and Austin.

REFERENCES

Bélanger, M. et M. Morasse, 1978. Le cerf de Virginie a-t-il sa place dans la forêt privée? Direction générale de la faune, ministère du Tourisme, de la Chasse et de la Pêche, Québec.

Demers, Pierre, Biologiste régional au ministère du Loisir, de la Chasse et de la Pêche (Sherbrooke).

Huot, J., 1973. Le cerf de Virginie au Québec. Service de la faune. Ministère de la Chasse et de la Pêche, Québec, bulletin no. 17.

Potvin, F., 1972. L'aménagement intégré de la faune et de la forêt du Québec - Normes générales. Service de la faune, ministère du Tourisme, de la Chasse et de la Pêche, Québec, bulletin no. 16.

6.11.2 Spawning Grounds

Lake Memphremagog is an excellent fishing lake. Among the principal species are land-locked salmon (anadromous Atlantic salmon), rainbow trout, brown trout, lake trout, small-mouth and large-mouth bass, yellow walleye, chain pickerel, perch and smelt. The quality of the fishing depends directly on the maintenance of the fish stocks. It is therefore essential to protect all spawning grounds, which are increasingly threatened by numerous activities. It may be noted that the status of "fish sanctuary" given to a stream does not entail the control of the use of adjacent land.

The principal spawning grounds, known to MLCP specialists, have been shown on the map. There may be others that have not been identified owing to insufficient inventorying.

Salmon, trout and smelt are known for low resistance to the modification of their habitat, particularly in respect of the pH, dissolved oxygen and turbidity. Great care must be taken to ensure the stability of tributaries where these fish spawn, even though the fishing is already the subject of certain restrictions in these places (Table 3). To this end, certain measures should be taken for tributaries and marshy bogs of a lake:

- ensuring the effectiveness of the septic installations on the waterfront;
- avoiding soil erosion;
- prohibiting the clearing of the shorelines and regenerating the sites already cleared in order to restore the integrity of the forestial border;
- prohibiting pasturing along the banks, to protect water clarity;
- preventing the drainage, excavation, dredging, dyking and filling of marshes as well as shoreline sustaining works.

REFERENCES

Demers, Pierre, Biologiste régional au ministère du Loisir, de la Chasse et de la Pêche (Sherbrooke).

Lévesque, L. et G. Pageau, 1965. Inspection des tributaires du lac Memphremagog en 1964. Service de la faune du Québec, ministère du Tourisme, de la Chasse et de la Pêche, tiré-à-part 96.

Meunier, P. et F. Guimont, 1979. Potentiel d'utilisation de l'eau en milieu lacustre. Service de la qualité des eaux. Direction générale des eaux, ministère des Richesses Naturelles du Québec.

6.11.3 Mountains and Escarpment

Mountains play a preponderant role in the quality of a landscape where their natural character has been preserved. In the Lake Memphremagog basin, ten mountains merit protective action due to their outstanding characteristics. These are Bear, Owl's Head, Sugar Loaf, Hog's Back, Pevee, Place, Chagnon, Orford and Chauve Mountains, and the Bunker Hill escarpment, all shown on the map.

Table 3: MLCP Fish Sanctuaries (1982-83) located
in the Drainage Basin of Lake Memphremagog

| Sanctuary | Period Closed to Fishing |
|---|--|
| Perkins, Taylor and Castle Brooks, all tributaries of Lake Memphremagog, from source to mouth | Year round |
| Tributaries of Perkins, Taylor and Castle Brooks, from source to mouth | A) 1 April - 22 April B) Freeze-up - 31 March |
| Other tributaries of Lake Memphremagog, from source to mouth | A) 1 April - 14 April B) 1 May - 17 June C) Freeze-up - 31 March |

The guidelines for forest cutting apply here without exception; generally speaking, any activity that downgrades the natural character of the mountain slopes must be avoided. However, it must be admitted that, from a practical standpoint, alpine skiing stands as an exception to this rule. In any event, as several ski centres already exist in the region, the need to develop others should be cautiously weighed, the environmental repercussions carefully evaluated and appropriate palliative techniques employed (e.g. covering bare ground with a waterproof membrane, during a rain and at night, is an expedient in use in the Municipality of Mont Tremblant, Quebec).

7. CONCLUSION

The variety of the landscape and the quality of the environment are two of the main advantages which set apart a region as being attractive for the purposes of recreation and tourism. The drainage basin of Lake Memphremagog is wonderfully provided with landscapes. However, the ecological balance of the environment is too fragile for the region to be developed without respecting a certain number of fundamental principles.

The rules which have been set out in this guide constitute the minimum precautions that must be taken by the MRC de Memphremagog, the body responsible for regional planning. Although the practical application of this Environmental Land use Planning Guide affects all of the population, its contents must be put into effect by the municipal legislators. Consequently, one of the primary roles of the MRC is to take action so that each of the local municipalities includes these environmental guidelines in its by-laws, to ensure that human activity is kept in harmony with the environment of Lake Memphremagog.

THE BILL 125 PROJECT
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MEMPHREMAGOG-CONSERVATION, INC.,
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