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THE B.E.V.A. METHOD IN THE ASSESSMENT OF THE WOODY VEGETATION OF THE MARGHILOMAN BUZAU PARK

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Abstract

Relaxing in the shade of a tree, enjoying its fragrance, the oxygen offered as a gift, the refuge it offers, gives all the measure of the wealth of trees. An individual good, a collective wealth, the tree has a value attributable to the functions it performs. Whether the tree is young or centuries-old, it is directly or indirectly influenced by people, which is why it is important to appreciate its value. This is why it is necessary to assess the financial value of ornamental trees and estimate the amount of compensation in the event of damage. The chosen research topic is carried out in Buzău, on the domain of Alexandru Marghiloman. He built for his wife a wonderful tree park, which has become public today, on an area of 16,000 square meters. To date, there is no single reference assessment scale unanimously recognized by communities, experts, insurance companies and the judiciary. The B.E.V.A. method - the Tree Value Assessment Scale created in France (Barème d`Evaluation de la Valeur d`un Arbre) (or the method of large cities in France) - was used to evaluate the trees in Marghiloman Park. B.E.V.A. is used to calculate the value of a tree in an urban landscape or road alignment based on 4 criteria (species, girth, health, aesthetic value). The results have been registered and are part of the green inventory of this park.

Key words: *B.E.V.A., Marghiloman Park, woody vegetation.*

INTRODUCTION

Alexandru Marghiloman built for his wife a wonderful tree park, which became public nowadays. Today, it covers an area of 16,000 m^2, out of the initial 22,500 m^2, surrounding the 'Albatros' villa and its outbuildings, a park famous in the past due to its English style and the multitude of exotic plants acclimatized here.

The ensemble was built in several stages in the second half of the nineteenth century (ca. 1884) and consists of 'Villa Albatros', the work of French architect Paul Gottereau, a secondary body and stables, in a huge tree park. The buildings were abandoned in 1985 and are in poor condition. At present, only 'Villa Albatros' has been restored, the rest being severely damaged.

MATERIALS AND METHODS

B.E.V.A. - Tree Value Assessment Scale (Barème d'Evaluation de la Valeur d'un Arbre) (or the method of the large cities in France) - this method consists of the product of certain indices that represent the variety, aesthetics and health, location as well as size.

These scales are accredited through decisions of the deliberative assemblies of the communities and integrated in contractual documents, such as tree mapping, road regulations and general clauses/rules applicable to all public works contracts.

Depending on their specificity, local authorities have sometimes adapted this scale by changing the indices.

The arrangement or the value of the arrangement of the tree is obtained by multiplying the following 4 indicators between them:

1. species and variety index;
2. size index (circumference);
3. health index;
4. location and aesthetic value index.

Species and variety index

It is based on the average retail price (price including VAT, rounded) of a tree with a 10/12 trunk, according to the compilation of offers on the market. The reference price is the one in force in the year of the damage, an update being made every year. The value of the index to be taken into account is one tenth of the unit

reference price. This index makes it possible to express the species' rarity, the multiplication and cultivation difficulties, the growth time and the adaptation to the region. It also allows the introduction of a monetary value from the beginning in calculating the value of the arrangements.

Size index (circumference)

The index is obtained by measuring the circumference of the trunk, measured one meter from the ground, and expresses the increase in value depending on the age of the tree and its size (Figure 1).

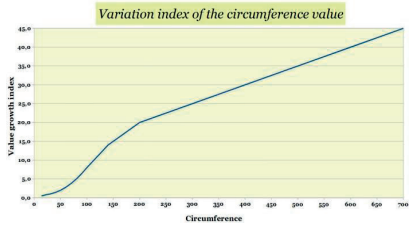

Figure 1. Variation index of the circumference volume

Health index

The health is estimated based on the general condition of the aerial parts: poorly healed lesions, injured trunk, parasites, the tree's development stage, its vigor. The reference health state is that of the tree before the injury. The index value can vary from 2 to 8.

Mark 8: Class A: very good condition (healthy, vigorous);

Mark 6: Class B: slightly affected (healthy, medium strength, minor lesions and alterations in the process of healing);

Mark 4: Class C: altered (low strength, unhealed, unscarred wounds);

Mark 2: Class D: irreversible (in the process of irreversible decline. Significant damage, confirmed presence of woody fungi, predominantly dead wood).

Location and aesthetic value index

The value of the index can vary from 3 to 8. It corresponds to the sum of 3 criteria (Marks):

Impact on the landscape

Mark 4: Presence remarkable by status;

Mark 3: Very strong impact;

Mark 2: Significant impact;

Mark 1: Insignificant impact.

