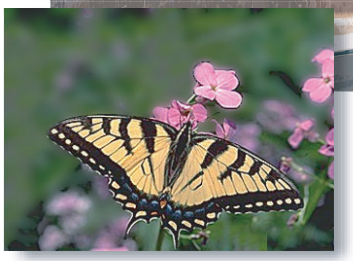
Controlling highway corridor vegetation

The New Québec Approach

"In harmony with nature"



2002 Award Environmental Achievement

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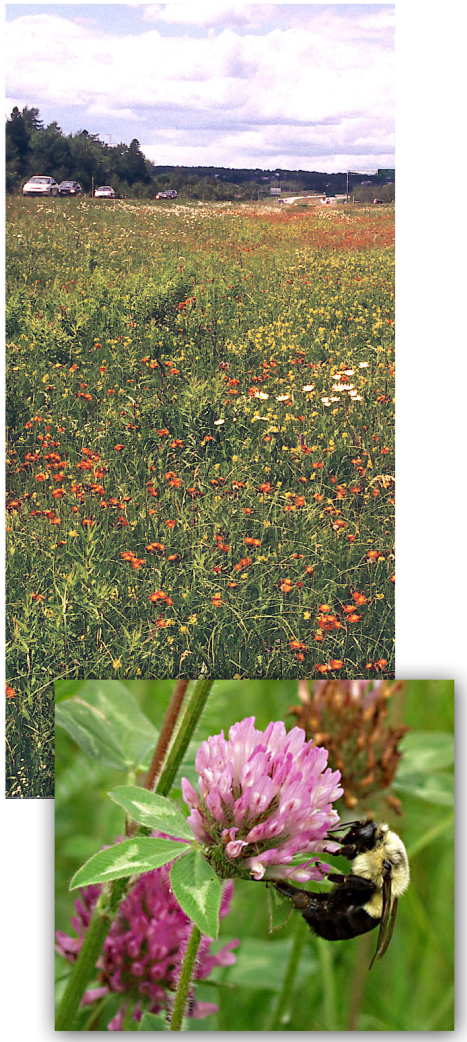

PART A:
THE PROJECT: ORIGINS AND APPROACH

INTRODUCTION

Figure 1: An example of bloomed meadow wich is much appreciated in rural area by ecological vegetation managers.

The Ministère des Transports du Québec (“MTQ”) maintains over 2000 km of highway corridors. Traditional methods of controlling vegetation along highways result in a boring landscape, deteriorate ecosystems and generate high costs. The MTQ has therefore undertaken to develop new maintenance methods that improve user safety, satisfy neighbouring residents, beautify the landscape and consider the existing plant life and wildlife, while controlling ragweed.

Until now, the traditional method for the treatment of highway approaches was systematic moving, from the edge of the asphalt-covered pavement to the limit of the right-of-way. In rural areas, two or three mowings per year were required, while in urban areas, three or four mowings were necessary each year, sometimes more.

The new approach eliminates systematic multiple annual mowing, except on the first two metres from the pavement, where the frequency will even be increased (four or five mowings per year) to ensure highway safety (visibility), better control of ragweed (*Ambrosia artemisiifolia*) and a quality view. This approach will allow local plant life to flourish, thereby providing road users with a flowery and diversified landscape (Figure 1). Only cyclical cutting (every 5 to 10 years would be sufficient, according to the results we have obtained) will control the growth of certain woody plants that can endanger the safety of highway users.

Figure 2: Scientists performing vegetation surveys.

Figure 3: Wild plant contribution to landscape improvement.

This new method, which has already proven itself elsewhere, has the objective of minimizing and targeting vegetation control interventions according to the MTQ's objectives. A scientific assessment of the development of plant life and wildlife, including visual monitoring of the transformation of the landscape, was performed on these sites to ensure that the project meets the stated objectives (Figure 2).

The results of this monitoring confirm that the new approach offers real environmental benefits. Among other things, it establishes the bases of the ecology of Québec highway corridors. From the visual standpoint, the new approach is perceived positively by the public, which is discovering these new landscapes (Figure 3). The monitoring process also made it possible to design and perfect new landscape monitoring tools applied to road corridor management.

