

CASE STUDY - GREENING CITIES

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ABSTRACT

Trees are an integral and valuable part of the urban environment. They provide a visual softening to the harsh lines of urban development and make cities livable by improving the quality of life. They also provide city dwellers with a sense of stability in an environment that is continually changing. Trees have several settings in an urban area. These include parks, private property and along streets and boulevards. The largest green space in most cities is the roadside and median. This area provides the greatest opportunity for greening cities. It is, however, poorly understood. The paper which follows uses Calgary projects to provide some insight into the history, and problems associated with street trees.

INTRODUCTION

The largest green space in most, if not all cities, is not the area set aside for parks, but the area alongside and within the carriageway of roads. These green spaces, when combined, form the largest "park" in most cities and are the areas to address when speaking about the greening of cities.

To put this statement into perspective, Calgary has over seven thousand acres of boulevards - twice the area of Fish Creek Provincial Park. The city of Edmonton in 1980 had approximately 90 000 to 95 000 large trees of which only 20 000 were in parks with the remainder on street boulevards and medians. The city of Lethbridge in 1981, had approximately 31 000 trees.

When I was asked to make this presentation on the "Greening of Cities in Alberta", it was suggested that the paper concentrate on a "lake community". On reviewing a map of Alberta, I found there were actually very few "lake communities" in our Province. Cold Lake, Bonnyville, Lac la Biche, Wabamun, and Waterton were the only ones I found which would qualify. None of these, to my knowledge, have a currently active street tree planting program. Most communities are just beginning to pursue such programs. Red Deer, for example, began its street tree planting program in 1962 and by the end of 1980 had planted over 6 000 large trees. Based on the relatively limited amount of information, I decided to speak on the city I know best - Calgary.

Rather than concentrating on some technological aspect of urban tree planting, such as sound attenuation or the effects of neutralizing waste, this paper will be more general.

Tree planting for Greening of Cities in Canada is a relatively new phenomenon. It started just over a century ago - less than the average life span for most tree species. We are still in the first generation of street tree planting and have a limited knowledge base as to the long term effects such a program has. Generally though, the effects are positive ones.

Trees clean the air, provide shade, absorb noise, reduce glare, block wind, soften harsh views, and bring unity and character to our cities. Trees contribute to the livability of neighborhoods. They remind us all that concrete, steel, asphalt and brick build subdivisions but they don't build communities. The beauty of many older communities such as Edmonton's Garneau district and Calgary's Mount Royal area can be largely attributed to the urban forest which now provides a setting for the houses and creates a sense of maturity.

HISTORICAL PERSPECTIVE

In 1851, the Imperial Dictionary, "English Technological, and Scientific" noted that an avenue set with trees was called a "walk". This definition remained in place for a number of years until the early 1900s when the term was exclusively used for pedestrian ways.

The earliest legislation in the country which relates to trees in terms of their aesthetic qualities (as opposed to their timber value) is the 1871 Tree Planting Act of Ontario. This Act was intended to encourage the planting of trees along the highways.

It has also been noted that in central Canada during the pre-motoring age, street trees were required along city streets to provide shade for open carriages in the summer. In the winter, they would help hold the snow cover on the road surface and thus provide a smoother and longer season of operation for sleighs.

As previously mentioned, street tree planting is still in the first generation. In 1914, for example, the city of Calgary was raising Poplar, Ash, Manitoba Maple, Fir (probably more correctly called white spruce) and Silver Poplar in its nursery. Now, there is very limited use of poplar, with the native ones grown in the early part of the century, not used at all and the Manitoba Maple considered a weed tree.

Arbor Day is an annual celebration which takes place in the first week of May. This year Arbor Day is on May 7th - this Thursday in fact, and the Premier's wife, Mrs. Getty, will be participating by handing out Landscape Alberta Awards to five recipients. One of the awards is for landscape excellence in reclamation.