Group homogeneity

Mark 2: Homogeneous grouping;

Mark 1: Heterogeneous grouping.

Patrimonial interest

Mark 2: Protected by laws or regulations;

Mark 1: It is not specifically protected

Scale for assessing the extent of damage caused by tree injury.

Damage to a tree is estimated in relation to the landscape value of that tree.

The amount of compensation will depend on the extent of the injury and will be calculated according to the scale shown below.

Damage to the trunk, flaking or peeling bark

Large wounds heal very slowly or not at all. They are often the site of outbreaks of infection, reducing the strength, vitality and value of the tree. In the case of lesions, percentage of the maximum width (horizontal measurement) of the injury expressed in centimeters, in relation to the circumference of the trunk at the height of the injury, is established.

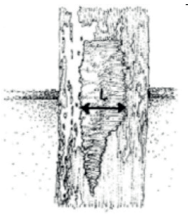

Figure 2. Measuring the wound on the trunk of a tree

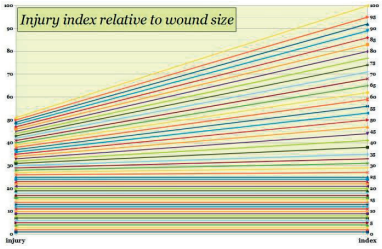

Figure 3. Injury index relative to wound size

If more than 50% of the sap tissue is destroyed, i.e. when the wound is more than half the circumference of the shaft, the shaft will be considered lost. Compensation is a percentage of the arrangement value proportional to the extent of the damage. This ratio is set by the scale presented below.

Broken, torn or dried branches

Assessing the degree of damage to a tree's crown is a function dependent on the volume of the destroyed crown. The volume before mutilation is taken as reference (Figure 4).

If intervention is required on the entire crown to rebalance the shaft, the damage rate is a function of this reduction.
If half of the branches are broken, depreciated, the tree is considered lost.

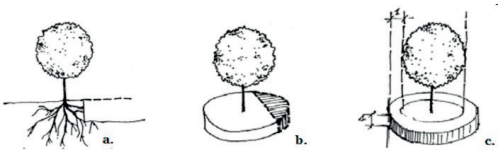

Figure 4: a. Affected tree; b. Affected root volume; c. The volume of the root taken as reference

When the damage requires sanitary or reforming dimensions, the compensation to be paid must take into account the cost of the interventions. The compensation is a percentage of the value of the arrangement in proportion to the size of the damage. This ratio is set by the scale.

Affected root system

Cut roots: the damage assessment is calculated as described above, taking into account the proportion of cut or broken roots in relation to the entire root system. This total volume is assimilated to the volume of the soil around the tree corresponding to a cylinder 1 m deep and 2 m in diameter larger than the crown's projection on the ground.

The cost of replacing a tree

In assessing the cost of compensation claimed for any damage to the departmental patrimony of trees, the landscape value of the tree may be increased, as appropriate, by the cost of auxiliary services: cutting and excavation works, supplying with new trees, replanting works.

RESULTS AND DISCUSSIONS

Results obtained regarding the value of trees

When carrying out this evaluation, regarding the inventory value of the ornamental trees located on the Marghiloman Domain, there were preparatory, organizational, logistical, data collection and processing activities.

All this has led to the design, testing and implementation of a calculation program that can give a real picture of the inventory value of ornamental trees on the analyzed surfaces with applicability in any landscaping.

Figure 5: Marghiloman Park: 2011 (Buzău Municipal Plan)

Placement and mapping of trees

The surface of the Marghiloman Domain is covered by plots with vegetation, a pond, constructions and alleys destined for pedestrian traffic and horse walking.

For rigor and to give scientific value to the study, we first proceeded to the topographic marking of all the trees on the analyzed surface. The result is the maps used in locating and listing each tree.

Following the field work, it was found that the accuracy of the maps was good enough, and, in case of inconsistencies, the errors were corrected and any omissions or changes in the positioning of the arboreal vegetation suffered over time were corrected on the map.

Preparation and fieldwork

The first step was to divide the area of interest into lawns that received an identification code, a code that was later used in the work and in filling in the fieldwork information on the observation sheets.

The next step was to complete the observation sheets with the information resulting from the measurement and observation of each tree. This after each identified tree has received a unique highlight code.

Switching to digital format and calculating the value of ornamental trees

Because the calculations are laborious, we drew up a calculation program through which data can be obtained that can be analyzed, exploited according to needs and that highlights the monetary value of the trees on the domain.