Contrary to the traditional approach, this new method integrates concerns related to landscape, biodiversity, wildlife habitat, ragweed control, highway safety and infrastructure sustainability, while ensuring better management of the MTQ's financial resources.

This new approach also allows the Government to respect its various commitments and responsibilities, including:

- the clauses of the International Biodiversity Treaty, which the Government of Quebec has signed;
- promotion of regional tourism through highway landscape enhancement;
- wildlife conservation and enhancement;
- reduction of global warming (greenhouse effect) by giving more space to woody plants;
- improvement of highway safety;
- public health (ragweed control);
  better management of public funds..

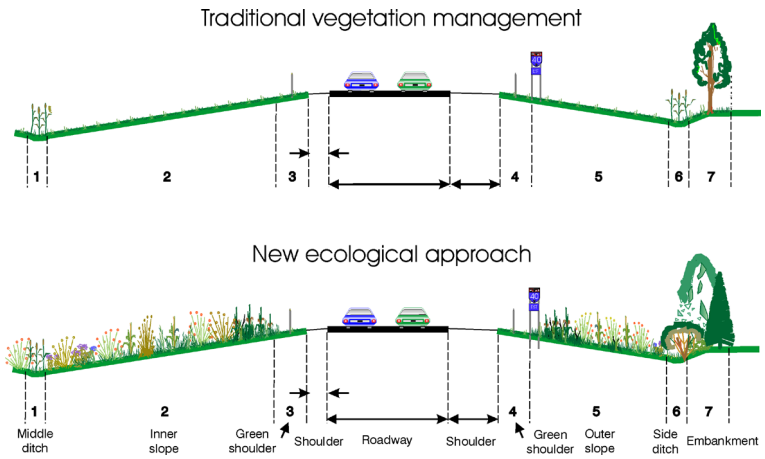

Figure 4: Proposed intervention concepts

Zones 1 and 6: Maintain shrub cover over the ditches to avoid the development of aquatic plans.

Zones 2 and 5: Manage the inner embankments as high meadow and control woody plants at a rhythm varying according to the growth of vegetation in the neighbouring habitat (forest or agriculture).

Zones 3 and 4: Mow a strip two metres from the shoulder to a height of 75 millimetres four times a year.

Zone 7: Designate the shoreline more specifically for woody plants, trees and shrubs. To improve the highway environment, this type of vegetation control will be adapted to the local habitats through which the highway passes.

INTERVENTION CONCEPT

The pilot project for control of highway corridor vegetation was designed to consider the different habitats through which a highway corridor passes. The various proposals for vegetation control and utilization were developed from an analysis of the existing situation and an understanding of the relationship between the highway and the environment through which it passes. The purpose of this project is not to apply a new management method to all highway corridors that would result in a uniform landscape. On the contrary, it seeks to change the type of management according to the intrinsic qualities of the neighbouring habitat and foster a harmonious relationship between the highway and its environment.

More concretely, this new approach favours the expression of a much more diversified plant life by allowing plants to complete their life cycle. The abundance of flowers, grains, fruits and taller vegetation favour a greater abundance of insects, small mammals and birds along the entire food chain. Thus, these habitats will serve both as a refuge for plant life and wildlife and as a traffic corridor for wildlife in humanized habitats. The results of scientific monitoring also confirmed that this new management method would not result in an increase in collisions with wildlife.

Regarding the landscape, the diversification of colours and textures and their succession through the seasons will enliven the landscape and attach it to the immediate habitat. This landscape, much more representative of the regions through which road users are travelling, will enhance the visual quality of Québec's highways.

Figure 4 illustrates the intervention concept while Table 1 presents the types of management and the advantages and disadvantages for a highway section's different zones.