In 1923 public school children participated in Arbor Day much as they do today. The children cleaned up the school yard and planted flowers and trees. In 1924, a travelling railroad show equipped with movies and

functioning as a school room went from community to community on a tree planting campaign. It was sponsored by the Canadian Forestry Association of Alberta.

Also in 1924, on Arbor day, staff of a local bank helped green their city by planting street trees near the building. As a point of interest, the Union Bank of Canada commenced business in Strathmore in October 1908. It was taken over by the Royal Bank in 1925.

Most communities started with few or no trees. The community I live in for example, had no trees along the newly laid out streets although some native species could be found along the river's edge. Boulevards were generally left without grass and without improvement. Gradually, however, these areas were tilled and grass established. Thirteenth Ave in Calgary began to take on an urban or suburban character, first with the establishment of turf on the boulevards and secondly in 1916, with the planting of trees.

By the 1920s, most inner city streets had been planted with street trees. The trees were planted at about a two inch caliper size - much as they are now, and gradually became well established. It's interesting to note that often the planting consisted of alternating deciduous and coniferous trees. Double rows of trees were also planted, the inner row probably giving way over time to the widening of the street. One trusts that this double planting was the result of foresight as the greening of cities could have been significantly delayed had all trees required removal to accommodate street widening. The alternating coniferous-deciduous planting created quite a dense hedgerow along the street and as the trees became larger probably began to interfere with sight lines and curbside parking.

PROBLEMS

Soon however, for some unknown reason, perhaps because of the "fluffing" of the poplar, or because of the interference with power lines, city forces began in the late 1920s to control the growth of street trees through brutal pruning techniques. The results were called totem poles by one of the city's early Parks officials. Sixty-five years later, boulevard trees are still subjected to the same sort of stupidity.

A sequence of photos, taken over a five year period show the results of regrowth. The trees which were truncated by the severe pruning were Balsam Poplar and by the end of the first summer the trees had begun to show significant branch growth. Within two years the "fluffing" had returned and the trees had once again taken on a tree form although quite contrived. By the beginning of the fifth year, the trees had recovered further shape and basically returned to the same condition as they were before the unnecessarily harsh pruning.

One thing which was noticed during the period of regrowth was a more dramatic growth of suckers and the pushing up of the roots in the boulevard.

The benefits gained because of the pruning, if any, resulted in greater problems for the lawnmower.

Other problems which are now surfacing in areas with mature trees are the blocking of sight lines due to the large size of the tree trunks, and the interference of branches with power lines. This latter problem probably won't last forever though as lines get put underground.

Root-sewer conflicts are the main source of problems. Calgary has approximately 2465 km (1532 miles) of sewers and so the opportunity for conflict is significant. Edmonton, by comparison has 4190 km (2604 miles) of sewers. These figures include both sanitary and storm systems. Whenever there is a root-sewer problem the tree is the first to be blamed, and I feel unjustly so as they are only sending their roots to where the food is. It's common knowledge that if the pipes don't leak the roots don't intrude. Many systems, particularly in the older neighborhoods, were designed to exfiltrate and infiltrate water so as to help control the ground water situation. Also, installation techniques in the early part of the century were not so sophisticated as to ensure leak free systems. Trees are now reaching maturity as the systems are beginning to break down and the problems are becoming more prevalent. Edmonton, for example had approximately 120 digups in 1980 due to root-sewer conflicts. At an average cost of about \$3500.00 per repair, the total amount expended is very significant. Calgary does not keep separate records of such conflicts but it is anticipated that the situation is proportionately as large as Edmonton's. City Administration's reaction to root-sewer problems is to discourage tree planting near utilities and prohibit the planting of certain species instead of addressing the real problem of sewer upgrading and quality control to ensure leak-free systems.

