

MORE THAN JUST AESTHETICS: QUANTIFYING THE MONETARY VALUE OF TREE ALIGNMENTS IN “CATACUZIONO” PARK FROM FLOREȘTI – PRAHOVA COUNTY

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Abstract

*Florești Domain embeds a historic park designed by landscape architect Karl Friedrich Wilhelm Meyer, that features tree lines that contribute significantly to its aesthetic and ecological value. This study quantifies the economic value of these trees using the BEVA (Bareme d'Evaluation de la Valeur d'un Arbre) method. This method considers factors like tree size, species value, aesthetic contribution, health, and location to determine a monetary value for the presence of each tree within the general setup. The research relies on a smart tool used to make the tree inventory and to analyse data from three main tree lines: *Aesculus hippocastanum* L. (horse chestnut), *Juglans regia* L. (walnut) and *Tilia tomentosa* Moench (silver linden). The paper describes the evaluation process and provides an estimation for the total value of the targeted tree population. The study also reveals that inadequate management and vandalism have resulted in a 26% reduction in the potential value of these trees. The BEVA method provides a practical tool for assessing the financial value of trees in urban landscapes, facilitating informed management decisions and promoting better tree care.*

Key words: tree value, BEVA, TreePlotter, Cantacuzino Domain, Karl Friedrich Wilhelm Meyer.

INTRODUCTION

Public parks and gardens emerged in Europe in the 19th century. Representing a new cultural phenomenon at the time, many of them have been appreciated and extensively used by the public ever since.

Today, in most countries that have reached an unprecedented level of industrialization, technology, and urbanization, the conservation of existing parks and gardens, as well as the development of green areas serves as an important mean of protecting both people and their living environment.

In the case of historic gardens and parks, the vegetal compositional elements are at least as important as the built one for defining the character of these heritage green spaces. While the monetary value of the built components can be easily assessed, allowing for example for the estimation of damages or restoration costs, in Romania there is no established practice for evaluating the green components, particularly trees in historic parks and gardens.

The urban forests and trees are playing within our living environment primarily by regulating the microclimate, providing ecological benefits and reducing pollution. In this respect, there are already countless studies highlighting the benefits that urban green spaces provide for inhabitants, both at national and international level, such as Dwyer et al., 1991; Dwyer et al., 1992; Chiesura, 2004; Georgi & Zafiriadis, 2006; Nowak & Heisler, 2010; Millward et al., 2011; Hanspach et al., 2011; Shackleton et al., 2015; Duinker et al., 2015; Mexi & El-Shamali 2015 and Culescu 2015, to name just a few examples. Further more, Georgi & Zafiriadis (2006) lean over the impact of vegetation on the urban microclimate, observing how trees influence summer conditions, including air temperature, relative humidity, and solar radiation in Thessaloniki, Greece. Nowak and Heisler (2010) studied extensively the air quality in parks and urban areas. A similar research was conducted in Poland, in Łódź, the value of street trees in the city centre being assessed in relation with their contribution to

urban ecosystem services (Giergiczny & Kronenberg, 2014).

The value of trees is a constant topic of discussion: how much they worth in relation to different features like the oxygen they produce, their aesthetic contribution to a landscape, or their importance to a specific community.

However, in Romanian context, these are often highly subjective discussions about aspects that are difficult to quantify and evaluate. In the recent years, among the earliest recorded approaches to evaluating historic landscapes in Romanian heritage parks and gardens is proposed El-Shamali et al. (2010). In this research, the maximum aesthetic value was attributed by the authors to “fallen ancient trees, whose decaying trunks dramatically and spectacularly shaped the landscape”. Also in the Romanian context, Dobrescu (2009) described a rather narrow approach of the topic within the national literature, while Ciupa et al. (2005) proposed a complex 28-criterion method for evaluating vegetation, which, even from the authors' perspective, remains highly laborious. At international level, several well-established methods are currently used to estimate the value of the vegetal features within a green space. Among the ones considered for this research there were:

- **The BEVA** - Bareme d'Évaluation de la Valeur d'un Arbre **method** (Conseil general des Hauts-de-Seine, 2004; Culescu, 2018; Département du Loiret, 2020; Mairie de Metz, 2015; Ville de Rouen - Direction des Espaces Publics et Naturels, 2015)
- **The BURNLEY** (Burnley, 1967; Culescu, 2018; Kielbaso, 1979; McGarry, 1988; Moore, 1991; Watson, G., 2002)
- **The CAVAT** - Capital Asset Value for Amenity Trees **method** (CAVAT Group, 2023-1; CAVAT Group, 2023-2; Culescu, 2018; Doick et al., 2018);
- **The CTLA** - Council of Tree and Landscape Appraisers **method** (Council of Tree and Landscape Appraisers, 2020; Culescu, 2018)
- **The HELLIWELL method** (Culescu, 2018; Hellis Solutions Limited, 2019; Helliwell, 1967; Negrutiu, 1980; Padlet, 2020; Watson G., 2002)