Below, we present the structure of the spreadsheet of a plot that includes the transcription of the information collected in the field and its processing (Figure 6).

It has the following fields:
Current number of the evaluated tree
Species
Tree/specimen code
Impact on the landscape (**R**emarkable, **P**owerful, **W**eak (S), **I**nsignificant
Landscape impact index (calculated)
Patrimonial interest (**P**rotected, **N**ot protected)
Solitary, **G**roup (layout)
Solitary, group (**H**omogenous, **He**terogeneous)
Homogeneity index (calculated)
General state
Very good (F), **S**lightly affected (**U**), **A**ltered, **I**rretrievable
Health index (calculated)
Trunk observations
Circumference at 1,0 m from the soil
Size index (calculated)
The circumference at the maximum width of the wound
Maximum width of the wound
Injury percentage (calculated)
Trunk damage index (calculated)
Crown observations
Diameter [m]
Damage percentage [%]
Crown damage index (calculated)
Roots observations
Root damage index
Damage percentage (calculat)
PLOT VALUE BALANCE SHEET Lei
The price of a specimen in the nursery [Lei]
TREE EVALUATION Lei
Tree value (calculated)
Devaluation from trunk injury (calculated)
Devaluation from crown injury (calculated)
Devaluation from root injury (calculated)
Current value (calculated)

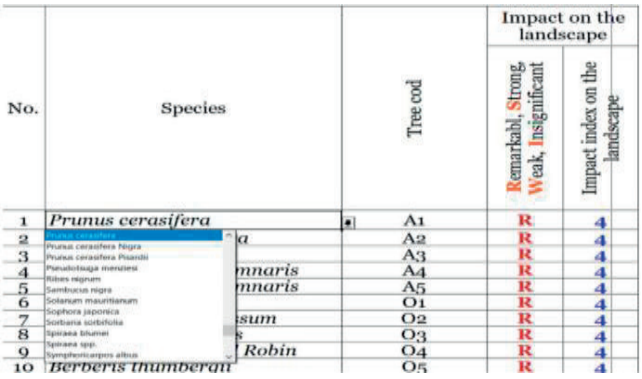

Figure 6. Detail of entering the data collected in the field in the spreadsheet

Number of copies made	
worked	identified
21	21

BALANCE SHEET VALUE PLOT [Lei]					
3330	9324	0	0	0	9324

No.	Species	Tree cod	Impact on the landscape: Remarkabl, Strong, Weak, Insignificant	Impact index on the landscape	Property interest: Protected, Unprotected	Index of patrimonial interest	Solitary, Group: Solitary, group (H=Homogenous, H=heterogeneous)	Homogeneity index	General state: Very good, Slightly damaged, Altered, Irrecoverable	Health index	Trunk remarks: Circumference, 1.0 m from the package (cm)	Size index	The circumference at the maximum width of the wound	Maximum wound width	Injury percentage	Trunk damage index	Crown remarks: The diameter [m]	Percentage of damage %	Index of decrease a crown	Roots remarks: Percentage of damage %	Root damage index	The price of a specimen in the nursery [Lei]	TREE EVALUATION [Lei]: Tree value	Devaluation from torso injury	Devaluation from crown injury	Devaluation from root injury	Current value
1	*Prunus cerasifera*	A1	R	4	U	1	S	2	V	8	10	0,5			0	0	0,6		0		0	90	252	0	0	0	252
2	*Cedrus deodora aurea*	A2	R	4	U	1	S	2	V	8	10	0,5			0	0	1		0		0	3240	9072	0	0	0	9072
3	*Cedrus deodara*	A3	R	4	U	1	S	2	V	8	7	0			0	0	2		0		0	400	0	0	0	0	0
4	*Chamenyparis columnaris*	A4	R	4	U	1	S	2	V	8	10	0,5			0	0	1,5		0		0	160	448	0	0	0	448
5	*Chamenyparis columnaris*	A5	R	4	U	1	S	2	V	8	12	0,5			0	0	0,8		0		0	160	448	0	0	0	448
6	*Juniperus chinensis*	O1	R	4	U	1	S	2	V	8	10	0,5			0	0	0,6		0		0	55	154	0	0	0	154
7	*Vaccinium corymbosum*	O2	R	4	U	1	S	2	V	8	0,9	0			0	0	0,8		0		0	120	0	0	0	0	0
8	*Euonymus europaeus*	O3	R	4	U	1	S	2	V	8		0			0	0	0,7		0		0	45	0	0	0	0	0
9	*Photinia fraseri Red Robin*	O4	R	4	U	1	S	2	V	8		0			0	0	1,5		0		0	36	0	0	0	0	0
10	*Berberis thumbergii*	O5	R	4	U	1	S	2	V	8		0			0	0	15		0		0	35	0	0	0	0	0
11	*Berberis thumbergii*	O6	R	4	U	1	S	2	V	8		0			0	0			0		0	35	0	0	0	0	0
12	*Weigela florida*	O7	R	4	U	1	S	2	V	8		0			0	0	1,5		0		0	32	0	0	0	0	0
13	*Aesculus carnea*	A6	R	4	U	1	S	2	V	8	38	1,4			0	0	2		0		0	280	2195	0	0	0	2195
14	*Juniperus chinensis*	O8	R	4	U	1	S	2	V	8	0,2	0			0	0	0,7		0		0	55	0	0	0	0	0
15	*Juniperus chinensis*	O9	R	4	U	1	S	2	V	8	0,2	0			0	0	0,7		0		0	55	0	0	0	0	0
16	*Pinus mugo*	A7	R	4	U	1	S	2	V	8		0			0	0			0		0	113	0	0	0	0	0
17	*Juniperus chinensis*	O10	R	4	U	1	S	2	V	8		0			0	0			0		0	55	0	0	0	0	0
18	*Liriodendron tulipifera*	A8	R	4	U	1	S	2	V	8	13	0,5			0	0	2		0		0	105	294	0	0	0	294
19	*Juniperus chinensis*	O11	R	4	U	1	S	2	V	8		0			0	0			0		0	55	0	0	0	0	0
20	*Juniperus chinensis*	O12	R	4	U	1	S	2	V	8		0			0	0			0		0	55	0	0	0	0	0
21	*Cedru*	A9	R	4	U	1	S	2	V	8		0			0	0			0		0	210	0	0	0	0	0