PLANTING PROGRAMS

The city of Calgary does not have a tree inventory, and according to the 1982 fall municipal planting survey of the International Society of Arboriculture, plants fewer trees than Edmonton (600 as compared to Edmonton's 3375). This however may be somewhat misleading as Developers are more usually the ones who green cities. For example: The large overall plan for a new area in Calgary called "The Homesteads" was prepared using a team of Planners, Engineers, and Landscape Architects. This group worked hard to ensure that whatever natural vegetation occurred on site was maintained. The approach, although admirable, did not contribute to "greening" because the natural vegetation was retained in joint-use sites. When these were taken over by the Parks Department, they in conjunction with the School Board, cleaned the site of all trees. This I understand was done to allow the installation of an irrigation system and to create playfields. It seems, trees, playing fields and schoolchildren don't mix.

To review how a street tree planting program becomes reality, I'll review the sequences involved from concept through to installation. Subdivision plans, when filed with the city do not have street trees indicated. These are

added later and generally coincide with the installation of the houses. In a subdivision such as the "Temple" area in Calgary the design and installation sequence involved the following:

1. Review of all legislation affecting plant locations viz a viz the location of utilities;
2. Develop a planting concept - trees selected to help define residential use functions ie; large tree varieties on the major streets and smaller varieties along the cul-de-sacs. This heirarchy helps the community to achieve an identity.
3. The filing of all design plans with appropriate city departments for their approval and line assignment.
4. The tendering and contracting out of the installation. The timing of this component is very critical as the trees need to be installed just as the houses are being completed but before they are ready for market. Street trees enhance the homes for the market.
5. The maintenance of the trees on an annual basis including watering, fertilizing, pruning and insect control. Maintenance ideally should continue for a period of three years and assumes the residents will do the watering.

Most developers also install trees on the homeowner's lots. During the recent economic downturn, it was rather amusing to see a battle of trees emerging as every week it seemed houses were coming on the market offering more and more trees. At one time, I believe the "ante" was up to six trees per lot.

It's also interesting to note that many people do not want trees planted on the boulevard and particularly on their lots. The lot planting program used for the Temple area and McKenzie area included the following:

1. Development of lot planting design to coincide with the boulevard planting design and account the architectural styles.
2. Delivering information pamphlets door to door to inform residents that trees were going to be planted, that the homeowner would be responsible for tree watering, that the species would be either ash, poplar, elm or in the cul-de-sacs schubert chokecherry and that the trees would be planted only on the front yard. The pamphlets gave the homeowners the option of moving the stakes placed on the yard to mark the trees to various locations - as long as they remained in the front yards, and the option of refusing trees.
3. Installation of the trees and maintenance, other than watering completed by contractor for a period of one year.

One response which wasn't contemplated was the number of people who did not want trees on their lots even though they were being installed at no cost. These individuals did not want to be bothered by anything which they had to maintain. Also many people would not consider poplar under any circumstances. Although the total number of such individuals wasn't that large, it was still an eye opener.

The effects of these "greening" operations can be seen when you drive through the communities I've mentioned. The trees have been in place for periods ranging from two to upwards of eight years and as they mature their visual impact and aesthetic contribution to the community becomes more pronounced.

The trees currently being used for street tree planting programs include: Green Ash, Northwest Poplar, Brooks #6 Poplar, American Elm, and Schubert Chokecherry. These trees are generally all planted in straight rows as dictated by engineering criteria based on the underground utilities. The underground utilities which no one sees have a direct bearing on the above ground visual environment of our city streets.

In older communities planting consisted of using the native species from which today's plant materials have been derived and also Birch and Spruce. These plantings still exist in some areas of the city and help create a unique quality to the streetscape. However, Birch does not do as well as other species when used as a street tree because of slower growth and therefore smaller appearance.

Most communities' street trees were planted within a time frame of a few years with trees of about the same age. As a consequence they are all ageing about the same rate and will reach their useful life span in a similarly narrow time frame. Those communities which were first planted in the early 1900s now have mature urban forests which are about to die off. These trees, represent the end of the first generation and are large, generally in only average condition and very often located close to residences. If they are not selectively removed and replaced with new trees, they will begin to fall down with serious consequences.