Table 1: Summary of the new approach for using and managing roadside vegetation

VEGETATION MANAGEMENT	1 MIDDLE DITCH	2 INNER SLOPE	3,4 GREEN SHOULDER	5 OUTER SLOPE	6 SIDE DITCH	7 EMBANKMENT
EXISTING SITUATION	• Generally wet environment • High vegetation • Periodic mowing • Occasional digging	• Moderately drained environment • Low herbaceous vegetation • Periodic mowing	• Meadows • Annuals adapted to a dry, impoverished environment (e.g. ragweed) • Periodic mowing	• Moderately drained • Low herbaceous vegetation • Periodic mowing	• Wet environment • High vegetation (sometimes shrubby) • Cutting (variable) • Occasional digging	• Natural environment • Highly variable vegetation and maintenance
PROPOSALS FOR MANAGING GREEN SECTIONS	• No maintenance (ditch shaded by shrubs) except for selective cutting every 10 years • Ditch cleaning using "lower third" method **	• Control of woody plants to maintain a high grassland (every 2 or 3 years) • Planting of shrubs to form hedges	• Mowing 4 times/yr (closer to soil)	• Control of woody plants to maintain high grassland (every 2 or 3 years)	• No cutting • Development of shrubby ground cover • Ditch cleaning using "lower third" method	• No maintenance • Development of fallow land • Planting • A certain control of vegetation to maintain visual openings
IMPACT OF ECOLOGICAL MANAGEMENT						
Ecological	• Creation of habitats for microfauna • Diversification of vegetation • Ecological filter	• Diversification of plant and animal species • Diversification of habitats	• Better control of ragweed	• Diversification of plant and animal species • Diversification of habitats • More valued fauna compared to zone 2	• Diversification of plant and animal species • Diversification of habitats • Protection of aquatic milieus • Ecological filter	• Defragmentation of riparian habitats • Development of an ecotone • Diversification of plant and animal species • Diversification of habitats
Landscape	• Integration in landscape	• Makes for a more interesting landscape according to different flowering times • Diversifies the landscape with local variation in plant species	• Transitional zone between road and zones 2 and 5 • Visual showcasing of meadow	• Ensures a visual continuity between zone 7 and the road • Makes for a more interesting landscape according to different flowering times • Diversifies the landscape with local variation in plant species	• Integration with the landscape	• Visual harmonization of the road with surrounding landscape • Structuring of the landscape as perceived by motorists
Economic	• Lower cleaning costs due to decrease in peat formation • Decrease in extent of excavation due to use of "lower third" method	• Lower cutting costs • Investment necessary for planting	• Higher costs compared to current frequency of mowing	• Lower cutting costs	• Lower cleaning costs due to decrease in peat formation • Decrease in extent of excavation due to use of "lower third" method	• Lower cutting costs • Decreased cost of maintaining fences when shaded by forest cover • Investment necessary for planting
Safety	• Partial reduction in night glare for motorists	• Partial reduction in night glare for motorists • Snowtrap effect • Slowing of vehicles that lose control (skidding) • Increase motorists' attention	• Plainer view of guideposts and road signs	• Snowtrap effect • Slows skidding vehicles • Increase motorists' attention	• Snowtrap effect	• Snowtrap effect

CONTRIBUTION OF THIS NEW METHOD TO ENVIRONMENTAL PROTECTION, HIGHWAY SAFETY AND THE LANDSCAPE

Figure 5: Wild chicory is a well adapted plant for severe conditions. This plant is found on highway embankments.

This new management approach benefits both highway users and neighbouring residents. Although its main purpose is to improve ecosystems and the landscape, it has positive effects on highway safety, ragweed control, reduction of maintenance costs and several other fronts.

- IMPROVING THE DIVERSITY OF THE LANDSCAPE

The varied ecological conditions from one region to another mean that the application of this new vegetation control method produces plant life and a landscape specific to each region. It offers highway users a diversity of scenery and more harmonious integration of the road corridor into the neighbouring landscape. Finally, such a management method allows a landscape to be transformed over the seasons, as plants pass through their complete life cycle (Figure 5).

- IMPROVING THE ECOLOGICAL VALUE OF RIGHTS-OF-WAY

This type of vegetation control method increases the number of plant and animal species present in the highway corridors (increase in biodiversity) and the biomass of trees and shrubs. It also increases carbon fixing (CO_2), thus helping to reduce global warming. Moreover, reducing the use of motorized equipment for traditional grass cutting also reduces CO_2.

