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EVALUATING THE RECREATION POTENTIAL OF URBAN FORESTS

ÉRIC REY – LESCURE

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Rey-Lescure, E. 1978. L'inventaire du potentiel récréatif des forêts urbaines. Can. Centre Rech. For. Laurentides, Ste-Foy, Qué. Rapp. Inf. LAU-X-32. 90 p.

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ABSTRACT

Urban forests are disappearing from our cities, and to have a picture of the possibility of using them for outdoor activities, a method for evaluating their recreational potential is proposed. Bio-physical and aesthetic criteria are ranked and estimated in relation to various developmental infrastructure categories. Quantitative results allow an estimation of the relative quality of forested and unforested sectors in comparison with each of the developmental infrastructure categories.

This method was used to survey all non-protected forested sites of the Montreal Urban Community. The results have not been fully utilized because in the developmental process of managing urban forests, the recreational demand survey by each urban sector is lacking. This identification of the population's needs requires a united effort by the sociological sciences. Only the balance between the supply and the demand of forested sites will lead to a practical approach for protecting and developing instead of the present "laisser-faire" policy.

RESUME

Les forêts urbaines sont en voie de disparition dans nos agglomérations. De façon à dresser un bilan de leurs possibilités d'utilisation pour des activités de plein air, on propose une méthode d'inventaire de leur potentiel récréatif. Une série de critères bio-physiques et esthétiques sont pondérés et évalués en fonction de différentes catégories d'aménagement récréatif. Les résultats quantitatifs permettent d'estimer la qualité relative des espaces boisés et des espaces vacants associés pour chacune des catégories d'aménagement.

Cette méthode a permis d'inventorier tous les sites boisés non protégés de la Communauté Urbaine de Montréal. Les résultats disponibles n'ont pas encore été tous utilisés de façon rationnelle car dans le processus d'aménagement des forêts urbaines il manque encore l'inventaire de la demande récréative par secteurs urbains. Cette identification des besoins de la population appelle un effort concerté des sciences sociologiques. Seule l'adéquation de l'offre et de la demande en espaces forestiers permettra une approche rationnelle de sauvegarde et d'aménagement au lieu du laisser-faire actuel.

PREFACE

This publication on a method for evaluating the recreation potential of urban forests is a follow-up to two University of Montreal research reports.

The first report, "Forêts Urbaines - Méthode d'évaluation du potentiel récréatif: région métropolitaine de Montréal" (Urban Forests - A Method for Evaluating Recreation Potential in the Montreal Metropolitan Region) written by F. Oehmichen, E. Rey-Lescure, and M.C. Robert of the Faculté dAménagement of the University of Montreal (1975), was funded by the Canadian Forestry Service of Environment Canada.

The second, "Forêts Urbaines - Inventaire et détermination du potentiel récréatif des boisés urbains de la Communauté Urbaine de Montréal" (Urban Forests - Inventory and Determination of the Recreation Potential of Urban Woodlands in the Montreal Urban Community), written by F. Oehmichen, C. Michaud, and P.A. Cloutier of the Centre de Recherches et d'Innovation Urbaines of the University of Montreal (1977), was funded jointly by the Canadian Forestry Service of Environment Canada and the Ministry of State for Urban Affairs.

This is the final version of the evaluation method, which was developed on an experimental basis under the first contract and made operational under the second.

INTRODUCTION

Only recently, in the last few decades at most, have foresters become interested in urban woodlands. As in many other fields, this interest is due to a crisis situation, manifested, in the case of urban forestry, by a serious disparity between supply and demand. Urban populations are demanding a better environment to live in, and especially areas developed for recreation and education in a natural setting. At the same time, urban and outlying forest sites are rapidly disappearing under the unbridled thrust of urbanization. The prevalence of this situation in the Montreal metropolitan region was the impetus for the Canadian Forestry Service to fund research into the precarious situation of urban woodlands and their potential uses. The urgent need for action prompted our group to develop a method for evaluating the recreation potential of urban forests (summer 1974), which made it possible to gather and evaluate data on all the woodlands in the Montreal Urban Community (MUC) during the summer of 1976 (figure 1). Some selection of priorities, based on an analysis of the existing situation, was necessary to meet operational objectives. Presented here, is a general outline of the basic context of our work.

1 SUPPLY

Forest resources in the MUC are disappearing at a rapidly increasing rate. According to Dion (1976), woodland area has decreased as follows:

1928	4 124 ha (10,190 ac)
1964	3 290 ha (8,130 ac)
1975	2 488 ha (6,150 ac)

The situation is even more critical than these figures indicate, because only 1 416 ha (3,500 ac) remain of the original forest of 1928, which is now mature and, for the most part, climactic. The remaining 1 012 ha (2,500 ac) are pioneer or second successional stands of lesser esthetic, educational, and recreational quality. These stands have sprung up since 1928, as a result of the accumulation of agricultural lands by speculators waiting for the right moment to sell. Only 18% of the 2 488 ha (6,150 ac) of woodlands left in 1975 were for public or semi-public use and thus effectively protected; these are city and metropolitan parks, golf courses, and the Morgan Arboretum. The remaining 2 044 ha (5,050 ac) were in the hands of private corporations or individuals and thus liable to disappear as a result of urban development. Furthermore, according to Oehmichen *et al.* (1977), only 1 821 ha (4,500 ac) of unprotected woodlands were left in 1976, which indicates a loss of 222 ha (550 ac) or about 11% in one year. At this rate, the last of the unprotected woodlands left in 1975 will be gone within ten years.

2 DEMAND

The demand specifically for woodland spaces open to the public for recreation and education is difficult to separate from the demand for outdoor activities in general. Use of existing sites, for example Mont St-Hilaire or the Morgan Arboretum, is extremely heavy. In 1971, the Arboretum received 22 000 visitors (Inhaber, 1972), who came for recreation or relaxation. In 1968, 5 600 children came for educational activities; in 1971, there were more than 13 000 (Algar, 1973).

In general, the demand for outdoor activities is increasing. According to studies done by the Outdoor Recreation Resources Review Commission (1962), many socio-economic factors have a qualitative and quantitative influence on demand. Let us apply the most important of these factors - population forecasts - to the situation in Montreal. According to the Service d'Urbanisme de Montréal (1967) (Montreal Urban Planning Office), the population of the Montreal region will increase from 2.5 million in 1967 to 4 million in 1981 and to about 6.5 million in 2000. This means that, even if individual demands remain the same, the overall need will nearly triple simply because of population growth. In addition, the rising level of education is leading to more participation in outdoor activities, and the gradual reduction in working hours is making free time available. On the other hand, the increasing mobility of the population (more cars) favours regional parks at some distance from the city more than urban forests and parks. However, as a result of the steep jump in the price of gasoline, we may see a reversal of this trend. These factors, whether positive or negative, whether circumstantial or linked to deeper tendencies, cannot, given the present estimates, alter the growth in public demand for outdoor recreation areas.

It is clear, then, that the number of high-quality woodland sites is decreasing dramatically, while the recreational, educational, and esthetic services they can offer are in greater and greater demand. The urgent need for action to protect the urban forests in Montreal is evident. And this situation holds true in Toronto (Bureau of Municipal Research, 1971) and Vancouver (Real Estate Board of Greater Vancouver, 1975) as well.

3 RESEARCH OBJECTIVES

Urban forest conservation requires knowledge of the quantity and quality of the resource. In 1974, no inventory of the woodlands in metropolitan Montreal was available. Faced with this lack, we set ourselves the goal of developing a workable method of evaluating the recreation potential or urban forests, which could be applied to the MUC. The following premise and tactical decision underlie our goal:

- Traditional forest evaluation as defined by the forest evaluations standards of the Quebec Department of Lands and Forests is not applicable in an urban setting because it is overly oriented toward wood production, and because it does not take into account human impact on the forest environment and the environmental impact of the forest on humans.
- Faced with the urgent situation described above, we chose to emphasize the recreational potential of urban forests rather than their biological, educational, or esthetic potential. Recreational use of forests has a direct social role which can be perceived by the entire population and it should increase the awareness of municipal and government representatives who are in a position to find legal and financial solutions to the problems.

In adopting this attitude, we do not deny the other functions or roles of the urban forest - purifying air and water, acting as a screen against noise and visual pollution, mitigating the rigours of the climate, supplying a variety of products, providing a habitat for wildlife, and furnishing other benefits, both tangible and intangible. However, society does not yet seem to have fully recognized these values, perhaps because we lack complete scientific data that would allow us to develop urban forests to these ends. Furthermore, the preservation of forests and their development for recreational use do not preclude their biological and esthetic role in providing a more varied environment.

4 PLANNING FRAMEWORK

Evaluating the recreational potential of urban forests is only one of a number of stages necessary to establish a policy for preservation and then implement development programs.

The preservation of urban forests is dependent on political and legal processes with economic repercussions, such as public zoning, the taxation of capital gains, the placing of land in reserve, and price controls. Setting aside these complex matters whose scope goes far beyond the question of urban woodlands, there are many stages in the process of site development; they are the framework for planning and developing urban forests. Table 1 shows the three distinct parts in the process: supply input, demand input, and development.

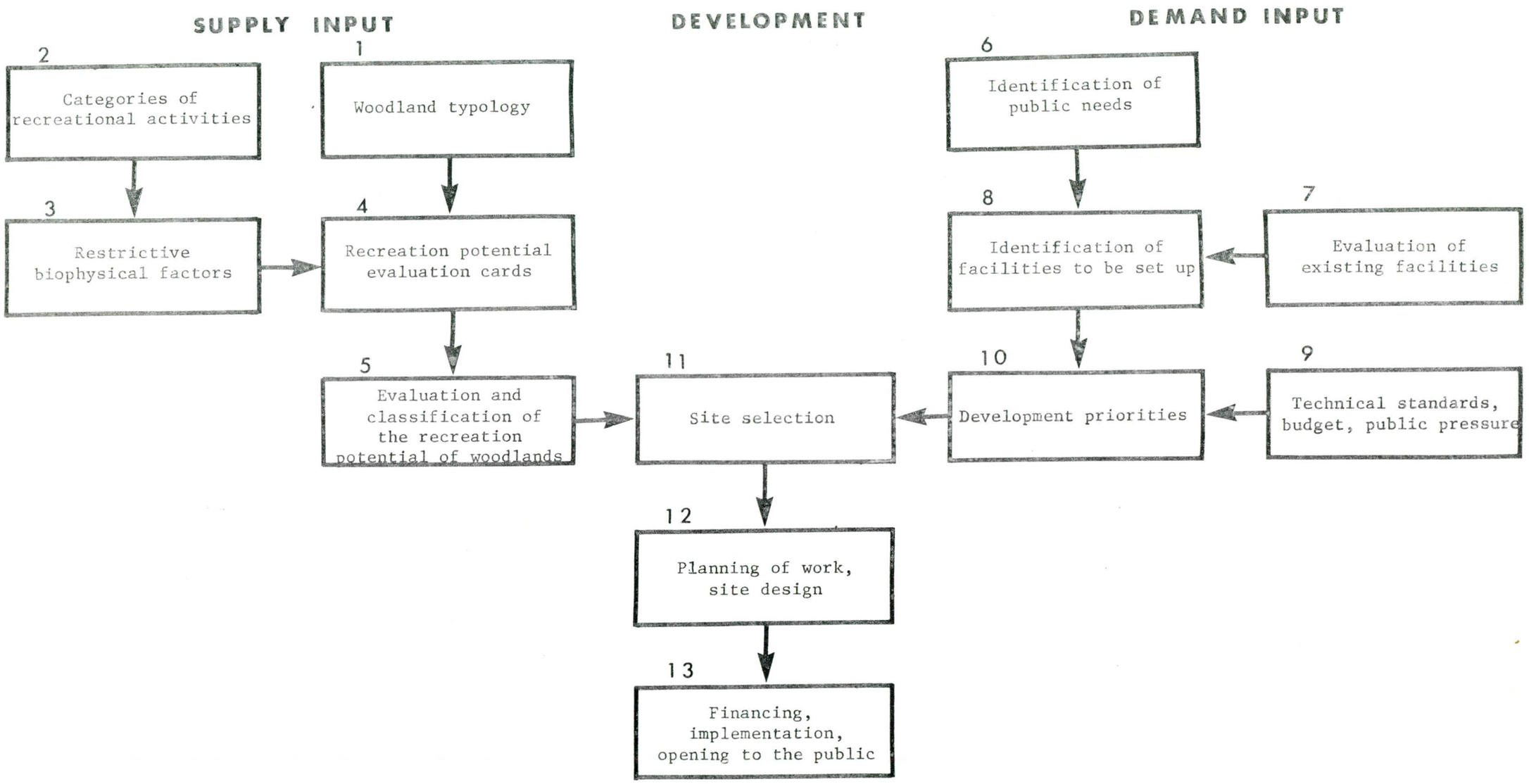
Stages 1 to 5 are the subject of this report. They permit a classification of all forested zones in terms of their capacity (i.e. potential) for development directed toward various public recreational activities.

Stages 6 to 10 attempt to define the demand for certain kinds of outdoor recreational activities (games, sports, hiking, cross-country skiing, picnicking) in order to determine what facilities should be set up (outdoor centre, nature centre, picnic grounds) to complement those already existing. It is the responsibility of each city or, on a larger scale, of the regional grouping (e.g. the MUC) to carry out this work and then set development priorities, taking into account budgetary restrictions, pressure from neighbourhood groups, and certain technical standards.

Once development priorities have been set and the woodland sites best suited to them are know, the choice of sites to develop can be made (stage 11). The actual development method, stages 12 and 13, is known; it is the same as that followed in the case of neighbourhood or regional park: design, financing, implementation, and, finally, opening to the public.

In Montreal and the suburbs of the MUC, demand input in particular, especially the identification of public needs, is in an embrionic stage. Occasionally citizens pressure public bodies (e.g. the Terra Cotta case) or a school board calls for public use of private land ("la Chapelle de la Réparation"), but as a general rule, municipal administrators do not have complete information on the outdoor recreational and educational needs of the various social strata in their area of responsibility. Too often municipal recreation services plan their facilities on the basis of current but arbitrary norms rather than preferences expressed by the population as

TABLE 1: Stages in the recreational planning and development of urban woodlands



a whole. Recreational facilities thus become less attractive to the public (Gold, 1972). As an example, in Montreal over a few years many city parks were changed into stadiums, to the great disadvantage of the majority of the population, who do not participate in specific sports, but prefer green areas developed for relaxation and walking (Bonhomme, 1975).

The evaluation of demand in terms of needs expressed by the population is a major challenge for those professionals involved (Rogers, 1974, Pollard, 1976). The contribution of the social sciences to this task is obvious. If this aspect does not receive attention very soon in the Montreal region, the effort expended to evaluate urban forest resources will have been in vain, since, as we have pointed out, the ressource is rapidly disappearing.