STREET TREE INVENTORY

The city of Calgary does not have an inventory of its street trees and has no policy respecting their removal and replacement. If all the trees along the streets of the older neighborhoods were to die off, current legislation respecting the underground utilities would prevent their replacement. Picture the Mount Royal area of Calgary without street trees and think of the visual impact not to mention the reduced property value.

One system which can help cities gather the necessary inventory data and help them formulate policies respecting tree replacements is to involve public school students. This was done in one community in Calgary and produced very good results. The program was structured to achieve three goals. These were:

1. Allow students to learn about their community and how it functions (social);
2. Allow students to learn about trees, how to identify the various types, and how they contribute to a better environment (science);
3. Produce a street tree inventory for the city Parks Department.

The city, community and school all enthusiastically supported the program. The students from grades three to six learned a great deal about their neighborhood and presented the results of their studies to a general community meeting attended by many residents and city parks personnel. During their studies the students found the community occupied 381 acres of land (154 hectares) and supported an overall street tree population of about two trees per acre. They found that there were over 180 Poplar, 138 Birch, 122 Elm, and 84 Green Ash with a variety of other species and many shrubs. They reviewed old plans of the area, came across old photos, and gained a positive feeling about where they live.

The project represented one of the few times in community history that everyone - the Community Association, the School and the City all pulled together toward a common goal. If anyone is interested in further information on such a program please contact me at your convenience.

CHALLENGES FOR THE FUTURE

The challenge for the future Greening of Cities is to treat the urban forest as an integral part of the city system. This will require a holistic approach to city development and administration. Trees are an important member of the city community. As such they must be fully integrated with street functions and underground utilities. This integration will require a serious look at the real reasons for the problems currently being experienced and informed far reaching decisions regarding the selection, placement, maintenance and replacement of urban trees. If this can be realized the concepts regarding beautiful cities referred to in most general planning documents will be easy to achieve.

Proceedings of a Symposium

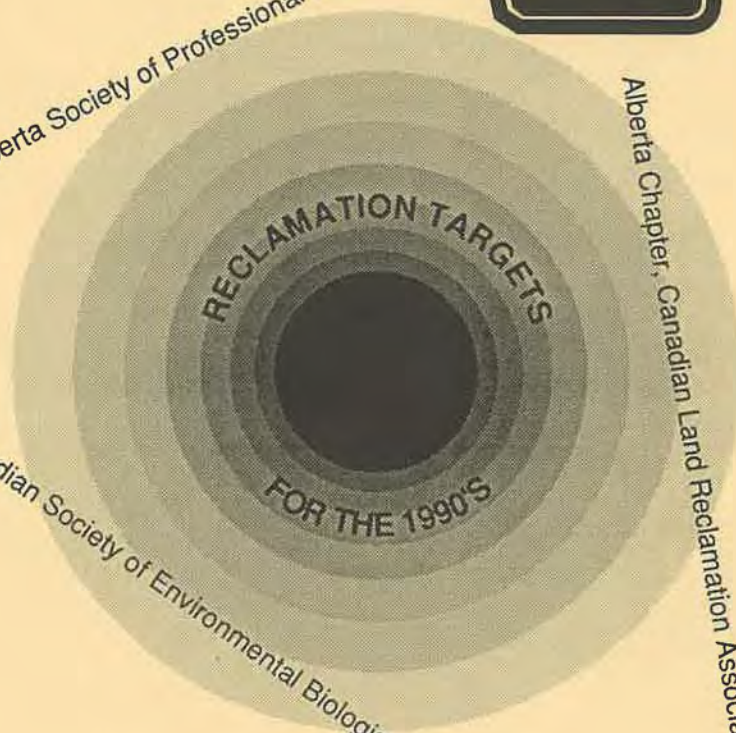


The Alberta Society of Professional Biologists



The Canadian Society of Environmental Biologists, Alberta Chapter

Alberta Chapter, Canadian Land Reclamation Association



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The Organizing Committee would like to thank:

Mr. J. Green, Mr. B. Free, Ms. N. Ross and Mr. C. Powter: Session Chairmen

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Norwest Soil Research Ltd.
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PROCEEDINGS

Alberta Environment, Research Management Division

And a special thank you to our two guest speakers:

Dr. David Samuel, University of West Virginia who spoke on Reclamation to Wildlife Habitat in the United States

Dr. Larry Holbrook, Biotechnica International of Canada, Calgary, Alberta who spoke on Biotechnology and Biologists

- and -

to the Hon. Ken Kowalski, Minister of Environment, for delivering the opening address.

MESSAGE FROM THE ORGANIZING COMMITTEE

Reclamation practitioners and researchers have gone a long way to solving the problems posed by such disturbances as mining, drilling and pipeline construction. The future challenge for reclamation lies in applying our expertise in other areas such as industrial site decommissioning, habitat creation and restoration, and urban design.

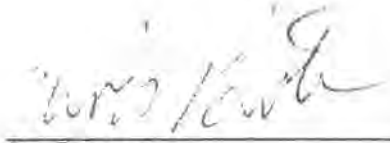
The Symposium was designed to expose participants to a wide variety of "new" areas where reclamation science could be applied. These were the "targets" referred to in the Symposium title. The speakers did an excellent job in meeting this goal. Some of the participants felt the Symposium had not provided enough information on new methods to be employed in reclaiming these new disturbance types. While this was not the goal of the Symposium it remains a valid concern that should be addressed in a future symposium.

Finally, the Hon. Ken Kowalski, Minister of Environment, encouraged all participants to get out and preach the need for, and successes of, reclamation, and indeed all environmental programs. Telling ourselves in conferences how wonderful we are is preaching to the converted. We need to let those who benefit from our labours, that amorphous group known as the public, know what we have done for them. This, too, should be the topic of a future symposium.

The papers in this proceedings have been edited and retyped into a common format. The contents of the papers are essentially unchanged from the submitted manuscripts of the authors.



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TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
MESSAGE FROM THE ORGANIZING COMMITTEE	v
The Evolution of Reclamation Practice - from Complex to Simple - Dr. P. Ziemkiewicz	1
Regulatory Response to Changing Reclamation Demands - Mr. D.L. Bratton	5
Reclamation and Industry in Alberta Today and Tomorrow (1990s) - Dr. A.W. Fedkenheuer	13
Successful Landscape Manipulation in the Urban Fringe - From a Gravel Pit to a Lake - Mr. G. Browning	24
Reclamation to Wildlife Habitat - Goals and Delivery - Mr. C.W.B. Stubbs	30
Emerging Issues - Land Degradation - Dr. D.S. Chanasyk	35
Industrial Site Decommissioning - Mr. M.J. Riddle, Mr. A.E. Osborne, and Mr. R.B. Geddes	46
The Reclamation and Management of Garbage Dumps and Gravel Pits in Alberta - Mr. L.M. Kryviak	55
Case Study - Greening Cities - Mr. L.R. Paterson	60
Reclamation of Ducks Unlimited Habitat Projects in Alberta - Mr. J.W. Martin	67
Buck for Wildlife's Volunteer Fisheries Habitat Enhancement Program - Mr. W.E. Griffiths	74
Soil Salinity in Alberta - Mr. L.A. Leskiw	80
PANEL DISCUSSION - What is Successful Reclamation?	
Government Perception - Mr. L.K. Brocke	97

continued ...

TABLE OF CONTENTS (CONCLUDED)

	Page
Industry Perception	
- Mr. P.D. Lulman	99
A Biologist's Perception	
- Dr. D. Parkinson	101
A Landscape Architect's Perception	
- Mr. L.R. Paterson	103
The Public's Perception	
- Mr. C. Wallis	107
Symposium Summary	
- Mr. R. Johnson	111
LIST OF PARTICIPANTS	115