However, due to evaluation criteria, only BEVA method could be retained for this research. It is important to note here that the other methods

include parameters that cannot be provided in Romanian context due to the lack of public data or the shortage of specialized workforce. The main exclusion reason were:

For Burnley method:

- The differences in the Romanian vegetation profile compared to the Australian flora on which the method is calibrated;
- The need for an accurate determination for the following: a tree's volume (in cubic meters, including foliage and not restricting the measurements only to woody parts as in forestry); the useful lifespan of the analysed specimen; the extent to which the analysed specimen fits within the space where it is located.

For CAVAT method:

- The need to determine the social value of a specimen;
- The requirement to assess how the species and the analysed specimen fit within the space where it is planted;
- The need to evaluate of how a tree is functioning from the biological point of view.

For CTLA method:

- The need have information regarding the replacement costs for each species for the largest specimen that can be transplanted from a local nursery;
- The need to use a coefficient assigned to each species based on its physical characteristics, rarity, and the degree of difficulty regarding its propagation and development in a nursery;
- The difference between the vegetal species profile between Romana and US (for examples species considered native in US are exotic for Romania and, thus, the degree of rarity is different).

For the Helliwell method:

- The need to determine the tree's expected useful lifespan, the significance of its placement within the landscape, and its relationship with the surroundings (all requiring highly specialized workforce for the evaluation);
- The requirement to correlate the above mentioned factors with the tree's impact on increasing property value (an aspect for which there are no studies or reliable data in Romania).

The exclusions of this methods was also based on the fact that, although they are mentioned in the national literature almost half a century ago (see for example Negrutiu, 1980), they have never been used in official manner (by professionals, by the public administration, in litigious situations etc.).

Lastly, the research is based on BEVA method and not on its newer version, VIE (Freytet et al., 2025, because this enhance version draws on data predetermined for each French city and, at this time, no similar data could be found for Romanian cities.

Therefore, this study aims to present a monetary valuation for tree lines embedded within the historic park of Cantacuzino Domain in Floresti - Prahova County from Romania (code PH-II-m-A-16389.04 according to Ministry of Culture, 2015. The paper is presenting the 2023 situation for the tree lines of *Aesculus hippocastanum* L. (horse chestnut), *Juglans regia* L. (walnut) and *Tilia tomentosa* Moench (silver linden) that are bordering the main north-south pathways within the hunting area of this historic domain. The goal of this demarche is to establish the current value of these green compositional elements and to provide an important stepping-stone for future restauration activities.

MATERIALS AND METHODS

In terms of material and methods, this research rests on two main pillars: **the TreePlotter software and BEVA** (Bareme d'Evaluation de la Valeur d'un Arbre) method.

The TreePlotter Inventory is a GIS-based green tree management system that allows users to

collect and update data, to evaluate trees and to monitor the maintenance process and trees' evolution over time and preserves the maintenance work history for tree population. The software was built by certified arborists and foresters (Hanou, 2014; TreePlotter, 2019; Morar et al., 2019) and it is extensively used in US and Western Europe to tackle tree evaluation and maintenance activity. Its cloud-based functionality enables navigation, data filtering, reporting, and export options, ensuring seamless management and live data access.

To develop this tree inventory, field data were collected and processed during the summer of 2023 using the TreePlotter software (see Figures 1, 2 and 3). Data collection targeted the most important alignments bordering the roads within the park of the Cantacuzino Domain from Floresti - Prahova County. The research leaned over the following species: *Aesculus hippocastanum* L. (horse chestnut), *Juglans regia* L. (walnut) and *Tilia tomentosa* Moench (silver linden).

For each tree were collected information regarding the location, the species and the tree trunk diameter at 1.00 meters, according to the European technical & quality standards for nurserystock for amenity trees in standard form (ENA, 2010). This height for diameter measurements aims to establish a connection for a potential replacement of an individual tree with nursery stock material produced for urban environment plantations. In this case, the diameter measurements does not aim to establish the wood quantity and value as it is the case for DBH, measured at 1.20 meters or 1.30 meters, according to the norms establisher in this respect in each country, in the forestry field.