5 METHODOLOGICAL APPROACH

A quick overview of the urban forests in the Montreal area shows a wide variety in size, location, and accessibility of sites. Evaluating the recreation potential of sites independently of these variables would give rough results of little use to planners. For example, the recreational use of two biologically equivalent sites (same stands, same soil) will be quite different if one is in an urban environment and the other in an agricultural environment. It can be seen, then, that the future use of the sites depends on socio-economic variables. This should come as no surprise, since, as we showed earlier, outdoor recreation demand is largely dependent on these variables. Biological characteristics will be analysed as limitations or potentialities for site development.

Our approach has been to prepare a woodland typology (Table 2) that takes the above-mentioned variables into account (Rey-Lescure, 1974). The choice of variables stems from three basic criteria:

- they are general; each one integrates a whole set of more specific elements,
- the data they refer to are already available or easily obtainable,
- they are easy to manipulate and thus can be adapted to changing conditions.

5.1 AREA

0-7 ha (0-19 ac) ..... woodlots

8-79 ha (20-199 ac) ..... large woodlots

80 ha or more (200 ac or more) ..... forests

This variable is of great importance because the capacity to support visitors and the development possibilities vary enormously among woodlands of, for example, 4, 60, or 120 hectares. These values are arbitrary, but they correspond roughly to the average areas of various types of parks found in the urban setting: the neighbourhood park, the district park or city park, and the metropolitan park.

5.2 RESIDENTIAL DENSITY

Residential density is the ratio, expressed in inhabitants per hectare, of the population to the land area devoted to dwellings.

0-59 inh./ha (0-24 inh./ac) ..... outlying

60-119 inh./ha (25-49 inh./ac) ..... suburban

120 inh./ha (50 inh./ac) and over ..... urban

TABLE 2: Woodland typology

Forested area in ha (in ac)		RESIDENTIAL DENSITY IN INH./ha (INH./ac)				
		120 and over (50 and over)	59 to 119 (25 to 49)		0 to 59 (0 to 24)	
		Minimum accessibility classes				
80 and over (200 and over)	1	Urban Regional forest	1 If 2, 3 or 4	Suburban Regional forest Suburban Reserve forest	1 If 2, 3 or 4	Outlying area Regional forest Outlying area Reserve forest
8 to 79 (19 to 199)	2	Urban District large woodlot	2 If 3 or 4	Suburban District large woodlot Suburban Reserve large woodlot	1 If 2, 3 or 4	Outlying area Regional large woodlot Outlying area Reserve large woodlot
0 to 7 (0 to 19)	3	Urban Neighbourhood woodlot	3 If 4	Suburban Neighbourhood woodlot Suburban Reserve woodlot	If 1, 2 3, or 4	Outlying area Reserve woodlot

NOTE: There are no reserve woodlands in the urban category, since for the most part, accessibility is very good. Limitations in area, then, determine serviceability. In suburbs or outlying zones, the accessibility classification determines the serviceability or whether the woodland will be classified as reserve.

This variable was chosen because it is a kind of spatial representation of certain socio-economic characteristics of the population. The grouping of average densities was done with values predicted for 1981 (Service d'Urbanisme de Montréal, 1971).

5.3 ACCESSIBILITY

We defined four accessibility classes:

1- accessible by highway and regional transportation facilities,

2- accessible by road and by public transportation linked to the regional facilities,

3- accessible by public transportation or to pedestrians,

4- no access or roads.

We have set a minimum level of accessibility for each type of woodland. In general, the larger the site, (i.e. a forest) the farther it is from the centre (i.e. outlying) and the higher its accessibility rating must be (class 1) if it is to be considered potentially serviceable (in this case, on a regional scale). If accessibility is judged to be inadequate, the site is classified as "reserve". The serviceability classification are: neighbourhood, district, and regional.

5.4 WOODLAND TYPOLOGY

By combining the three factors described, we arrive at the nine types of woodlands that appear in Table 2.

This typology allows the planner to compare forests units that are similar in size or in location relative to population. It establishes a hierarchy of natural space supply that is easily adaptable to the hierarchy of needs for outdoor recreation facilities and equipment with its familiar typology:

- neighbourhood parks,
- district parks,
- city parks,
- metropolitan parks,
- regional parks.

The methodological approach we have outlined here is the starting point for evaluating the recreation potential of urban forests.

6 METHOD FOR EVALUATING THE RECREATION POTENTIAL OF URBAN FORESTS

The method consists of a quantitative and qualitative field evaluation of ecological, physical, and esthetic factors (key elements), in relation to various recreational land uses (developmental infrastructure categories).

A similar approach was used for a recreational evaluation of the Vernon Parish region in Louisiana (McCollum, 1968). On a larger scale, McHarg (1969) proposes a similar method, which interprets ecological factors in relation to range of potential land uses (recreation, dwellings, agriculture, forests, industry).

Delimiting the sites (figure 1)

Sites are mapped by means of aerial photographs. They should be natural, cohesive spatial units, in that no physical or man-made barriers (such as roads, railroads, rivers) divide them. They should include one or more forested areas, surrounded by fields or other open areas. The forests area alone counts for the classification of the site as a woodlot, a large woodlot, or a forest. There is a far greater chance that the open space will be developed, because there are fewer obstacles to construction (no trees or stumps), ecological interest in these areas is not as great and thus public pressure to save them is not as strong, and finally, the peripheral location of these areas, which makes them a protective "cushion" for the woodlands, usually means that they are most exposed to urban development. For these reasons, the area of open spaces is not counted in the typology of the sites to be evaluated. On the other hand, their importance for recreation has not been ignored, and these areas are taken into account in the evaluation. People like open spaces near forests; they prefer the edge of the forest, opening onto a field or lake, to the dense inner forest (Kiemsted, 1967) for both recreational and dwelling purposes (Lugassy, 1970). The importance of open spaces to all levels of urban living has been demonstrated by many authors (Rey-Lescure, 1976). The recreational evaluation, then, covers both the forest and the associated open spaces.

Delimiting the sectors

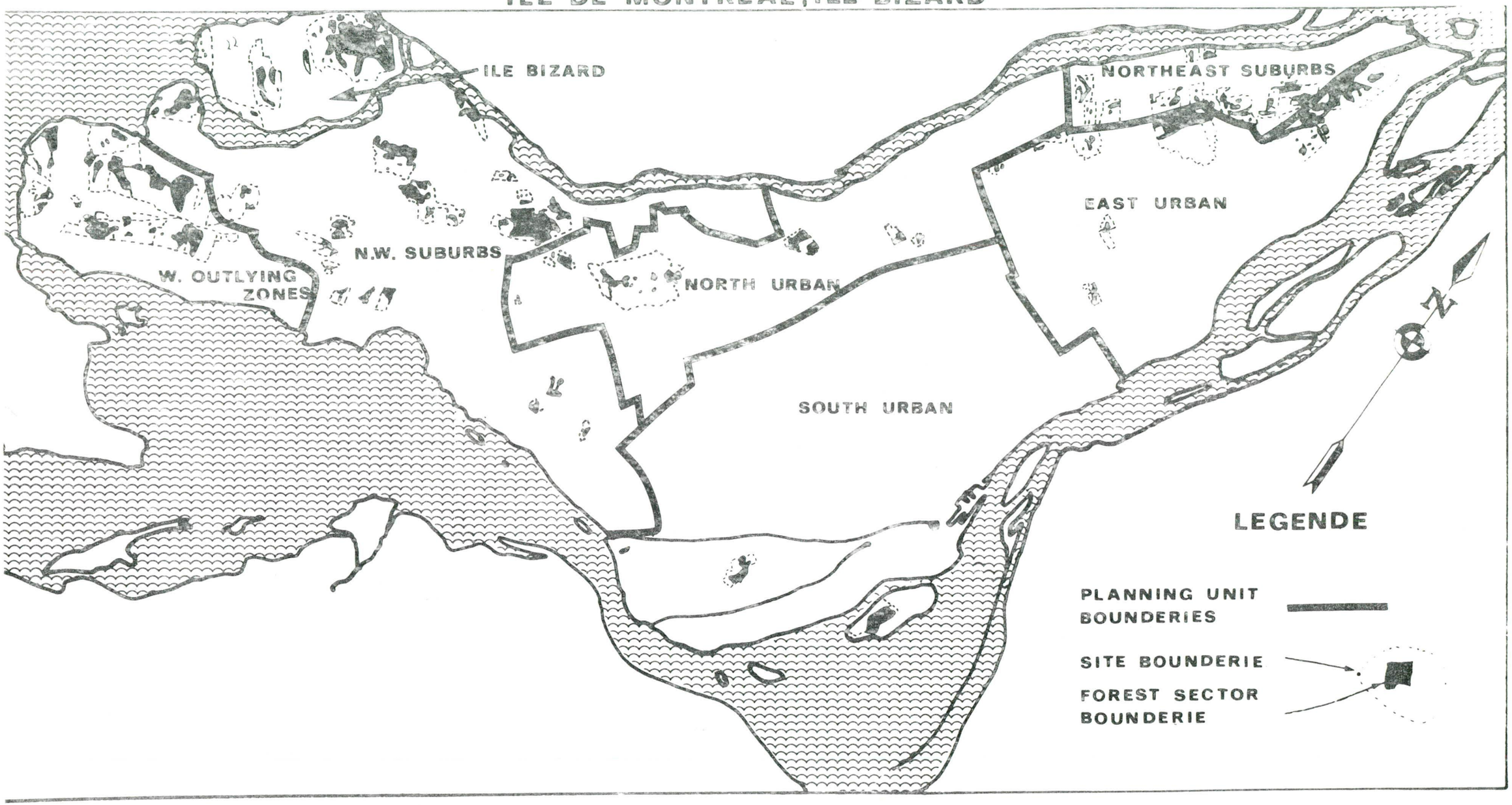
(See photographs in appendix)

Once each site has been classified as a forest, large woodlot, or woodlot, it is broken down by means of aerial photographs into evaluation units, designated as either forested sectors or unforested sectors.

The following criteria define forested sectors:

- homogeneity in vegetation composition (deciduous, mixed, or coniferous stands),

FIGURE Nº1: EVALUATION OF SITES IN THE MONTREAL URBAN COMMUNITY
ILE DE MONTREAL, ILE BIZARD



- homogeneity in vegetation density,
- homogeneity in the storey density,
- homogeneity in the height of the dominant class.

In addition, various criteria can provide a more detailed differentiation within a homogeneous zone - for example, a path or stream cutting the zone into two separate parts.

Similarly, unforested sectors associated with forested sectors in a single site are also divided into units. The unforested sectors are open areas, such as fields, fallow land, vacant lots... They are located between two or more forested sectors, or separated from each other by a screen of trees, a stream, or a ravine.

The evaluation of recreation potential is done at two levels:

1) Intrasite level: each forested and each unforested sector is evaluated, making intrasite comparisons possible. Two tools have been developed for this purpose:
   - the sector evaluation card - forested sector,
   - the sector evaluation card - unforested sector;
2) Intersite level: intersite comparison is possible with synthesis evaluation cards, which summarize the results of the sector evaluation cards for each site.

6.1 SECTOR EVALUATION CARDS

These cards are divided into several columns, which represent the different developmental infrastructure categories, and several lines listing key elements - the ecological, physical, and esthetic factors which are used as evaluation criteria (Tables 3 and 4). At the intersections of the lines and columns, there are: a weighting coefficient (C), partial ratings (PR), a rating (R), and a result (Re). Let us examine each of these elements in detail.

6.11 DEVELOPMENTAL INFRASTRUCTURE CATEGORIES

We have defined five developmental infrastructure categories for outdoor recreation. These categories are very general and are intended to be broad enough to include any kind of recreational activity, given the similarities in facilities necessary. Four of these categories are applicable to forested sectors (Table 3): serviced areas, wilderness shelters and day-use areas, trails, and ecological reserves. The fifth category, games and sports fields, is applicable to unforested sectors (Table 4).

It would have been unrealistic to develop a site evaluation method based on a more or less exhaustive list of outdoor activities, since no study of the expressed needs of the public was available. When such a study does become available, planners can use our infrastructure categories and choose specific sites or sectors which will be suitable for the activities desired by the population in a particular area. For example, if the need for an archery field is identified, the results for the "games and sports field" category can be used; if a picnic site requiring a minimum of development is needed, the "wilderness shelters and day-use areas" category can be used.

Serviced areas

This category includes all facilities equipped with major infrastructures that will cause a noticeable impact on the woodlands where they are installed. Among these are camping and picnicking grounds with services, lodges, summer camps, resort facilities, auditoriums, reception centres, and outdoor theatres.

FORESTED SECTOR

	SERVICED AREAS				WILDERNESS SHELTER AND DAY-USE AREAS				TRAILS				ECOLOGICAL RESERVE			
	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re
MICROCLIMATE																
SUNLIGHT PREVAILING WINDS	1				2				0				0			
SOIL																
DRAINAGE CARRYING CAPACITY SOIL DEPTH	2				2				2				0			
VEGETATION																
STATION QUALITY STOREY DENSITY SENSITIVITY CLASS	1				2				5				8			
OPEN AREA																
AREA POSITION	2				1				0				2			
WATER																
AREA OR LENGTH POSITION QUALITY RIPARIAN VEGETATION	1				1				1				3			
TOPOGRAPHY																
SLOPE	1				1				2				0			
LANDSCAPE																
VISUAL INTEREST COEFFICIENT	2				1				1				0			
RESULT																

C: COEFFICIENT PR: PARTIAL RATING R: RATING Re: RESULT

COMMENTS

TABLE 3

SECTOR EVALUATION CARD

Case No

Percentage of forested area Woodlot W

Total: %

UNFORESTED SECTOR

	V				V				V				V			
	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re
MICROCLIMATE sunlight prevailing winds	1				1				1				1			
SOIL drainage	2				2				2				2			
VEGETATION tree layer and shrub layer	1				1				1				1			
WATER area or length position quality	1				1				1				1			
TOPOGRAPHY slope and position	1				1				1				1			
LANDSCAPE visual interest coefficient	2				2				2				2			
FINAL RESULT																

C: COEFFICIENT PR: PARTIAL RATING R: RATING Re: RESULT

GENERAL COMMENTS

TABLE 4

SECTOR EVALUATION CARD

Unforested sectors	Percentage of total unforested area
U	%
U	%
U	%
U	%

case no.

Wilderness shelters and day-use areas

This category requires a certain amount of site development, but less than the preceding category. Furthermore, a system of rotation for the location of the facilities can be planned, allowing respite to the site if there is a sudden increase in popularity. This category includes wilderness camping and picnicking grounds, emergency shelters, and spaced stations on cross-country skiing or hiking trails.