Figure 7. Spreadsheet with data for a plot and tree evaluation

Number of copies made	
worked	identified
21	21

BALANCE SHEET VALUE PLOT [Lei]					
3 330	9 324	0	0	0	9 324

The price of a specimen in the nursery [Lei]	TREE EVALUATION [Lei]				
	Tree value	Devaluation from torso injury	Devaluation from crown injury	Devaluation from root injury	Current value
90	252	0	0	0	252
3 240	9 072	0	0	0	9 072
400	0	0	0	0	0
160	448	0	0	0	448

Figure 8. Detail of the balance sheet calculation for the data entry sheet

To these is added the box that highlights the number of specimens inventoried on the plot and those that have been identified and evaluated (worked on), as well as the value balance for the worked plot.
The spreadsheet subsequently has a sheet with the value of the seedlings in the nursery (Figure 9).

		Dendrological balance [pieces]					Surface		Pieces		
		Deciduous	Nuts	Coniferous	Ornamental	Pieces	[m²]	[ha]	Identified	Remained	% worked
	SUM	1119	37	136	399	1691	82960	8,296	277	1427	16,38
AREA	57180	25	0	1	21	47	1984	0,1984	41	6	87,23
	59962	1063	37	135	376	1611	68130	6,813	207	1417	12,85
	63924	31	0	0	2	33	12846	1,2846	29	4	87,88

Figure 9. Domain tree balance

A comprehensive picture of the value of the trees, as well as the distribution on each area (cadastral number) and the plots is given by spreadsheets that include information on tree and shrub species as well as nursery prices for seedlings.

		Dendrological representation [%]				
		Deciduous	Nuts	Coniferous	Ornamental	Pieces
	SUM	66,17 %	2,19 %	8,04 %	23,60 %	100,00 %
AREA	57180	53,19 %		2,13 %	44,68 %	100,00 %
	59962	65,98 %	2,30 %	8,38 %	23,34 %	100,00 %
	63924	93,94 %			6,06 %	100,00 %

		Dendrological density [pieces / 100 m²]					Surface returned to a specimen [m²/specimen]
		Deciduous	Nuts	Coniferous	Ornamental	Pieces	
	SUM	1,35	0,04	0,16	0,48	2,04	49,06
AREA	57180	1,26		0,05	1,06	2,37	42,21
	59962	1,56	0,05	0,20	0,55	2,36	42,29
	63924	0,24			0,02	0,26	389,27

Figure 10. Domain tree balance after place work

The following figure shows a general balance and an analysis by areas and by the whole domain that took into account the number of inventoried and identified specimens as well as the areas on which they are found.
The part of the calculation that highlights the inventoried and identified tree material
Using this centralized data, we made an analysis that highlights the categorization of the evaluated vegetation and we calculated the category density globally and by areas.