These new linear habitats contribute to create links between habitats isolated by agricultural, industrial and urban activities (defragmentation of habitats). All of this biological productivity along the highway approaches benefits the habitat through which the highway passes, particularly in highly humanized habitats (urban and agricultural).

Figure 6: Ragweed proliferation on the first two meters of the road embankment.

- CONTROLLING RAGWEED

Ragweed is an annual plant that produces a very large quantity of pollen, causing major allergy problems for a large part of the population (10%). Given that this plant grows abundantly within the first two metres of vegetation from the pavement (Figure 6), this strip has to be mowed closer to the ground (6 cm instead of 15 cm) and more often. By concentrating our mowing efforts on this zone, the growth of this plant will be reduced significantly, thus reducing production of allergenic pollen.

- IMPROVING HIGHWAY SAFETY

The presence of high grass and trees near traffic lanes helps to slow down out-of-control vehicles, thus improving highway safety. The high vegetation located in the median also reduces night glare. In winter, high grasses and woody plants (trees and shrubs) serve as a windbreak, capturing part of the snow falling on the traffic lanes. Finally, the more dynamic landscape created by the mix of colourful vegetation helps increase the driver's attention span.

Figure 7: Signs and prospectus used in communication program and an example of a wide media cover.

The main merit of this new approach is to transfer a commonplace and costly practice into an activity that promotes biodiversity, wildlife habitats, the beauty of the landscape, highway safety and public health, while generating savings.

This approach already existed in several European countries and U.S. States and had to be adapted to the cultural and environmental context specific to Québec. The MTQ has innovated by implementing this new method gradually, with emphasis on the "information" component, given the different audiences. The MTQ conducted a three-year pilot project for this purpose, in three different types of environments: forest, agricultural and urban fringe. Attached to this project was a vast communications program that enabled the MTQ to validate the new approach. This communications program included installation of signs announcing the experimental sections, production of a pamphlet for the general public (Figure 7), a large number of presentations to many partners (municipalities, farmers, professional associations in the environment field, groups of MTQ employees) and a major media relations effort (television, radio, print).

Another innovative aspect of this project was to ensure, for the pilot project, scientific monitoring of the development of the plant and animal communities subject to this new vegetation control. In addition to this scientific monitoring, the changes in the landscape were monitored. Monitoring of the plant community, performed on a series of permanent plots, provided information on the specific composition, density and height of vegetation, and the speed of implantation of woody plants. Monitoring of the animal community focused on the specific composition and abundance of birds, small mammals, insects, batrachians and reptiles. A series of readings was also taken to find out the impact of this vegetation control method on the wildlife collision rate. To our knowledge, no such thorough monitoring has been done concerning vegetation control of highway corridors. At first, this new approach aroused considerable apprehension both from the people responsible for maintenance at the MTQ and the general public. The fear of an invasion of animal and plant pests and the deterioration of the landscape quickly faded away after the results of these monitoring operations were presented. Researchers from the Université du Québec à Trois-Rivières, the Canadian Wildlife Service, for the wildlife component, and the Université de Montréal, for the landscape, carried out these operations, in which many graduate students participated, to produce a considerable volume of knowledge on the ecology and landscape of highway corridors. These efforts will result in a large number of scientific publications.

Figure 8: Bloomed meadow evolving towards an advanced status where asters and goldenrods proliferate.

The knowledge obtained will make it possible to forecast the medium and long-term changes in the plant community and thus adapt our vegetation control practices to the target objectives regarding ecology, the landscape and highway safety (Figure 8). Since vegetation is the basis of wildlife habitats and serves as the backdrop of the landscape, knowledge of how it is transformed, resulting from a major reduction of mowing, is essential.

FINANCIAL IMPACTS OF THIS NEW VEGETATION CONTROL APPROACH

In addition to the numerous benefits of this new method, it involves no additional disbursements in many cases. In other cases, it results in major savings in the sectors where maintenance is currently intensive throughout a highway right-of-way. These savings are primarily the result of a substantial cost reduction in mowing and cutting. Moreover, due to the fact that ecological management is relatively new, it can be foreseen that savings should be greater when companies adapt their work methods. Part of these savings will gradually be redirected to the production and maintenance of landscaping along the highway corridors.