Trails

By the term "trail" we refer to all paths used for recreational activities (whether passive or active) but not service roads (which are included in the categories "serviced shelters" and "wilderness shelters and day-use areas"). The evaluation of the physical elements of a site is based on the summer use of the trails - which does not in any way imply the neglect of wintertime recreational activities - but does not specifically analyse it. A large range of activities makes use of nature trails: hiking, bicycling, nature walks, cross-country skiing, snowshoeing, jogging, snowmobiling, horseback riding, physical fitness activities.

Ecological reserves

We do not give to this term the restrictive definition used in the Act respecting Ecological Reserves (Assemblée Nationale du Québec, 1974) but rather the meaning of site protection for pedagogical and scientific purposes. Strictly speaking, ecological reserves are not a developmental infrastructure category; however, our urban forest conservation viewpoint prompts us to consider this aspect of forest use, especially since the educational value of an ecological reserve is greatly enhanced by the proximity of a large student population. The rating of a site in the ecological reserve category should be considered as an indication of potential rather than an affirmation, given the very general approach of our evaluation system. The sites that obtain the highest ratings in this category should be scientifically evaluated before any conservation and/or development work is done.

Games and sports fields

This category is applicable on the unforested sector evaluation card only; it is in fact the only type of infrastructure considered for this kind of space. However, a wide variety of sports and games can be played in these areas, such as track and field, team sports, tennis, children's games.

6.12 KEY ELEMENTS

With the key elements or factors a qualitative and quantitative description of the sites with regard to the above-mentioned developmental infrastructure categories is possible. The key elements are of a biophysical or esthetic nature. As shown in Tables 3 and 4, they are not all accorded equal importance (their specific weighting is fixed by a weighting coefficient in each column). An element may be omitted from the evaluation of a particular category (in which case, the coefficient is 0).

Most key elements are made up of several subfactors, which are rated in the field.

Ratings are given on a scale of 0 to 10, with the following equivalencies:

Qualitative value	Quantitative value
none	0/10
poor	3/10
acceptable	6/10
good	8/10
excellent	10/10

A rating of 6/10 is considered average. At or above this level, the subfactor or key element is acceptable.

There are seven key elements: microclimate, soil, vegetation, open area, water, topography, and landscape. The following tables show:

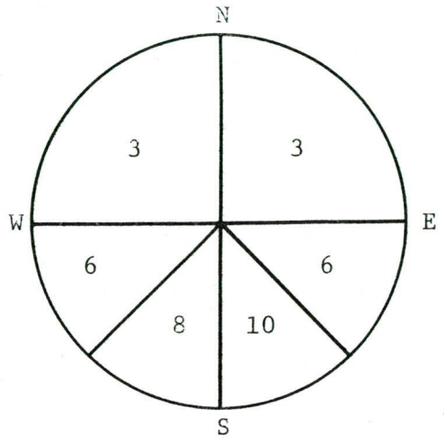
- characteristics of each key element and subfactor, with regard to the different developmental infrastructure categories, where applicable,
- the ratings assigned to each of the subfactors for the different categories,
- the procedure followed to assign to each key element a rating on a scale of 10.

Microclimate (Table 5)

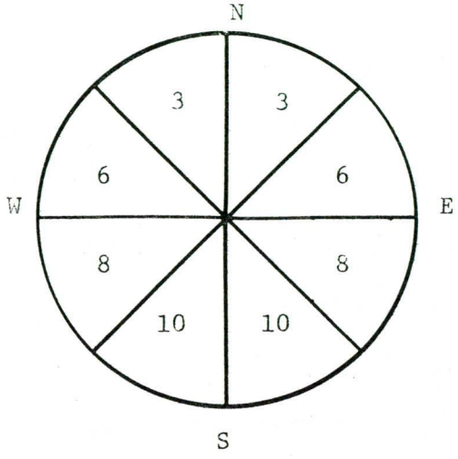
The two aspects of microclimate that are easy to measure in the field are exposure to sunlight and exposure to prevailing winds. Ratings for exposure to sunlight vary depending on the type of activity involved: serviced shelters and wilderness shelters and day-use areas are grouped together and games and sports fields form a separate group. Wind force and frequency are the basis for measuring the exposure to prevailing winds;

A: EXPOSURE TO SUNLIGHT

SERVICED AREAS
WILDERNESS SHELTERS



GAMES AND SPORTS FIELD



B. EXPOSURE TO PREVAILING WINDS

FOR SLOPE

TO THE SOUTH	(S)	: 0
SOUTHWEST	(SW)	:-1
WEST	(W)	:-1
NORTH	(N)	:-1
NORTHEAST	(NE)	:-1

FLAT LAND: NEUTRAL EXPOSURE: X

Note: The rating for exposure to sunlight is based on site exposure (exposure is shown by the cardinal points in the circle); figures in the sections show the ratings. For a combination of exposures, an average should be calculated.

PROCEDURE:

1. RATE EXPOSURE TO SUNLIGHT (A)
2. RATE EXPOSURE TO PREVAILING WINDS (B)
3. ADD A AND B

TABLE 5

KEY ELEMENT: MICROCLIMATE

all of the activity categories are given the same rating. This key element is not applicable to trails and ecological reserves, since it plays only a negligible role in development for and participation in relevant activities and thus has no significant influence on the selection of a site or sector.

With the exception of Mount Royal and a few other places, the MUC territory is flat, which means that exposure to winds is uniform throughout. Therefore, during the evaluations (see examples in appendix), only sites with an unusual exposure were rated; others were marked x.

Soil (Table 6)

The purpose of analysing this key element is to determine how suitable the site is for activities and facilities. Three subfactors are evaluated: drainage, carrying capacity, and soil depth. Because of the complexity of the first two subfactors and the low degree of accuracy required in our evaluation, we decided to use only one element, the percentage of sand (i.e. particles of 0.05 to 2.0 mm (0.02 to 0.08 in) in diameter found in a soil sample taken at a depth of 30 to 60 cm (12 to 24 in) in each sector). Heavy deposits of peaty organic matter and fill composed of industrial or domestic waste products have the lowest ratings for drainage. The soil depth subfactor rates the depth of the loose soil layer, in accordance with the geomorphological situation and the biological components of the site.

Since ecological reserves do not require any special infrastructure, the key element "soil" does not enter into the evaluation. For games and sports fields the evaluation deals with drainage only, since the other subfactors are not very relevant to the installation of this kind of facility.

Vegetation (Tables 7, 8 , 9, and 10)

The subfactors used for evaluating the key element "vegetation" are station quality (Table 7), storey density (Table 8), and sensitivity class (Table 9).

Station quality (Table 7) is determined from a curve showing the "age-height" relationship. This curve is based on 541 samples of representative trees in the dominant class of the stands evaluated within the MUC. Using the SACADOS analysis system (Boudoux and Bonenfant, 1975) to approximate functions, we chose second order polynomial regression represented by the curve in Table 7. Among the simpler mathematical models, this one best fits the data we observed. Because of

A: DRAINAGE

% SAND	RATING
100 - 86	10
85 - 71	9
70 - 56	8
55 - 41	7
40 - 26	6
25 - 11	5
10 et -	4
ORGANIC MATTER	3
WASTE FILL	0

COMMENTS

FOR MIDDLE OR BOTTOM OF SLOPE, LOWER RATING (-1)

FOR DEPRESSION OR BASIN, LOWER RATING (-2)

B: CARRYING CAPACITY

% SAND	RATING
100 - 71	10
70 - 41	8
40 - 26	6
25 et -	3

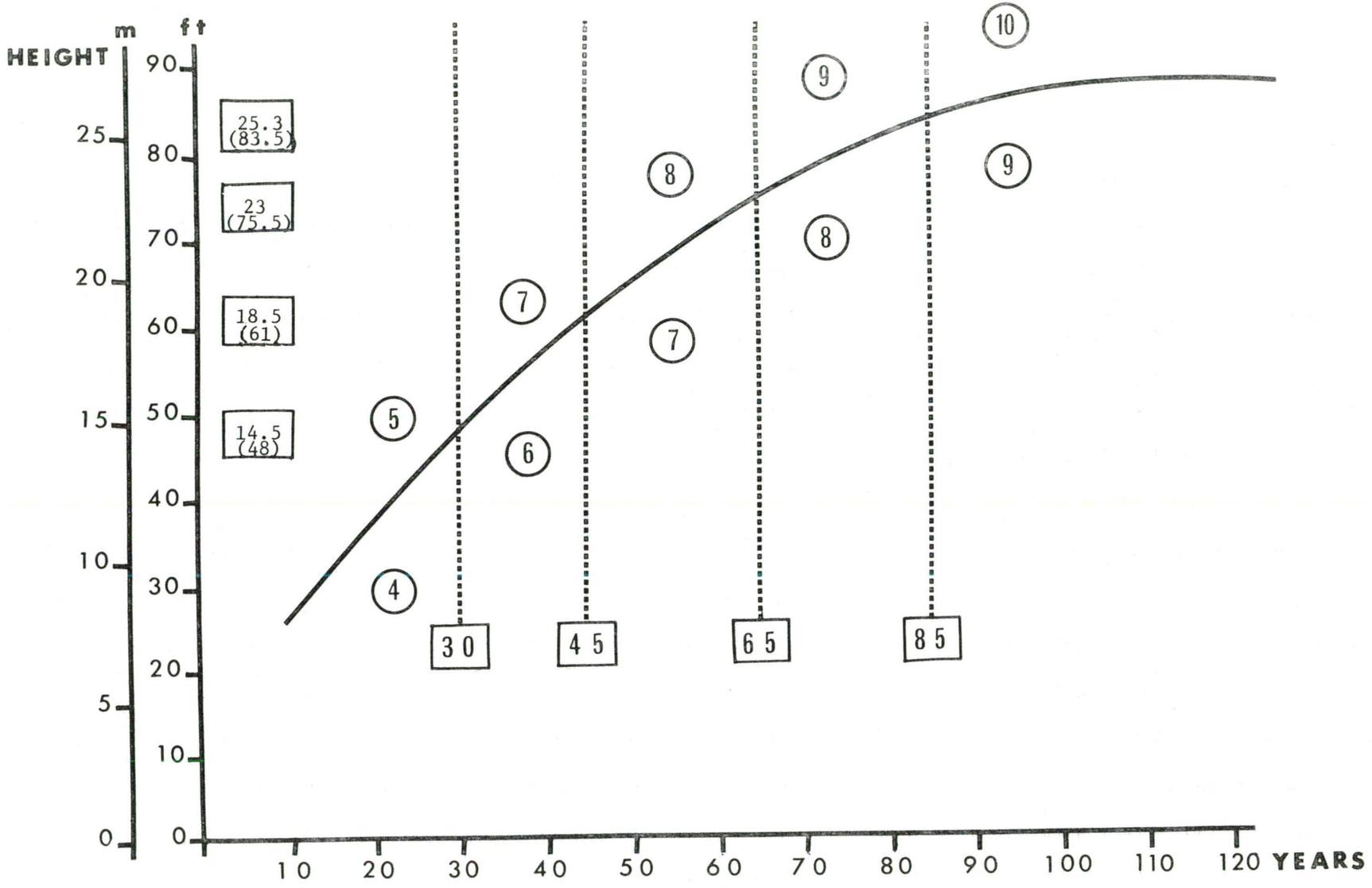
C: SOIL DEPTH in cm (in.)

		RATING
0 - 29	(0 to 11)	3
30 - 89	(12 to 35)	6
90 - 179	(36 to 72)	8
180 and over	(73 and over)	10

PROCEDURE:

THE PROCEDURE IS NOT IDENTICAL FOR ALL ACTIVITY CATEGORIES ON THE EVALUATION CARDS. SOMETIMES EVALUATION OF SECTION A (eg. GAMES AREA) IS SUFFICIENT; FOR OTHER ACTIVITIES, SECTIONS A, B, AND C MUST BE EVALUATED INDIVIDUALLY AND THE AVERAGE CALCULATED.

TABLE 6
KEY ELEMENT: SOIL



LEGEND

RATING

m (ft) MAXIMUM VALUES FOR AGE AND HEIGHT CLASSES

PROCEDURE:

- CHOOSE SPECIMENS REPRESENTATIVE OF THE HIGHEST HEIGHT CLASS OF THE STAND.
- MEASURE HEIGHT AND AGE OF EACH SPECIMEN. MARK THE VALUES ON THE CURVE, AND CALCULATE THE AVERAGE TO OBTAIN THE RATING.

TABLE 7

KEY ELEMENT: VEGETATION

STATION QUALITY

the low level of accuracy required, all species were lumped together. Station quality is weighted according to age: the highest ratings are assigned where the age-height classes are highest. A mature forest can be developed immediately and the public generally prefers well-grown forests to young, bushy thickets.

Storey density (Table 8) is evaluated on the basis of the percentage cover of each layer: the highest rating is given for maximum cover. Adding the ratings of the different layers to obtain the final rating for this subfactor favours uneven-age stands with more layers than other stands.

Sensitivity classifications (Table 9) assess the fragility of a forest community. This subfactor is applicable to the ecological reserve category only; the highest ratings are given to the most fragile communities. Table 9 is based on the following criteria:

1- A transitional stand should be analysed in terms of the forest community that it is evolving towards.

2- Next, plant communities or groups are classified by soil type and drainage characteristics. Plant groups that usually grow on very dry or very wet soil are considered very sensitive because any interference or use may cause irreversible environmental damage.

3- This last factor is weighted according to how common a particular forest community is in the greater Montreal region. Of two communities of equal sensitivity, the less common one will be assigned a higher rating.

The ratings for vegetation in unforested sectors are different (Table 10). They refer to characteristics that influence the visual quality of these open spaces.

Open area (Table 11)

Although our study is oriented towards urban forests, we cannot ignore the spatial relationships that exist between the forested area (shape, perimeter, gaps) and the unforested area inside or outside the forest, which determine the openness of the forest, its penetrability, and the type of development suited to its compact or spread-out nature. For a large number of recreational activities openings are the most important part of the forest. The border between the forest and the open area is often more attractive than the forest itself. The relationship between forested and open spaces is therefore evaluated under the key element of open area.