		VALUE ESTIMATION [Lei]							
		16,38	1 403 786	9 465 560	8 607	741	529	9 877	9 455 683	7
			VALOAREA ESTIMATĂ A ARBORILOR [Lei]							
		% evaluation	The value of the nursery	Value of trees	Devaluation from trunk injuries	Devaluation from crown injuries	Devaluation from root injury	TOTAL damage	The value of the identified trees	Increasing the value of the nursery
AREA	57180	87,23	6 969	29 985	140	121	87	348	29 637	4
	59962	12,85	218 847	1 473 036	1 270	0	0	1 270	1 471 766	7
	63924	87,88	4 136	47 517	0	0	0	0	47 517	11

Figure 11. Tree material value

We centralized all this information in a table that gives the inventory value of the evaluated ornamental trees located on the analyzed area of the Marghiloman Domain.
Figure 11 shows the estimated values for all tree material in the park. This was done with two parameters:
the percentage resulting from the ratio between the identified specimens and the evaluated specimens;
the value of the specimens evaluated for the three areas (cadastral numbers).

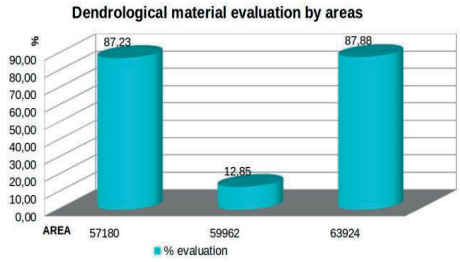

Figure 12: The stage of the field analysis at the date of making this material

From Figure 12 it can be seen that the estimated value of the tree material would be 9,456,238 lei at an evaluated specimen percentage of 16.38%. From the table you can read both the percentage of specimens assessed for each area and the damage due to injury and damage to the trunk, crown and roots.
Also, from this table you can see that most of the damage is in AREA 59962.

The calculations took into account the B.E.V.A. evaluation method and scales according to this method were used to calculate the indices.

CONCLUSIONS

The Marghiloman Domain Park in Buzău is a challenge regarding the reorganization in the idea of restoring the atmosphere specific to the interwar period of maximum flowering.
In a way, this park had special characteristics, somewhat unique, in that it combined an ornamental vegetation with many acclimatized species to that specific to the area, to which was added the presence of animals, a sector where vegetables were grown and let's not forget the existence of a heated greenhouse.
Also noteworthy is the organization of the park on well-defined principles that regulated both the organization of the vegetation and that of the animal sectors, the organization of routes and that of the buildings.
It is remarkable for the positioning and the logic of their placements and included:
living spaces; relaxation sectors; agro-zootehnical sectors; technical buildings.
By restoring the characteristic historical vegetation, to which the principles of permaculture can be associated, the biodiversity of both the vegetation and that of insects and animals attracted will be greatly increased. All these actions must comply with the regulations regarding the historical character as well as those regarding protected areas. Only through a documented, scientific approach with the application of the principles that govern biodiversity will the results be as desired. Establishing the value of ornamental trees framed in a certain context can play an important role in establishing the value of the domain, in establishing premiums in the case of insurance services and a role before legal bodies in case of litigation. Normally, in the case of administrations, it should provide a basis for discussions in establishing construction, road, municipal regulations, etc.
Tree evaluation is an entrepreneurial opportunity by providing services of:
-Tree inspection;
-Assessing the health and structure of a tree;
-Risk assessment for tree-related properties and people;
-Evaluation of the monetary value of trees and wood lots in the urban perimeter and landscaped areas;
-Assessment of the monetary value of damage to trees;
-Inventory and prescriptions for trees
-Supervision of arboricultural works (planting, cutting, cutting of trees along alleyways and roads, etc.)
This assessment comes in support of:
-Inspection of urban area trees that grow in parks, green spaces and on the street;
-Approval of applications for authorization to cut down trees;
-Legal disputes involving trees;
-Expropriations;
-Damage insurance files for affected trees;
-Judicial expertise;
-Purchase/sale of spaces with tree;
-Providing trees to urban spaces;
-Development of municipal policies on urban trees and forests;
-Elaboration of urban arboriculture plans.

All this should play an important role in assessing biodiversity, in maintaining the balance and health of an environment conducive to life.
Biodiversity would create an environment that brings joy and health benefits and a compensation for anthropogenic aggression

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