APPLICATION TO TRANSPORTATION AND POSSIBILITIES OF TRANSFERRING THE RECOMMENDED APPROACH TO OTHER TAC MEMBERS AND THE ENTIRE TRANSPORTATION COMMUNITY

Figure 9: The scientific studies put emphases on the quality of the wildlife habitat inside the highways right of way

Highway and road networks in general are omnipresent throughout countries and regions. They involve the use of large areas of land, part of which is sterilized by the creation of pavement and the majority of which is covered with vegetation. This man-made linear ecosystem possesses a definite value, both biologically and in terms of the landscape (Figure 9). This, at least, is what this project has revealed. The results of this research also show that the method of managing this ecosystem had a great influence on its value.

The knowledge acquired in the course of this project will benefit the members of the TAC in their approach to vegetation control of highway corridors. It will enable them to orient their vegetation control method to maximize the environmental benefits offered by the vegetation present along transportation corridors, particularly in Canadian provinces located in the same latitudes. Moreover, the approach concerning the “communications” component and the method of implementation of such a profound change in vegetation maintenance methods could benefit TAC members wishing to introduce such changes. This type of change often collides with a culture that has long been in place.

The important knowledge acquired regarding the operation of these ecosystems often neglected by the scientific community will serve to enhance them for the benefit of a better environment. This is the spirit in which the Ministère des Transports has already committed itself to disseminate the results of this research through scientific publications, which are already in production. Scientific papers that have already been delivered, notably on the occasion of the International Symposium on Environmental Concerns in Right-of-Way Management, held in Calgary in 2000 (4 papers), in France at the “Entretiens Jacques-Cartier” in 2001, and within the TAC as a candidate for the Environmental Achievement Award in 2002.

CONCLUSION

Monitoring program research report of the experimental report

DOMON, G., P. POULLAOUEC-GONIDEC, J. FROMENT, C. MONTPETIT 2003. Monitoring visuel du paysage de corridors autoroutiers soumis à une gestion écologique, instrumentation, suivi visuel 2000-2001-2002 et analyse des perceptions des usagers. Université de Montréal, Chaire en paysage et environnement, 247 p.

GERIN-LAJOIE, J., E. LEVESQUE, Y. BÉDARD 2003. Gestion écologique des emprises de trois tronçons autoroutiers : projet pilote de gestion extensive du patrimoine vert, suivi écologique volet flore. Université du Québec à Trois-Rivières, Département de chimie-biologie. 143 p.

BOURASSA, J.P., N. CHAMPAGNE 2003. Étude de la diversité animale présente le long d'emprises autoroutières du sud du Québec, PREMIÈRE PARTIE. Présentation du projet, observation, déductions et recommandations tirées du projet. 10 p. DEUXIÈME PARTIE, Évaluation de la diversité entomologique et effets de la modification dans la gestion des végétaux sur les insectes au sol. 231 p. TROISIÈME PARTIE, Inventaires annotés de l'ensemble des insectes enregistrés le long des trois tronçons autoroutiers au sud du Québec, 65 p. QUATRIÈME PARTIE. Inventaires annotés des amphibiens, des reptiles et des micromammifères. Université du Québec à Trois-Rivières, Département de chimie-biologie. 21 p.

BÉLANGER, L., B. JOBIN, G. LACROIX, Y. BÉDARD 2003. Suivi écologique de projet-pilote de gestion différenciée des emprises autoroutières, volet avifaune et mortalité par collision. Environnement Canada, Service canadien de la faune.181 p.

The research reports produced on the three experimental sections have confirmed the major ecological and landscape gains of this new approach to vegetation control of highway corridors. The benefits of this new approach concerning highway safety and the resulting savings resulted in the application of this vegetation control method on over 85% of the Quebec highway system in 2002.

The implementation of this vegetation control method over the past several years, and its generalized use in 2002, leads the Ministère des Transports du Québec to consider its many practices in a spirit of reclaiming the environment and sustainable development.

Transports Québec