STOREY DENSITY

STOREY	% COVER	RATING	MAXIMUM RATING
UPPER STOREY - DOMINANT CLASS	75 and over 50 to 74 0 to 49	5 4 3	5
- INTERMEDIATE CLASS	CONTINUOUS 50% and over DISCONTINUOUS 25% to 49% RARE OR ABSENT 24% and under	2 1 0	2
- UNDER STOREY	DENSE 75% and over FAIRLY DENSE 30% to 74% RARE OR ABSENT 29% and under	2 1 0	2
- UNDER COVER	CONTINUOUS 50% and over DISCONTINUOUS 49% and under	1 0	1

PROCEDURE:

A. - RATE EACH LAYER

B. - ADD THE RATINGS TO OBTAIN A RATING FOR STOREY DENSITY OF VEGETATION

TABLE 8

KEY ELEMENT: VEGETATION
STOREY DENSITY

SENSITIVITY CLASSES FOR THE MONTREAL REGION

CLASSES	5 (least sensitive)	4	3	2	1 (most sensitive)
RATINGS	2	4	6	8	10
ASSOCIATIONS	BEECH MAPLE*with HICKORY MAPLE*with BASSWOOD MAPLE with ELM SUGAR MAPLE MAPLE with ASH	RED OAK BUR OAK BEECH with BASSWOOD ELM MAPLE*-NORTHERN ASSOC. MAPLE*with RED OAK	LARCH (TAMARACK) RED MAPLE HEMLOCK RED MAPLE with YELLOW BIRCH ELM-ASH SILVER MAPLE ELM with HICKORY ASH with SILVER MAPLE	ASPEN FIRE BEECH with ASPEN BLACK ASH YELLOW BIRCH GREY BIRCH MIXED CEDAR CEDAR with ASH WHITE PINE and RED PINE	WHITE SPRUCE BALSAM FIR BLACK SPRUCE PEATLANDS

*MAPLE: SUGAR MAPLE

PROCEDURE:

A. - DETERMINE WHAT ASSOCIATION THE FOREST BELONGS TO.

B. - FIND THE ASSOCIATION ON THE CHART AND NOTE THE RATING.

TABLE 9
KEY ELEMENT: VEGETATION
SENSITIVITY

VEGETATION OF UNFORESTED SECTORS

UPPER STOREY / UNDER STOREY AND UNDER COVER	NO TREES PRESENT	TREES PRESENT		
		SCREENS	GROVES	ABUNDANT REGENERATION
PASTURE	APPROXIMATE CONDITION 6 very well maintained 4 partially maintained 3 not maintained	8 - 10	8 - 10	6 - 8
FALLOW OR WASTE LAND	3 dump	6	6	3 - 6

HEDGES: Species such as crataegus, prunus, cornus, salix, thuja.

ABUNDANT: plus 2

SPARSE: plus 1

PROCEDURE:

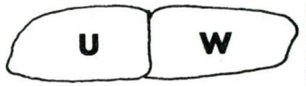
- DETERMINE WHICH TERMS BEST DESCRIBE THE SITE. IF THE SITE HAS TWO DISTINCT ASPECTS, AVERAGE THE RATINGS OBTAINED.

TABLE 10
KEY ELEMENT: VEGETATION
UNFORESTED AREAS

A: AREA RATIO

% FORESTED	% UNFORESTED	RATING
1 - 50	99 - 50	10
51 - 60	49 - 40	9
61 - 70	39 - 30	8
71 - 80	29 - 20	6
81 - 100	19 - 0	4

B: POSITION

TYPES **W:** Forested **U:** Unforested		WEIGHTING FACTOR FOR RATINGS
Peripheral		1.0
Contained		0.9
Interlocked		0.8
Adjacent		0.7

For the category of ecological reserves, the term buffer zone is used instead of open area. The buffer zone can be other woodlands (Case A) or an open area (Case B), whose depth will be evaluated. If there is no buffer zone, a rating of 0 is given. If the buffer zone is of several types, the rating should be worked out according to the percentage of each type.

Case A: forested buffer zone

Depth in m(in ft)		Rating
152 and over	(500 and over)	10
91 - 151	(300 - 499)	8
31 - 90	(100 - 299)	6
8 - 30	(25 - 99)	4
0 - 7	(0 - 24)	0

Case B: open buffer zone

Depth in m(in ft)		Rating
305 and over	(1000 and over)	6
229 - 304	(750 - 999)	5
153 - 228	(500 - 749)	4
76 - 152	(250 - 499)	3
16 - 75	(50 - 249)	2
0 - 15	(0 - 49)	0

PROCEDURE:

1. DETERMINE THE PERCENTAGE OF FORESTED AND UNFORESTED AREA AND ASSIGN A RATING (A)
2. WEIGHT THE RATING (A), USING THE WEIGHTING FACTOR (B)
   A X B = FINAL RATING

TABLE 11
KEY ELEMENT: OPEN AREA

In forested sectors (Table 3), open area is a key element which influences developmental potential and the quality of the recreational activities that can be pursued there.

Two subfactors are considered:

1- Area ratio, which evaluates the amount of unforested area, if any, contiguous to a forested sector. This gives an overall rating which is weighted by:

2- The relative position of the forested and unforested areas. The optimal situation is an unforested area surrounding a forested area. The next best is a clearing in a forested area, then an unforested area cutting into a forested area, and finally, a forested area adjacent to an unforested area.

It should be remembered that unforested sectors in a site are also evaluated as a resource suitable for developing games and sports fields (Table 4).

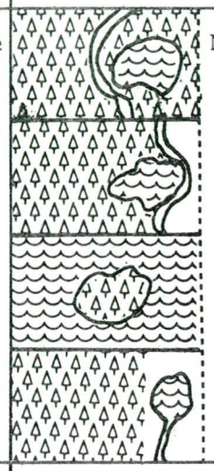
Water (Table 12)

Our evaluation method does not evaluate the potential for water sports or fishing, but rather looks at water as an environmental element that enhances the quality of the activities practised in a woodland area. An example is a picnic site set up under forest cover alongside a lake. We have determined three criteria to evaluate water present in a site: area or length of the body of water, its position, and its quality.

Values for area and length are based on those of typical lakes or watercourses in Quebec. The criterion of position consideres the path of a watercourse or the location of a lake in a woodland area. Under the criterion of quality are grouped such factors as depth, current, slope of banks, composition of riverbed or lake bottom, visible depth as an indication or turbidity.

With these subfactors a good description of the aquatic resource can be obtained without recourse to complex instrumentation in the field.

For the category of ecological reserve, evaluation is based on the amount of riparian vegetation; the information provided is intended to give an indication only. A floristic list should be made in order to estimate the real quality of a site, if the overall evaluation urges its conservation as an ecological reserve.

AREA OR LENGTH				POSITION		QUALITY									
AREA IN HECTARES (IN ACRES)		LENGTH AS A % OF THE PERIMETER OF THE FORESTED FACTOR		RELATIVE POSITION		AVERAGE DEPTH IN CENTRE IN METRES (FEET)		CURRENT IN KM/HOUR (MI/HOUR)		SLOPE OF BANKS		BED: PARTICLE SIZE		VISIBLE DEPTH IN METRES (FEET)	
Rating	Note	Rating	Note		Note	Rating	Note	Rating	Note	Rating	Note	Rating	Note	Rating	Note
9 and over (22 and over)	10	75 and over	10		10	0 - .3 (0 - 1)	3	0 - 5 (0 - 3)	10	0 - 5	10	SAND	10	0 - .3 (0 - 1)	3
5 - 8 (12 - 21)	8	50 - 74%	8		8	.4 - 1.2 (2 - 4)	8	6 - 10 (4 - 6)	8	6 - 15	8	SAND AND PEBBLES	8	.4 - .9 (2 - 3)	6
3 - 4 (7 - 11)	6	25 - 49%	6		6	1.3 - 3.0 (5 - 10)	10	11 - 15 (7 - 9)	6	16 - 45	6	MIXTURE	6	1.0 - 1.8 (4 - 6)	8
0 - 2 (0 - 6)	3	10 - 24%	3		3	3.1 and over (11 and over)	6	16 and over (10 and over)	3	46 and over	3	SILT AND CLAY	3	1.9 and over (7 and over)	10
RATING OUT OF 10				RATING OUT OF 10		AVERAGE OUT OF 10									

NOTE: WATERCOURSES LESS THAN 2 m (6 feet) WIDE ARE NOT EVALUATED

ECOLOGICAL RESERVES

- FOR ECOLOGICAL RESERVES EVALUATE ANY BODY OF WATER THAT HAS POTENTIAL FOR OBSERVATION OF RIPARIAN VEGETATION
- RATE AS INDICATED BELOW

ABUNDANT RIPARIAN VEGETATION WITH POSSIBILITIES OF INCREASING 10/10

RIPARIAN VEGETATION LIMITED TO CERTAIN SECTIONS FOR VARIOUS REASONS 6/10

NO VEGETATION 0/10

PROCEDURE:

1. RATE THE AREA OR LENGTH OF THE BODY OF WATER ON A SCALE OF 10
2. RATE ITS POSITION VIS A VIS THE WOODLAND ON A SCALE OF 10
3. RATE ALL BANK AND WATER QUALITIES ON A SCALE OF 10 AND AVERAGE THESE RATINGS
4. AVERAGE 1, 2, AND 3.

TABLE 12
KEY ELEMENT: WATER

Topography (Table 13)

This key element is considered to be a major characteristic of a site.

In our evaluation, topography is expressed in terms of position, slope, and microrelief. The ideal position is on a hilltop rather than in a basin, while a gently sloping microrelief is more advantageous than a steep, uneven slope; slope is a major limitation for the development of a games and sports field. On the other hand, topography should not be a significant element in the potential of an ecological reserve.

Landscape (Table 14)

Here, the term "landscape" designates the visual character of the area surrounding a woodland or open area. The visual quality of the setting influences the overall impression a site gives.

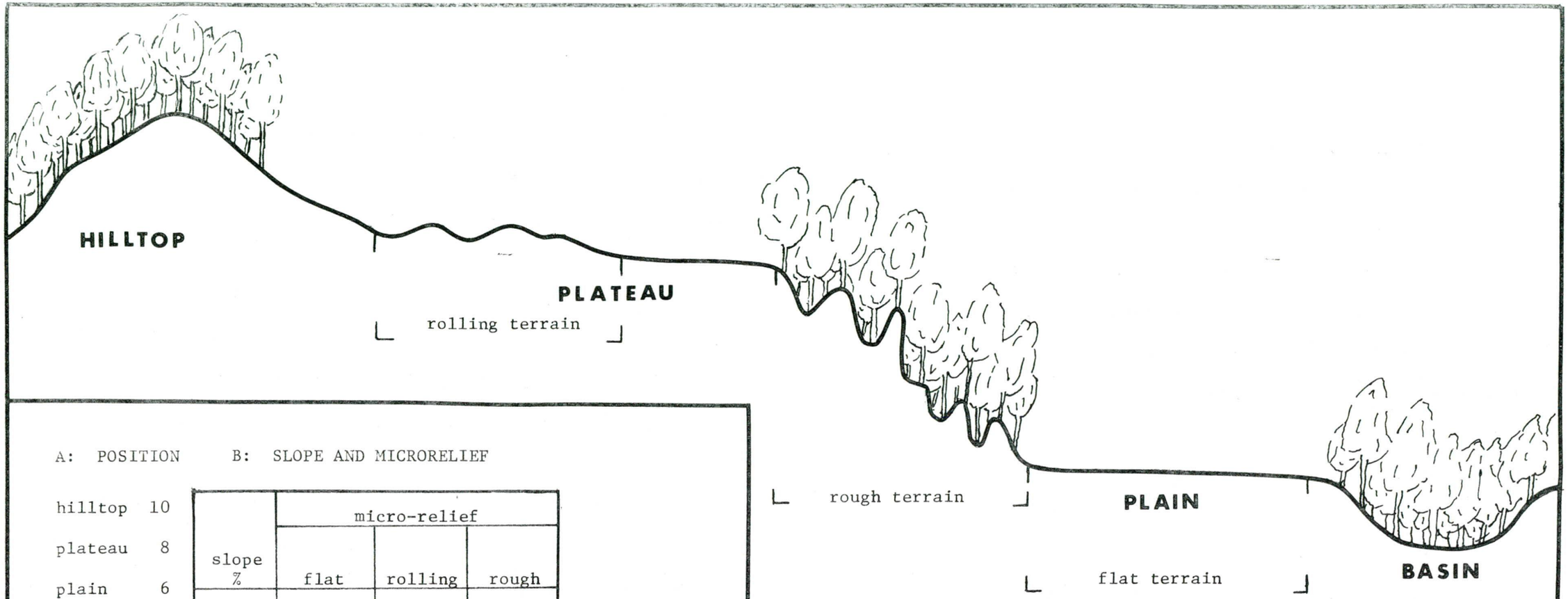
Four landscape elements have been defined:

1) water, in the form of lakes or rivers,
2) green spaces, rural landscape, groves, fields, pastures, etc...,
3) residential landscape, from the high-density urban type to the low-density surburban type,
4) industrial landscape, storage zones for materials or equipment, factories, etc...

Distance is an important perception factor in the evaluation of a landscape. For our survey, we used the system tested by Litton (1968) which was used in four years of field work.

	From	To
foreground	0 to 400 m (0 to 1/4 mi).....	800 m (1/2 mi)
middle distance	400 to 800 m (1/4 to 1/2 mi).....	5 to 8 km (3 to 5 mi)
background	5 to 8 km (3 to 5 mi).....	no limit

We have deliberately ignored the last category, since we are studying merely the landscape around woodlands, not vast stretches of land. Furthermore, the metropolitan area offers few sites with a view of more than 5 kilometres. The combination of foreground and middle distance enables us to give a very general description of the surrounding area, including not only the different types of landscape, but also topography. A varied topography in a landscape will raise the final mark.



A: POSITION

hilltop	10
plateau	8
plain	6
basin	4

B: SLOPE AND MICRORELIEF

slope %	micro-relief: flat	rolling	rough
0-5	10	8	6
6-10	8	6	4
11-15	6	4	2
16 +	4	2	0

for games and sports fields, substract 2 points from each of these numbers

PROCEDURE:

DECIDE WHICH TERMS BEST DESCRIBE THE SITE.
AVERAGE A AND B.

TABLE 13
KEY ELEMENT: TOPOGRAPHY

FOREGROUND	MIDDLE DISTANCE	RATING	
0 - 400 or 800 m (0 - ¼ or ½ mi)	400 - 800 m to 5 - 8 km (¼ - ½ to 3 - 5 mi)	MONOTONOUS TOPOGRAPHY	VARIED TOPOGRAPHY
WATER	WATER	9	9
	GREEN SPACES	7	10
	RESIDENTIAL	5	7.5
	INDUSTRIAL	4	6
GREEN SPACES	WATER	5	7.5
	GREEN SPACES	6	9
	RESIDENTIAL	4	6
	INDUSTRIAL	3	4.5
RESIDENTIAL	WATER	5	7.5
	GREEN SPACES	4	6
	RESIDENTIAL	3	4.5
	INDUSTRIAL	2	3
INDUSTRIAL	WATER	3	4.5
	GREEN SPACES	3	4.5
	RESIDENTIAL	2	3
	INDUSTRIAL	1	1.5

PROCEDURE:

TABLE 14

KEY ELEMENT: LANDSCAPE

TO OBTAIN THE FINAL RATING, IDENTIFY AND RATE THE VIEWS PROCEEDING HORIZONTALLY. SINCE LANDSCAPE ARE RARELY UNIFORM ALL AROUND A FORESTED OR OPEN SECTOR, EACH OF THE LANDSCAPE TYPES MUST BE RATED AND PROPORTIONATELY AVERAGED FOR THE FINAL RATING.

6.13 WEIGHTING COEFFICIENTS

These are multipliers that give the relative weight of a key element for each developmental category. (A key element may not apply to a particular category; in this case, the coefficient is 0.) As with the ratings, the basis for these coefficients was our own judgment, our field experience, the collaboration of several specialists, and the quantitative interpretation of descriptions and opinions given in the literature on outdoor recreation.

Here are the reasons behind our choice of weightings (Tables 3 and 4):

Microclimate: This element is important in the placement of single-position developments, such as chalets or picnic grounds. However, it is even more important for wilderness developments, because less comfort is provided. For this reason, their weighting coefficient is 2, while it is 1 for serviced shelters. Trail activities depend on regional climate conditions, while the ecological reserve, since it is not an activity in itself, should not be evaluated with respect to microclimate. Thus, in these two cases, a coefficient of 0 is justified.

Soil: This element is of major importance for all developments, and is therefore given a cofficient of 2. On the other hand, it cannot alter the choice of a site for ecological reserve; in this case, the coefficient is 0.

Vegetation: This element is less important for permanent developments, which are often located at the edge of the forest (coefficient 1), than for wilderness developments (coefficient 2). Trails are more interesting if they pass through varied and high-quality stands (coefficient 5). Vegetation is usually the most important element in justifying the creation of an ecological reserve (coefficient 8).

Open area: This factor, it can be seen, has less importance for wilderness developments (coefficient 1) than for serviced developments (coefficient 2). Open areas are of little advantage to trails, which are within the forest (coefficient 0). The creation of an ecological reserve in an urban setting, however, requires the presence of a buffer zone (coefficient 2).

Water: This element adds diversity in site development (coefficient 1). For ecological reserves, riparian vegetation is of great importance (coefficient 3), both for its scientific and educational value and the shelter it provides for wildlife.

Topography: This element has the most importance for activities associated with the development of a trail (coefficient 2).

Landscape: For the same reason as vegetation, landscape is of most importance for serviced developments (coefficient 2). It has no importance for ecological reserves (coefficient 0).

6.14 RESULTS (Tables 3 and 4)

A rating (R) is obtained from different partial ratings (PR), by means of the various procedures explained in Tables 5 to 14. This rating (R), on a scale of 10, is then multiplied by the weighting coefficient (C), which gives the result (Re). Next, the results for each key element involved are totalled for each developmental infrastructure category. This final result is shown at the bottom of each column and is expressed as a percentage. The final result for serviced and wilderness shelters and day-use areas is obtained instantly, because the sum of the coefficients equals 10. For trails and ecological reserves, it is necessary to perform a simple rule of three, since the sums of the coefficients are 11 and 13 respectively.

The results on the sector evaluation card, since they identify which sectors in a site are the most suitable for a particular use, constitute the basic information for urban forest site development. The analysis should be done FOR EACH DEVELOPMENTAL CATEGORY. In other words, the highest final result does not imply that that infrastructure category is the preferred use for that sector; the result must be compared to the results for the same use in other sectors. It should be remembered that it is the study of demand that will determine the main use or uses of a site. Thus the highest final result in the developmental category that corresponds to the chosen use indicates the sector with the greatest potential; the lowest result indicates the one with the least potential.

6.2 SYNTHESIS EVALUATION CARDS

The purpose of these cards (ex: Table 15) is to evaluate total site potential for each of the previously defined developmental categories. The results show the relative value of the sites; thus a preliminary selection of the best sites for a particular outdoor recreational activity is possible, once the needs of the population have been determined. These cards are therefore used for general urban forest planning; they identify the top-priority sites for preservation.

Synthesis evaluation cards summarize the elements of the forested and unforested sector evaluation cards. They list the five developmental infrastructure categories and the seven key elements, without the details of the subfactors. The weighting coefficients remain the same.

6.21 RATINGS (R)

The rating on the synthesis evaluation card is the average of the corresponding ratings from the sectors evaluation cards that were used to evaluate the site.

This rating is obtained through two operations:

1) Multiplying the ratings from each sector evaluation card by the "percentage of total forested (or unforested) area" (see space in lower right of Tables 3 and 4);
2) Adding the results to obtain a mark on a scale of 10.

6.22 RESULTS (Re)

The results are the product of the previously determined ratings and the weighting coefficients. The sum of the results (Re) gives the final result, expressed as a percentage, as on the sector evaluation cards. With these results, intersite comparisons for each developmental infrastructure category can be made.

6.23 OVERALL RESULTS (Table 15)

A last type of result is shown at the bottom of the synthesis cards. This is the overall result for the site, representing the evaluation of its recreational potential for the multipe activities possible--that is, all of the developmental infrastructure categories together. However, the category of ecological reservie is not included, as we cannot speak of activities. The overall results are important in so far as they give a general picture of the site, and at a quick glance at the map of Montreal Island a general idea of its forests' recreational potential.

	WOODLOT												NON FORESTED			WILDLIFE
	SERVICED AREAS			WILDERNESS SHELTERS AND DAY-USE AREAS			TRAILS			ECOLOGICAL RESERVES			GAMES AND SPORTS FIELDS			UNGULATES AND MIGRATORY BIRDS CLASSES 1 AND 2
	C	R	Re	C	R	Re	C	R	Re	C	R	Re	C	R	Re	
MICROCLIMATE	1			2			0			0			1			
SOIL	2			2			2			0			2			
VEGETATION	1			2			5			8			1			
LANDSCAPE	2			1			1			0			2			
OPEN AREA	2			1			0			2			0			
WATER	1			1			1			3			1			
TOPOGRAPHY	1			1			2			0			1			
FINAL RESULT																

	C	FR	V	C	FR	V	C	FR	V	C	FR	V	OVERALL RESULT %
URBAN WOODLANDS	3			0			1			3			
SUBURBAN WOODLANDS	2			1			2			2			
OUTLYING WOODLANDS	1			2			3			1			

C: COEFFICIENT R: RATING Re: RESULT FR: FINAL RESULT V: VALUE

COMMENTS

TABLE 15

SYNTHESIS EVALUATION CARD

Case No

hectare (acre)

Total area

Tables showing the overall results for sites have new weighting coefficients for each recreational development category. The difference has to do with site location (urban, suburban, outlying). They give a better picture of the site in terms of population density.

Thus, an urban site is more suitable for a games and sports field than is a site in a low-density outlying area. On the other hand, wilderness shelters and day-use areas are more advantageous in outlying areas than in highly urbanized settings.

The overall result is obtained by:

- selecting the line that corresponds to the location of the site to be rated (urban, suburban, outlying),
- entering the final absolute result,
- multiplying the final result by the coefficient (C) to obtain the value (V),
- dividing the sum of the values (V) by the sum of the coefficients (C) to obtain the overall result expressed as a percentage.

Wildlife

Consideration has been given to the use of forest lands for wildlife management, for the purposes of species protection or hunting. We used the Canada Land Inventory (1969), referring only to productivity classes 1 and 2, which classify land according to its potential for ungulates and migratory birds. However, our evaluation of wildlife is on a regional scale only; no information based on this system is given for the complete evaluation of the Montreal Island (MUC), since the Canada Land Inventory maps do not take-in urbanized areas. If evaluation had been done on a larger scale, taking in the Boucherville and Sorel islands, with their abundant wildfowl, it would have been a different situation. On the individual cards, the presence of any observed and identified wildlife is indicated in the space reserved for general comments.

6.24 TYPES OF CARDS

There are three types of cards, each with the same elements, corresponding to the types of forest sites:

- woodlots (Table 15),
- large woodlots (Table 16),
- forests (Table 17).

Examples of evaluation cards for two sites in the MUC, based on Oehmichen *et al.* (1977), are given in the appendix.

	LARGE WOODLOT												NON FORESTED			WILDLIFE
	SERVICED AREAS			WILDERNESS SHELTERS AND DAY-USE AREAS			TRAILS			ECOLOGICAL RESERVES			GAMES AND SPORTS FIELDS			UNGULATES AND MIGRATORY BIRDS CLASSES 1 AND 2
	C	R	Re	C	R	Re	C	R	Re	C	R	Re	C	R	Re	
MICROCLIMATE	1			2			0			0			1			
SOIL	2			2			2			0			2			
VEGETATION	1			2			5			8			1			
LANDSCAPE	2			1			1			0			2			
OPEN AREA	2			1			0			2			0			
WATER	1			1			1			3			1			
TOPOGRAPHY	1			1			2			0			1			
FINAL RESULT																

	C	FR	V	C	FR	V	C	FR	V	C	FR	V	OVERALL RESULT %
URBAN WOODLANDS	3			0			1			3			
SUBURBAN WOODLANDS	2			1			2			2			
OUTLYING WOODLANDS	1			2			3			1			

C: COEFFICIENT R: RATING Re: RESULT FR: FINAL RESULT V: VALUE

COMMENTS

TABLE 16

SYNTHESIS EVALUATION CARD

Case No

Total area

hectare (acre)

	FOREST												NON FORESTED			WILDLIFE
	SERVICED AREAS			WILDERNESS SHELTERS AND DAY-USE AREAS			TRAILS			ECOLOGICAL RESERVES			GAMES AND SPORTS FIELDS			UNGULATES AND MIGRATORY BIRDS CLASSES 1 AND 2
	C	R	Re	C	R	Re	C	R	Re	C	R	Re	C	R	Re	
MICROCLIMATE	1			2			0			0			1			
SOIL	2			2			2			0			2			
VEGETATION	1			2			5			8			1			
LANDSCAPE	2			1			1			0			2			
OPEN AREA	2			1			0			2			0			
WATER	1			1			1			3			1			
TOPOGRAPHY	1			1			2			0			1			
FINAL RESULT																

	C	FR	V	C	FR	V	C	FR	V	C	FR	V	OVERALL RESULT %
URBAN WOODLANDS	3			0			1			3			
SUBURBAN WOODLANDS	2			1			2			2			
OUTLYING WOODLANDS	1			2			3			1			

C: COEFFICIENT R: RATING Re: RESULT FR: FINAL RESULT V: VALUE

COMMENTS

TABLE 17

SYNTHESIS EVALUATION CARD

Case No

hectare (acre)

Total area

7 BRIEF ANALYSIS OF RESULTS

To aid in a critical analysis of our method, we will present a brief summary of the results obtained in the evaluation of woodlands on the Montreal Island (Oehmichen *et al.*, 1977). For this study, 105 sites were visited, representing a forested area of 1 672 ha (4,133 ac) and an unforested area of 3 480 ha (8,600 ac) , for a total of 5 152 ha (12,733 ac) (figure 1).

Table 18 shows the summary of results by developmental infrastructure category and by site category, for all of the MUC sites evaluated. It will be noted that the category of ecological reserve is not present in these results; this is due to the lack of consensus on the definition of terms, the weighting coefficients, and the ratings, among ecologists consulted at the time. The evaluating team chose to make, at the end of their report and as objectively as possible, recommendations concerning woodlands with strong potential as ecological reserves.

As a general rule, forests have the highest average results with slight variation (the lowest standard deviation). This is confirmed by the fact that the highest and lowest results for forests are clustered around the average much more than are the results for large woodlots. This can be explained by the fact that the majority of forests are in outlying areas of the city, so landscape ratings are higher, and their size makes them more resistant to human penetration and outside influences, such as high-rise construction, which brings about changes in the water table. The greater stability in the ecosystem should also be reflected in the ratings for vegetation.

If the results for the various developmental infrastructure categories are compared, it can be seen that the same order is obtained in all cases. That is, trails always have the highest average results, followed by wilderness shelters, then serviced shelters, and finally games and sports fields. The explanation is probably the same as before: trails are mostly integrated into the forest, while games and sports fields are on the edge, in open areas. Thus the environment of the latter is more subject to negative urban influences, such as visual pollution, which cause lower ratings for the key elements. This analysis will not be pursued, for, as we have seen, results should be compared within a single category, not to results in another category, since the key elements and the weightings are different.

TABLE 18: SYNTHESIS OF RESULTS BY DEVELOPMENTAL INFRASTRUCTURE CATEGORY AND BY SITE CATEGORY, FOR MUC SITES EVALUATED.

SITE CATEGORY	WOODLOTS					LARGE WOODLOTS					FORESTS					TOTAL				
Developmental infrastructure	SA	WS	T	GS	SYN	SA	WS	T	GS	SYN	SA	WS	T	GS	SYN	SA	WS	T	GS	SYN
Number of sites	69	69	69	60	69	32	32	32	30	32	4	4	4	4	4	105	105	105	94	105
Best result	75.0	76.1	81.5	79.4	74.8	74.1	73.6	80.3	71.4	74.0	63.8	65.4	72.7	65.1	66.4	75.0	76.1	81.5	79.4	74.8
Average result: $\overline{X}$	56.3	59.6	65.0	53.4	57.7	59.7	62.0	68.6	56.2	62.4	61.0	62.6	70.6	60.1	63.9	57.5	60.5	66.4	54.6	59.4
Lowest result	40.8	42.1	48.5	33.8	38.1	43.9	46.1	54.6	45.5	43.6	59.1	60.6	67.5	56.1	61.9	40.8	42.1	48.5	33.8	38.1
Standard deviation σ	6.5	6.0	7.5	7.8	7.3	6.7	5.9	5.8	6.0	6.3	2.1	2.0	2.5	4.0	1.9	6.6	6.0	7.1	7.3	7.2

SA : Serviced areas and day-use areas
WS : Wilderness shelters and day-use areas
T : Trails
GS : Games and sports field
SYN: Synthesis

If the results are next grouped by MUC sector (Table 19), certain spatial inequalities are revealed between the central and eastern Montreal Island urban sectors on the one hand, and the western sectors on the other. Not only are there fewer sectors in the centre and the east than in the west, but the average results for all developmental infrastructure categories are much lower as well. These results confirm the data on open spaces for Montreal Island given in Rey-Lescure (1976).

TABLE 19: SYNTHESIS OF RESULTS BY DEVELOPMENTAL INFRASTRUCTURE CATEGORY AND BY MUC SECTORS.

SECTORS	WEST OUTLYING ZONES NORTHWEST SUBURBS ILE-BIZARD					SOUTH URBAN NORTH URBAN					NORTHEAST SUBURBS EAST URBAN				
Developmental infrastructure	SA	WS	T	GS	SYN	SA	WS	T	GS	SYN	SA	WS	T	GS	SYN
Number of sites	56	56	56	47	56	13	13	13	12	13	36	36	36	35	36
Best result	75.0	76.1	81.5	79.4	74.8	65.1	66.1	69.8	68.9	67.9	68.4	72.2	76.6	61.8	72.4
Average result: $\overline{X}$	59.3	62.8	69.7	57.5	61.8	55.0	58.1	62.6	54.8	56.4	55.7	58.4	62.6	50.5	56.8
Lowest result	40.8	50.4	57.0	44.8	42.5	42.0	51.8	54.6	50.0	38.1	43.2	48.8	48.5	33.8	44.8
Standard deviation: σ	6.7	5.8	6.5	6.9	7.0	6.8	5.1	5.2	6.1	7.3	5.7	5.2	6.1	6.4	6.2

SA : Serviced shelters and day-use areas
WS : Wilderness shelters and day-use areas
T : Trails
GS : Games and sports area
SYN: Synthesis

8 DISCUSSION

Many environment evaluation methods have appeared since 1960, and several authors have attempted to classify and analyse these methods. According to Steinitz (1971), the choice of one method over others is a function of the availability of data, the definition of the problem, the type and degree of accuracy of the answers required, and the variety among the alternatives under consideration. In addition, the time, money, technology, human resources, and expertise available must be taken into account. Like other methods, our method for evaluating the recreation potential of urban forests is subject to these constraints and reflects a compromise. According to Steinitz (1971), there are five types of resource evaluation methods:

1) descriptive,
2) static, single-factor analyses,
3) static, multiple-factor analyses,
4) dynamic, single-sector models,
5) dynamic, multiple-sector models.

Under this classification, our method is a static multi-factor analysis, combining the techniques of the key elements and the ranking system (weighting coefficient). Without touching now upon the difficulties involved in applying these techniques, let us examine the general criteria to be used in analysing our method. Fabos (1971), in reviewing techniques that have been developed, has listed eight criteria for making general judgments concerning methods of quantifying environmental quality. How well does our evaluation of the recreational potential of urban forests meet these criteria?

1. The method makes it possible to evaluate the entire landscape continuum, from its unique features to its most degraded ones, including most of those in between.

In our method, subfectors such as station quality, sensitivity classification, visual interest coefficient, and water quality assess top-quality environments as well as very degraded ones. However, for sites of average quality, the final result should be used as a preliminary assessment. Then the ratings for each key element can be examined to discover the causes.

2. Unalterable features of the area are evaluated separately from those that can be changed.

As we have mentioned, our method is static. Therefore, for the final evaluation, it was not appropriate to separate permanent

environmental elements such as microclimate, soil, and topography from evolving elements such as vegetation and landscape.

3. Factors and variables used are appropriate to the scale and to the purpose of the method.

Yes, the subfactors that make up the key elements are easy to evaluate and are suitable to site scale. Nearly identical variables are used in other similar studies (Allison and Leighton, Soil Conservation Services, 1966).

4. The method can be used universally, given the same scale and purpose.

Yes, the evaluation cards could be used to evaluate the recreation potential of metropolitan forests in other regions or other countries, assuming that similar cultural characteristics exist in the populations with regard to outdoor activities. For example, if a population is not influenced by the "edge-of-the-forest effect", the importance of the "open area" element would have to be reconsidered. It is clear also that the ratings of other subfactors would have to be revised--for example, soil and vegetation, because of geographical variation.

5. The quantitative evaluation system can be reproduced by others.

Yes, on the whole, the simplicity of the method and the objective, quantitative characteristic of the field evaluations make our method easy for others to use. In fact, with this report, we hope to encourage its use by others.

6. The method can be used to predict changes of quality as a result of human activity.

No, as we have seen, our method is static, because it provides only for intersite comparisons at a given time. However, it would be possible and inexpensive to re-evaluate changeable environmental elements in order to update results.

7. The quantitative tools and techniques are appropriate to the method.

The various field techniques are traditional, and the task of compilation is very simple, albeit tedious. It is advantageous to computerize the data; this procedure presents no methodological or technical difficulties.

8. The method has the ability to reduce or eliminate conflicts in the decision-making process.

Yes, because it makes possible a rational choice of forest sites, in line with various developmental categories. However, it should be kept

in mind that the final choice of sites depends on developmental priorities, which are based on spatial recreational demands.

The choice of variables (key elements or subfactors) is the major problem for any method and is the area most open to criticism. Here a parallel can be drawn with the process of constructing a model, in which choices must be made among the numerous elements of the reality one is attempting to represent. The simpler the model the more subjective it is suspected to be; the more complex the model, the more cumbersome and the less effective it is to use. Among the near-infinity of elements of reality, the most important ones must be chosen. The crux of the problem are the words "most important". For example, for Fabos *et al.* (1973) the choice of variables for the METLAND model had to be justified in terms of the literature, the existing expertise and, for purely financial reasons, the availability and accessibility of data. In all cases the variables selected had to be supported by sufficient "empirical evidence".

For the selection of variables as well as the selection of weightings for them, one procedure is to use the Delphi method, which makes possible an objective determination of the consensus of a multi-disciplinary group (Pill, 1971). The main point in dispute is whether participants should be experts or laymen (S.C.O.P.E., 1977). For reasons of time and money, we based our choice of key elements on the opinions of experts only and also on "empirical evidence". We are convinced that the public would, in one way or another, select the same variables; however, we think people would also choose other variables, directly related to their personal experience of the environment--for example, insects. However, before accepting this kind of variable and determining whether it is measurable, one must ask whether it discriminates among the various areas under consideration. In other words, for the public, insects are a major obstacle to forest enjoyment, and so people tend to attach a great deal of importance to their presence. But, if we hypothesize that the number of insects in a given region is relatively independent of the type of forest cover, we can see that this factor does not discriminate and should not play an important role in the evaluation and the comparison of the recreation potential of different forests. If the opposite held true, then of course this variable would have to be included.

In deciding on the weighting coefficients, we tried to avoid the pitfall indicated by Steinitz (1971). Key elements often conceal basic variables that are identical although expressed in slightly different ways. The

result is an implicit weighting different from that indicated by the weighting coefficients. For example, we have seen that the "sensitivity classsification" subfactor for vegetation encompassed soil drainage characteristics (an extremely dry or extremely moist soil partially determines the "sensitivity" of a forest to human intervention). This subfactor plays a role only in the evaluation of ecological reserves and so in that case the criterion of drainage is not included, in order to avoid overrating its importance through the total of the weighting coefficients.

We tried to make the ratings for the subfactors uniform, that is to make the rating 6/10 represent the average condition of the phenomenon under study. In addition, bearing in mind that the overall accuracy of any system is no greater than the accuracy of its least accurate part, we simplified the ratings for some subfactors. It is wasteful to invest a lot of time in the precise measurement of one variable if other variables can be only roughly evaluated.

To conclude this discussion on the choice of variables, weightings, and ratings, we believe that the empirical approach adopted in the selection of the first two can and should be criticized. The essential thing, however, is that the same evaluation grid be used for the entire site under evaluation; this lends a certain validity to comparisons. Although the conceptual meaning of some of the ratings can be questioned, the method for rating variables is quite objective because it is quantifiable. This ensures maximum uniformity of results, independent of the subjectivity of the investigator in the field.

Each field evaluation team comprised a student in ecology, one in forestry, and one in landscape architecture. We felt this was the optimal number and represented a breadth of expertise covering the range and complexity of the key elements we had selected. Finally, in order to attain maximum success in the evaluation, the specialists in the teams, after a two-week field training period together, were frequently rotated to prevent biases from developing in the evaluation over a period of time.

Does this method of evaluating the recreation potential of urban forests contribute to the preservation of the forests of Montreal Island through recreational use? We believe it does, but we also realize that only a single part of the work is done; there remains the entire study of outdoor leisure activities and the manifested and latent needs of the

public. The so-called "biological" sciences have made their contribution, but at the regional level, there has so far been no contribution from the "social" and "economic" sciences. In the meantime, until our results can be used rationally for the whole of the territory, they are being used by organized groups for short-term action to save sites. However--and this is a great danger that we are well aware of--we wish to warn against the FALSE INTERPRETATION of these results for partisan and political purposes. To attempt to justify the destruction of certain woodlands on the basis of relative results constitutes intellectual dishonesty. The results indicate only that a certain site (or one sector of a single site) is more suitable than another for a particular broad developmental category--for example, trails. The worthlessness of a forested site cannot be deduced from a low result. We must also emphasize that the urgent situation described at the beginning of this article prompted our tactical choice of recreational potential over other functions, such as erosion control, noise control, air-pollution control, wind control, temperature control, etc. New descriptive variables, new weightings and new ratings would have to be found for all of these other utilitarian aspects, both tangible and intangible. For example, a woodlot on a very wet site is of little interest for recreation and will have very low ratings for the subfactors of drainage, slope, and position; on the other hand, the same woodlot could receive a very high rating for erosion control, flood control, and--if it were located between an industrial and a residential zone--noise or visual pollution control. These ratings would militate strongly in favour of preserving the site and developing it for these specific purposes.

9 CONCLUSION

As we have shown, both the quality and quantity of woodlands on the Montreal Island are rapidly shrinking. This observation has led us to postulate, as a starting point, that knowledge of their recreational potential could contribute to their preservation and development, if emphasis is placed on the direct social role that forests can play.

To make this chain reaction possible, we present one of the missing links--a method for evaluating the recreation potential of forest areas. This method evaluates biophysical and esthetic factors in varying combinations to estimate the relative suitability of sites for different kinds of recreational development.

Sector results are grouped by site. This allows analysis and interpretation at two levels: at the site level, for comparison of different sectors, and at the regional level, for comparison of different sites.

This method has several fundamental characteristics. It examines an urban woodlot in its urban setting and its immediate environment, by evaluating the unforested areas associated with the forested ones. We have seen that both the forest and its associated open area have a reciprocal and beneficial effect on the quality and diversity of recreational experiences. Assuming equivalent scale and purpose, this method is universally applicable; it is easy to reproduce and equally easy to modify (coefficients and ratings) for application to other areas or other social milieus.

Finally, to attain our primary goal--the preservation of woodlands--vigilance is necessary. We cannot permit abuse of the data and results in other fields nor interpretations which could serve to justify actions contrary to those mentioned or suggested in this evaluation.

REFERENCES

Algar, D. 1973. Kindergarten to grade four behavior on forest conservation field trips. Master's Thesis, Macdonald Coll., Univ. McGill, Montréal, Qué. 228 p.

Allison, and Leighton. Evaluating forest campground sites. University of New Hampshire. Coop. Ext. Serv. Ext. Folder 64. Durham, N.H.

Assemblée Nationale du Québec. 1974. Loi sur les Réserves Écologiques. Loi du Qué., chap. 29.

Bonhomme, J.P. 1975. A Montréal, les parcs sont devenus des stades. La Presse, Montréal, Qué. (mai)

Boudoux, M. and F. Bonenfant. 1977. Système automatique et conversationnel d'analyse de données statistiques. Can. Centre Rech. For. Laurentides. Ste-Foy, Qué. Mem. Tech. n° 4.

Bureau of Municipal Research. 1971. Urban open space: luxury or necessity. Bureau Municipal Res., Toronto. 55 p.

Canada Land Inventory. 1969. Les systèmes de classement des possibilités d'utilisation des sols. ARDA-Québec Rapport n° 1, 102 p.

Coomber, N.H. and A.K. Biswas. 1973. Evaluation of environmental intangibles. General Press, N.Y. 77 p.

Dion, J. 1976. Situation actuelle des boisés de la C.U.M. Rapport interne. Service de la planification, C.U.M. Montréal.

Fabos, J.G. 1971. An analysis of environmental quality ranking systems. *In* Recreation symposium proceedings. U.S.D.A. For. Serv. Northeast. For. Exp. Stn., Upper Darby, Pa. 40-55.

Fabos, J.G., R. Careaga, C. Green and S. Williston. 1973. Model for landscape resource assessment. Part I of the "Metropolitan Landscape Planning Model". University Mass. Res. Bull. n° 602, Amherst, 141 p.

Gold, S. 1972. Non-use of neighborhood parks. J. Am. Inst. Planners. Nov. 369-378.

Inhaber, J. 1972. Behavior and attitudes of suburban forest recreationists in the Morgan Arboretum. Thèse de Maîtrise, Macdonald College, McGill University, Montréal, Qué. 142 p.

Kiemsted, H. 1967. Zur Bewertung der Landschaft für die erholung. Stuttgart. *Cited in* F. Oehmichen, E. Rey-Lescure et M.C. Robert. 1975. Forêts urbaines - Méthode d'évaluation du potentiel récréatif: région métropolitaine de Montréal. Faculté de l'Aménagement, Univ. Montréal.

Litton, R.B. 1968. Forest landscape description and inventories. U.S.D.A. For. Serv. Res. Pap., PSW-49, Berkeley, Cal. 64 p.

Lugassy, F. 1970. Contribution à une psychologie de l'espace urbain. Pub. de Rech. Urb., Min. Equip. Log. Paris. 124 p.

McCollum, H.P. 1968. Vernon Parish outdoor recreation potential survey. North Louisiana Supplementary Educ. Center. 56 p.

McHarg, I. 1969. Design with nature. Nat. History Press, N.Y. 197 p.

Oehmichen, F., Rey-Lescure, E. and M.C. Robert. 1975. Forêts urbaines - Méthode d'évaluation du potentiel récréatif: région métropolitaine de Montréal. Faculté de l'Aménagement, Univ. Montréal. 68 p.

Oehmichen, F., Michaud, C. and P.A. Cloutier. 1977. Forêts urbaines - Inventaire et détermination du potentiel récréatif des boisés urbains de la C.U.M. Centre Rech. Innovations Urbaines, Univ. Montréal. 76 p. plus 8 rapports annexes.

Outdoor Recreation Resources Review Commission. 1962. Participation in Outdoor recreation: factors affecting demand among American adults. Report n° 20, ORRRC, Washington. 94 p.

Pill, J. 1971. The delphi method: substance, context, a critique and an annotated bibliography. Soc. Econ. Plan. Sci. 5, p. 57-71. *Cited in* S.C.O.P.E. 1977. Evaluation des impacts sur l'environnement - Principes et méthodes. I.C.S.U. - S.C.O.P.E. Rapp. n° 5, Min. Pêches Environ. Ottawa.

Pollard, D.F.W. 1976. Satisfaction of human needs by the urban forest. p. 354-361. *In* Trees and Forest for human settlements, Center for Urban For. Studies, Univ. Toronto.

Real Estate Board of Greater Vancouver. 1975. Green urban land policy - GULP - Planning Association of Canada, B.C. division and Real Estate Board of Greater Vancouver. 28 p.

Rey-Lescure, E. 1974. Les forêts urbaines de Montréal. For. Cons. 40: 4-7.

Rey-Lescure, E. 1976. Problématique des espaces ouverts et applications à la Communauté Urbaine de Montréal. Thèse de Maîtrise, Faculté de l'Aménagement, Univ. Montréal. 141 p.

Rogers, M.P. 1974. Assessing public recreation needs. Bureau of Outdoor Recreation U.S. Dept. Int., Lake Cent. Reg., Michigan. 15 p.

S.C.O.P.E. 1977. Evaluation des impacts sur l'environnement - Principes et méthodes. I.C.S.U. - S.C.O.P.E. Rapp. n° 5, Min. Pêches Environ. Ottawa. 175 p.

Service d'Urbanisme de Montréal. 1967. Montréal - Horizon 2000. Montréal, Qué.

Service d'Urbanisme de Montréal. 1971. Population emplois 1964-1981. Bull Tech. n° 7, Montréal, Qué.

Soil Conservation Service. 1966. Guide to making appraisals of potentials for outdoor recreation developments. U.S.D.A. *Cited in* J.G. Fabos. 1971. An analysis of environmental quality ranking systems. *In* Recreation symposium proceedings. U.S.D.A. For. Serv. Northeast. For. Exp. Stn. Upper Darby, Pa.

Steinitz, C., T. Murray, P. Rogers, D. Sinton and R. Toth. 1971. Honey Hill: a system analysis for planning the multiple use of controlled water areas. Vol. I and II. Dept. Landscape Architecture, Harward Univ., Cambridge, Mass.

APPENDIX

To illustrate this method the results for two sites of M.U.C. are taken from the report by Oehmichen *et al.* (1977), one woodlot in an urban area, and one large woodlot in an outlying area.

For each site is shown:

- an aerial photograph of the site with a transparency outlining the different sectors,
- a table summarizing in hectares (and acres) the percentage of forested and unforested sectors,
- evaluation cards for each sector,
- a synthesis evaluation card giving the final and the oeverall results of the site.

The results are given in English measures as they appeared in the original report.

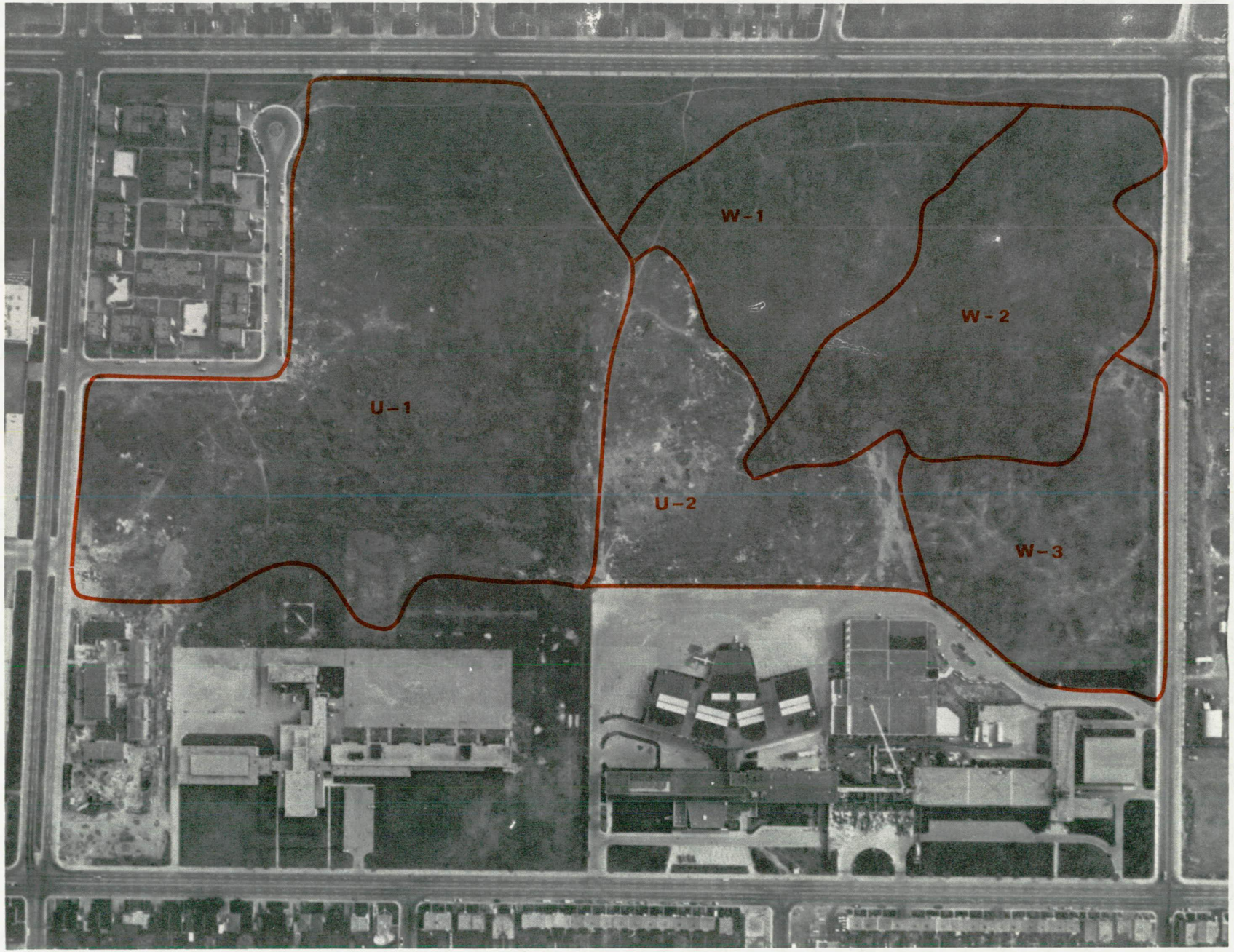
NORTH URBAN ZONES

Site #4

Woodlots

SUPERFICIES

FORESTED:	6.03 ha	(14.9 acres)
UNFORESTED:	16.88 ha	(41.7 acres)
TOTAL:	22.91 ha	(56.6 acres)



SITE #4 NORTH URBAN (56.5 acres)

FORESTED SECTORS	TOTAL AREA IN ACRES	% OF THE TOTAL	
		SITE'S FORESTED AREA	SITE'S FORESTED AND UNFORESTED AREA
B.1	5.6	37.5	9.9
B.2	9.3	62.5	16.4

FORESTED SECTORS	TOTAL AREA IN ACRES	% OF THE TOTAL	
		SITE'S UNFORESTED AREA	SITE'S FORESTED AND UNFORESTED AREA
V.1	23.8	57.0	42.0
V.2	14.6	35.0	25.8
V.3	3.3	8.0	5.8

COMMENTS

FORESTED SECTOR

	SERVICED AREAS				WILDERNESS SHELTER AND DAY-USE AREAS				TRAILS				ECOLOGICAL RESERVE			
	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re
MICROCLIMATE SUNLIGHT PREVAILING WINDS	1	6 X	6	6	2	6 X	6	12	0				0			
SOIL DRAINAGE CARRYING CAPACITY SOIL DEPTH	2	6 6 6	6	12	2	6 6 6	6	12	2	6 6 6	12		0			
VEGETATION STATION QUALITY STOREY DENSITY SENSITIVITY CLASS	1	7 8	7.5	7.5	2	7 8	7.5	15.0	5	7 8	7.5	37.5	8	7 8		
OPEN AREA AREA POSITION	2	10 .7	7	14	1	10 .7	7	7	0				2	5.8	5.8	11.6
WATER AREA OR LENGTH POSITION QUALITY RIPARIAN VEGETATION	1		0	0	1		0	0	1		0	0	3		0	0
TOPOGRAPHY SLOPE	1	8	8	8	1	8	8	8	2	9	9	18	0			
LANDSCAPE VISUAL INTEREST COEFFICIENT	2	4.8	4.8	9.6	1	4.8	4.8	4.8	1	4.8	4.8	4.8	0			
RESULT	57.1%				58.8%				65.7%							

C: COEFFICIENT PR: PARTIAL RATING R: RATING Re: RESULT

COMMENTS

Vegetation:

- this station appears to develop towards Maple with Hickory

TABLE 3

SECTOR EVALUATION CARD

Case No N.U. #4

Percentage of forested area — Woodlot W-1 — 5.6 ac

Total: 37.5 %

SURVEY

W-1

MICROCLIMATE

sunlight	flat	6
prevailing winds	X	

SOIL

drainage	sandy silt	6
carrying capacity	sandy silt	6
soil depth	1 to 3'	6

VEGETATION

station quality	Fraxinus americana	35 years 53 ft.		7
storey density:	upper storey	50 to 75%	4	
	intermediate class	continuous	2	
	under storey	fairly dense	1	
	under cover	continuous	1	
sensitivity class		elm ash		

OPEN AREA

area	forested 40%, unforested 60%		10
position	adjacent		0.7
reserve	forested 40% (500' and over)	4.0	5.8
	unforested 30% (1,000 and over)	1.8	
	unforested 30% (0 - 50')	0	

WATER

area or length
position
quality: depth
current
slope of banks
bed
visible depth
riparian vegetation

TOPOGRAPHY

slope and position	basin, slope 0 - 5%, rough terrain	8-8-9

LANDSCAPE

visual interest coefficient	green spaces 40% - green spaces	2.4
	green spaces 60% - residential	2.4

VEGETATION LIST:

Trees

Ulmus americana
Fraxinus americana
Acer saccharinum
Acer saccharum
Tilia americana
Carya cordiformis
Betula alleghaniensis
Populus tremuloides
Populus balsamea
Populus deltoides

Shrubs

Crataegus sp.
Corylus cornuta
Salix sp.
Cornus stolonifera
Viburnum trilobum
Rhus typhina
Rubus sp.
Rhamnus catharticus

Under storey

Vicia cracca
Ranunculus acris
Sanicula marilindica
Rhus radicans
Hydrophyllum virginianum
Uvularia grandiflora
Taraxacum officinale
Arisaema atrorubens
Smilacina racemosa
Prenanthes sp.
Osmorhiza claytoni
Sanguinaria canadensis
Barbarea vulgaris
Galium sp.
Tragopogon pratensis
Trifolium pratense
Asclepias sp.
Arctium sp.
Adiantum pedatum
Onoclea sensibilis
Asarum canadense

SECTOR EVALUATION CARD

FORESTED SECTOR

	SERVICED AREAS				WILDERNESS SHELTER AND DAY-USE AREAS				TRAILS				ECOLOGICAL RESERVE			
	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re
MICROCLIMATE SUNLIGHT PREVAILING WINDS	1	6 X	6	6	2	6 X	6	12	0				0			
SOIL DRAINAGE CARRYING CAPACITY SOIL DEPTH	2	3 3 8	4.7	9.4	2	3 3 8	4.7	9.4	2	3 3 8	4.7	9.4	0			
VEGETATION STATION QUALITY STOREY DENSITY SENSITIVITY CLASS	1	7 5	6	6	2	7 5	6	12	5	7 5	6	30	8	7 5		
OPEN AREA AREA POSITION	2	10 .7	7	14	1	10 .7	7	7	0				2	3.8	3.8	7.6
WATER AREA OR LENGTH POSITION QUALITY RIPARIAN VEGETATION	1		0	0	1		0	0	1		0	0	3		0	0
TOPOGRAPHY SLOPE	1	9	9	9	1	9	9	9	2	9	9	18	0			
LANDSCAPE VISUAL INTEREST COEFFICIENT	2	4.6	4.6	9.2	1	4.6	4.6	4.6	1	4.6	4.6	4.6	0			
RESULT		53.9%				54.0%				56.4%						

C: COEFFICIENT PR: PARTIAL RATING R: RATING Re: RESULT

COMMENTS

Vegetation:

- many dead elms (to burn)

Miscellaneous:

- existing footpath, width 5 to 6'
- a fence separates U-1 from W-2
- Ahuntsic College owns part of this land (cross country skiing trails)
- cover rare, many human actions
  - felling
  - grubbing up
  - clay pit
- existing climbing plants

TABLE 3

SECTOR EVALUATION CARD

Case No N.U. #4
Percentage of forested area

Woodlot W-2

9.3 ac

Total: 62.5 %

SURVEY W-2

MICROCLIMATE
- sunlight: flat — 6
- prevailing winds: X

SOIL
- drainage: clay
- carrying capacity: clay
- soil depth: 3 to 6'

VEGETATION
- station quality: Ulmus americana 37 years 62 ft. — 7
- storey density:
  - upper storey: 0 to 50% — 3
  - intermediate class: discontinuous — 1
  - under storey: rare — 0 — 5
  - under cover: continuous — 1
- sensitivity class: elm maple

OPEN AREA
- area: forested 40%, unforested 60% — 10
- position: adjacent — 0.7
- reserve: forested 30% (500' and more)
  unforested 30% (0 to 50') — 3.8
  unforested 40% (50 to 250')

WATER
- area or length
- position
- quality: depth
  current
  slope of banks
  bed
  visible depth
- riparian vegetation

TOPOGRAPHY
- slope and position: plain, slope 0 to 5%, rolling terrain — 9-9-9

LANDSCAPE
- visual interest coefficient: 70% green spaces - residential
  30% green spaces - green spaces — 4.6

VEGETATION LIST:

Trees

Ulmus americana
Acer saccharinum
Fraxinus pensylvanica
Acer rubrum
Salix nigra
Populus tremuloïdes
Populus deltoides

Shrubs

Cornus stolonifera
Salix sp.

Under storey

Arisaema atrorubens
Onoclea sensibilis
Rhus radicans (d)
Erigeron sp.
Vicia sp.
Oxalis montana
Galium sp.

SECTOR EVALUATION CARD

UNFORESTED SECTOR

	V				V				V				V			
	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re
MICROCLIMATE sunlight prevailing winds	1	6 X	6	6	1	6 X	6	6	1	6 X	6	6	1			
SOIL drainage	2	6	6	12	2	6	6	12	2	10	10	20	2			
VEGETATION tree layer and shrub layer	1	7	7	7	1	7	7	7	1	6	6	6	1			
WATER area or length position quality	1		0	0	1		0	0	1		0	0	1			
TOPOGRAPHY slope and position	1	9	9	9	1	9	9	9	1	9	9	9	1			
LANDSCAPE visual interest coefficient	2	3.9	3.9	7.8	2	4.8	4.8	9.6	2	3.9	3.9	7.8	2			
FINAL RESULT		52.3%				54.5%				61.0%						

C: COEFFICIENT PR: PARTIAL RATING R: RATING Re: RESULT

GENERAL COMMENTS

V-1:
- shrubs scattered
- some accumulation of surface water caused by landfill

V-2:
- on one side of the college there is part old fill

V-3:
- diseased or dead elm
- a fence separates nonforested #3 from forested #2.

TABLE 4

SECTOR EVALUATION CARD

Unforested sectors		Percentage of total unforested area	
		acres	
U	#1	23.8	% 57.0
U	#2	14.6	% 35.0
U	#3	3.3	% 8.0
U			%

case no. North Urban #4

SURVEY	U-1	U-2	U-3	U
MICROCLIMATE sunlight prevailing winds	flat 6 X	flat 6 X	flat 6 X	
SOIL drainage	gravel silt 6	gravel silt 6	gravel fill 10	
VEGETATION tree layer and shrub layer	trees in row waste land 7	rare waste land 7	trees waste land 6	
WATER area or length position quality: depth current slope of banks bed visible depth				
TOPOGRAPHY slope and position	9 plain, 0 to 5%, rolling terrain	plain, 0 to 5%, rolling 9	plain, 0 to 5%, rolling terrain 9	
LANDSCAPE visual interest coefficient	70% res. - res. 30% gr.spaces-gr.spaces 3.9	50% gr.spaces, gr.spaces 3 25% gr.spaces, res. 1 4.75 25% res., res. 0.75	70% res. - res. 2.1 30% gr.space-gr.sp. 1.8 3.9	

VEGETATION LIST U-1	U-2	U-3	U
Trees Ulmus americana Tilia americana Fraxinus pensylvanica Populus deltoïdes Acer negundo Acer saccharinum Shrubs Prunus pensylvanicum Salix sp. Rhus typhina Under storey Arctium sp. Solidago sp. Vicia cracca (d)	Trees Ulmus americana Fraxinus pensylvanica Acer saccharinum Acer negundo Populus deltoïdes Shrubs Cornus stolonifera Rhus typhina Under storey Chrysanthemum leucanthemum Vicia cracca (d) Tragopogon pratensis Asclepias sp. Anthriscus sylvestris Solidago sp. (d)	Trees Acer saccharinum Populus deltoïdes Ulmus americana Under storey Vicia cracca Chrysanthemum leucanthemum Tragopogon pratensis Trifolium pratense Arctium sp. Potentilla anserina Sisyrinchium augustifolium Taraxacum officinale Plantago sp. Ranunculus septentrionalis Erigeron sp.	

VEGETATION LIST

U_1	U_2	U	U
Under storey (continued) Anthriscus sylvestris Trifolium pratense Rosa sp. Chrysanthemum leucanthemum Fragaria sp. Graminea	Under storey (continued) Sisyrinchium augustifolium Graminea		

	WOODLOT												NON FORESTED			WILDLIFE
	SERVICED AREAS			WILDERNESS SHELTERS AND DAY-USE AREAS			TRAILS			ECOLOGICAL RESERVES			GAMES AND SPORTS FIELDS			UNGULATES AND MIGRATORY BIRDS CLASSES 1 AND 2
	C	R	Re	C	R	Re	C	R	Re	C	R	Re	C	R	Re	
MICROCLIMATE	1	6	6	2	6	12	0			0			1	6	6	
SOIL	2	5.2	10.4	2	5.2	10.4	2	5.2	10.4	0			2	6.3	12.6	
VEGETATION	1	6.6	6.6	2	6.6	13.2	5	6.6	33	8			1	6.9	6.9	
LANDSCAPE	2	4.7	9.4	1	4.7	4.7	1	4.7	4.7	0			2	4.2	8.4	
OPEN AREA	2	7	14	1	7	7	0			2	4.6	9.2	0			
WATER	1	0	0	1	0	0	1	0	0	3	0	0	1	0	0	
TOPOGRAPHY	1	8.6	8.6	1	8.6	8.6	2	9	18	0			1	9	9	
FINAL RESULT	55.0%			55.9%			60.1%						53.6%			

	C	FR	V	C	FR	V	C	FR	V	C	FR	V	OVERALL RESULT %
URBAN WOODLANDS	3	200	110	0			1	220	132.2	3	160	85.8	56.6%
SUBURBAN WOODLANDS	2			1			2			2			
OUTLYING WOODLANDS	1			2			3			1			

C: COEFFICIENT R: RATING Re: RESULT FR: FINAL RESULT V: VALUE

COMMENTS

TABLE 15

SYNTHESIS EVALUATION CARD

Case No N.U. #4

Total area: 22.9 hectare
56.6 (acre)

56.6%

WEST OUTLYING ZONES

Site #8

Large Woodlots

AREA

FORESTED:	9.51 ha (23.5 acres)
UNFORESTED:	5.63 ha (13.9 acres)
TOTAL:	15.14 ha (37.4 acres)

SITE #8 WEST OUTLYING ZONES (37.4 acres)

FORESTED SECTORS	TOTAL AREA IN ACRES	% OF THE TOTAL	
		SITE'S FORESTED AREA	SITE'S FORESTED AND UNFORESTED AREA
B.1	5.3	22.5	14.1
B.2	18.2	77.5	48.7

FORESTED SECTORS	TOTAL AREA IN ACRES	% OF THE TOTAL	
		SITE'S UNFORESTED AREA	SITE'S FORESTED AND UNFORESTED AREA
V.1	13.9	100	37.1

COMMENTS

FORESTED SECTOR

	SERVICED AREAS				WILDERNESS SHELTER AND DAY-USE AREAS				TRAILS				ECOLOGICAL RESERVE			
	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re
MICROCLIMATE SUNLIGHT PREVAILING WINDS	1	6	6	6	2	6	6	12	0				0			
SOIL DRAINAGE CARRYING CAPACITY SOIL DEPTH	2	8 8 8	8	16	2	8 8 8	8	16	2	8 8 8	8	16	0			
VEGETATION STATION QUALITY STOREY DENSITY SENSITIVITY CLASS	1	9 6	7.5	7.5	2	9 6	7.5	15	5	9 6	7.5	37.5	8	9 6		
OPEN AREA AREA POSITION	2	10 .8	8	16	1	10 .8	8	8	0				2	4.6	4.6	9.2
WATER AREA OR LENGTH POSITION QUALITY RIPARIAN VEGETATION	1	10 8 6.4	8.1	8.1	1	10 8 6.4	8.1	8.1	1	10 8 6.4	8.1	8.1	3		0	0
TOPOGRAPHY SLOPE	1	9	9	9	1	9	9	9	2	8	8	16	0			
LANDSCAPE VISUAL INTEREST COEFFICIENT	2	5.8	5.8	11.6	1	5.8	5.8	5.8	1	5.8	5.8	5.8	0			
RESULT	74.2%				73.9%				75.8%							

C: COEFFICIENT PR: PARTIAL RATING R: RATING Re: RESULT

COMMENTS

TABLE 3

SECTOR EVALUATION CARD

Case No P.O. #8
Percentage of forested area Woodlot W-1

5.3a

Total: 22.5 %

SURVEY W -1

MICROCLIMATE				
sunlight	flat			6
prevailing winds	X			
SOIL				
drainage	silt			8
carrying capacity	silt			8
soil depth	3' to 6'			8
VEGETATION	Quercus rubra	79 years	76 ft	
station quality	Acer saccharinum	66 years	67 ft	9
storey density: upper storey		75% and more	5	
intermediate class		discontinuous	1	
under storey		rare	0	
under cover		discontinuous	0	6
sensitivity class		bur oak		
OPEN AREA				
area	50% unforested, 50% forested			10
position	interlocked			8
reserve 50%	any obstruction		3	
	40% with obstruction (50' to 250')		2	
	10% forested obstruction (500' and over)		1	6
WATER				
area or length	20 acres and more			10
position	interlocked			8
quality: depth		10' and more	6	
current		0-3 mi/hour	10	
slope of banks		0-5%	10	6.4
bed		clay	3	
visible depth		0-1'	3	
riparian vegetation				
TOPOGRAPHY				
slope and position	slope 0 - 5%, plain, flat			9-9-9
LANDSCAPE				
visual interest coefficient	50% water res.		3.75	5.75
	50% green spaces res.		2.0	

VEGETATION LIST

Trees

- Quercus rubra
- Quercus macrocarpa
- Acer saccharinum (ass.)
- Fraxinus pensylvanica
- Ulmus thomasii
- Carya ovata
- Carya cordiformis
- Tilia americana
- Betula papyrifera

Shrubs

- Crataegus sp.

Under storey

- Carex sp.
- Galium sp.

SECTOR EVALUATION CARD

FORESTED SECTOR

	SERVICED AREAS				WILDERNESS SHELTER AND DAY-USE AREAS				TRAILS				ECOLOGICAL RESERVE			
	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re
MICROCLIMATE																
SUNLIGHT	1	6			2	6			0				0			
PREVAILING WINDS		X	6	6		X	6	12								
SOIL																
DRAINAGE		8				8				8						
CARRYING CAPACITY	2	8	8	16	2	8	8	16	2	8	8	16	0			
SOIL DEPTH		8				8				8						
VEGETATION																
STATION QUALITY		9				9				9				9		
STOREY DENSITY	1	8	8.5	8.5	2	8	8.5	17	5	8	8.5	42.5	8	8		
SENSITIVITY CLASS																
OPEN AREA																
AREA	2	8			1	8			0				2	0.6		
POSITION		.8	6.4	12.8		.8	6.4	6.4							0.6	1.2
WATER																
AREA OR LENGTH		10				10				10						
POSITION		8				8				8						
QUALITY	1	7.4	8.5	8.5	1	7.4	8.5	8.5	1	7.4	8.5	8.5	3		0	0
RIPARIAN VEGETATION																
TOPOGRAPHY																
SLOPE	1	9	9	9	1	9	9	9	2	8	8	16	0			
LANDSCAPE																
VISUAL INTEREST	2	6.6	6.6	13.2	1	6.6	6.6	6.6	1	6.6	6.6	6.6	0			
COEFFICIENT																
RESULT		80.0%				75.5%				81.5%						

C: COEFFICIENT PR: PARTIAL RATING R: RATING Re: RESULT

COMMENTS

Soil:

- rocky

Miscellaneous:

- existing road leads to houses situated near the water edge.

TABLE 3

SECTOR EVALUATION CARD

Case No P.O. #8

Percentage of forested area: Woodlot W-2 — 18.2a

Total: 77.5 %

SURVEY

W-2

MICROCLIMATE				
sunlight		flat		6
prevailing winds		X		
SOIL				
drainage		sandy silt		8
carrying capacity		sandy silt		8
soil depth		3' - 6'		8
VEGETATION		Carya cordiformis		
station quality		Acer saccharum	76 years 82'	9
storey density:	upper storey	75% and more	5	
	intermediate class	continuous	2	
	under storey	fairly dense	1	
	under cover	discontinuous	0	8
sensitivity class		Maple with Hickory		
OPEN AREA				
area		70% forested, 30 unforested		8
position		interlocked		0.8
reserve		70% any obstruction (water, road res.)		0.6
		30% with obstruction (50'-250')		.6
WATER				
area or length		20 acres and more		10
position		interlocked		0.8
quality:	depth	10' and more	6	
	current	0-3 mi/hour	10	
	slope of banks	0-5% slope	10	
	bed	sandy	10	7.4
	visible depth	0' - 1'	3	
riparian vegetation				
TOPOGRAPHY				
slope and position		0-5% slope, plain, flat		9-9-8
LANDSCAPE				
visual interest coefficient		50% water - res.	7.5	
		25% res. - water	3.75	6.6
		25% res. - green spaces	1.8	

VEGETATION LIST

Trees

Acer saccharum
Tilia americana
Carya cordiformis
Fraxinus pensylvanica
Ulmus thomasii

Shrubs

Sambucus pubens
Cornus alternifolia

Under storey

Taraxacum officinale
Gramineae
Rhus radicans
Viola sp.
Solidago
Prenanthes altissima
Hydrophyllum virginianum

SECTOR EVALUATION CARD

UNFORESTED SECTOR

	V				V				V				V			
	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re	C	PR	R	Re
MICROCLIMATE																
sunlight	1	6	6	6	1				1				1			
prevailing winds		x														
SOIL																
drainage	2	6	6	12	2				2				2			
VEGETATION																
tree layer and	1	10	10	10	1				1				1			
shrub layer																
WATER																
area or length	1	10	8.1	8.1	1				1				1			
position		8														
quality		6.4														
TOPOGRAPHY																
slope and position	1	10	10	10	1				1				1			
LANDSCAPE																
visual interest	2	5.5	5.5	11	2				2				2			
coefficient																
FINAL RESULT		71.4 %														

C: COEFFICIENT PR: PARTIAL RATING R: RATING Re: RESULT

GENERAL COMMENTS

TABLE 4

SECTOR EVALUATION CARD

Unforested sectors	Percentage of total unforested area
U-1 13.9 acres	% 100
U	%
U	%
U	%

case no. P.O. # 8

SURVEY	U-1	U	U	U
MICROCLIMATE sunlight prevailing winds	flat 6 X			
SOIL drainage	sandy clay 6			
VEGETATION tree layer and shrub layer	pasture wind brake 10			
WATER area or length position quality: depth current slope of banks bed visible depth	20 acres and more 10 interlocked 8 10' and more 6 0-3 mi/hour 10 0-5% 10 clay 3 0-1' 3 6.4			
TOPOGRAPHY slope and position	0-5%, plain 10			
LANDSCAPE visual interest coefficient	40% res. - green spaces 1.6 10% water - water 0.9 5.5 50% green spaces-gr.spa. 3			

VEGETATION LIST U-1	U-1 (continued)	U	U
Trees Acer saccharum Tilia americana Fraxinus americana Ostrya virginiana Prunus virginiana Shrubs Under storey Taraxacum officinale Fragaria sp. Equisetum sp. Trifolium sp. Graminea Vicia cracca Carex sp. Rhus radicans	Ranunculus sp. Veronica serpyllifolia Onoclea sensibilis Sisyrinchium angustifolium		

	LARGE WOODLOT												NON FORESTED			WILDLIFE
	SERVICED AREAS			WILDERNESS SHELTERS AND DAY-USE AREAS			TRAILS			ECOLOGICAL RESERVES			GAMES AND SPORTS FIELDS			UNGULATES AND MIGRATORY BIRDS CLASSES 1 AND 2
	C	R	Re	C	R	Re	C	R	Re	C	R	Re	C	R	Re	
MICROCLIMATE	1	6	6	2	6	12	0			0			1	6	6	
SOIL	2	8	16	2	8	16	2	8	16	0			2	6	12	
VEGETATION	1	8.3	8.3	2	8.3	16.6	5	8.3	41.5	8			1	10	10	
LANDSCAPE	2	6.4	12.8	1	6.4	6.4	1	6.4	6.4	0			2	5.5	11	
OPEN AREA	2	6.8	13.6	1	6.4	6.4	0			2	1.5	3.0	0			
WATER	1	8.4	8.4	1	8.4	8.4	1	8.4	8.4	3	0	0	1	8.1	8.1	
TOPOGRAPHY	1	9	9	1	9	9	2	8	16	0			1	10	10	
FINAL RESULT	74.1%			75.2%			80.3%						71.4%			

	C	FR	V	C	FR	V	C	FR	V	C	FR	V	OVERALL RESULT %
URBAN WOODLANDS	3			0			1			3			
SUBURBAN WOODLANDS	2			1			2			2			
OUTLYING WOODLANDS	1	200	148.2	2	300	225.6	3	330	264.9	1	160	114.7	76.0%

C: COEFFICIENT R: RATING Re: RESULT FR: FINAL RESULT V: VALUE

COMMENTS

TABLE 16

SYNTHESIS EVALUATION CARD

Case No P.O. #8 15.1 hectare (37.4) (acre)

Total area 74.0%