Figure 1. General view for the tree inventory in Cantacuzino Domain

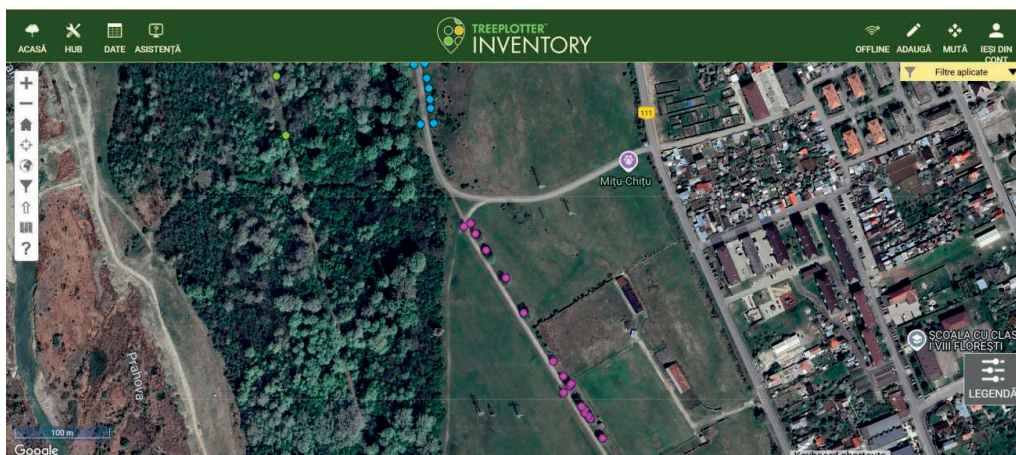


Figure 2. Detailed view from the tree lines inventory in Cantacuzino Domain:
(with blue) specimens of *Juglans regia* L.; (with magenta) specimens of *Tilia tomentosa* Moench.



Figure 3. Detailed view for a tree file embedded in TreePlotter Inventory for Cantacuzino Domain

BEVA Method (Bareme d'Evaluation de la Valeur d'un Arbre, roughly translated in English as: Scale for the Evaluation of a Tree's Value) is a simple way to calculate the value of trees as part of an urban landscape Département du Loiret, 2020).

This method was developed by the French Society of Arboriculture in collaboration with several public administrations from France.

Compared to other internationally recognized tree evaluation methods, BEVA is significantly simpler and easy to use both by public administrations and less specialized professionals. It is important to highlight here the fact that this method does not require:

- Special measurements using relatively expensive equipment;

- The involvement of professionals with highly specialised expertise;
- The use of very specific data, such as the maintenance cost of the analysed specimen.

The evaluation principles of this method are straightforward, beginning with an individual assessment of each tree.

For this purpose, four key features have been established to determine the value of each tree:

(1) *Tree Size Index*

To determine this index, the tree's circumference (in centimetres) is measured at 1.00 meter above ground level.

An index is assigned to each tree according to the following scale:

Table 1. Tree Size Index for BEVA method

Circumference	Index	Circumference	Index
10-14 cm	0.5	181-190 cm	19
15-22 cm	0.8	191-200 cm	20
23-30 cm	1	201-220 cm	21
31-40 cm	1.4	221-240 cm	22
41-50 cm	2	241-260 cm	23
51-60 cm	2.8	261-280 cm	24
61-70 cm	3.8	281-300 cm	25
71-80 cm	5	301-320 cm	26
81-90 cm	6.4	321-340 cm	27
91-100 cm	8	341-360 cm	28
101-110 cm	9.5	361-380 cm	29
111-120 cm	11	381-400 cm	30
121-130 cm	12.5	401-420 cm	31
131-140 cm	14	421-440 cm	32
141-150 cm	15	441-460 cm	33
151-160 cm	16	461-480 cm	34
161-170 cm	17	481-500 cm	35
171-180 cm	18	501-600 cm	44 etc.

(2) Species Value Index

This index is based on the selling price of a specimen from each species included in the study and is determined usually according to the selling prices of local nurseries.

The index is equal to 10% of the selling price of a tree with a circumference of 10-12 cm for deciduous species or a height of 150-175 cm for coniferous species. Seeing that Romania does not have that many local nursery that are producing amenity tree standards, a correlation was made between available resources at national level (Pepiniera Silva Periland, 2021; 2023; 2025) and the ones at European level (Bruns Pflanzen, 2011; 2021; 2023) that are usually providing planting resources for this country.

(3) Aesthetic and Health Value Index

This index is represented by a coefficient ranging from 1 to 10, depending on the tree's placement within the landscape (whether it is a solitary tree, part of a group, or an alignment) and the specimen's vigour.

The values for this index are:

- 10 for a healthy, vigorous, solitary, and remarkable tree;
- 9 for a healthy, vigorous and remarkable tree, placed in groups of 2-5 specimens;

- 8 for a healthy, vigorous tree, placed in a group, a protection plantation or in a tree alignment;
- 7 for a healthy tree with medium vigor, placed as a solitary specimen;
- 6 for a healthy tree with medium vigor, placed in groups of 2-5 specimens;
- 5 for a healthy tree with medium vigor, placed in a group, a protection plantation or in a tree alignment;
- 4 for a tree with very low vigor, old, placed as a solitary specimen;
- 3 for a tree with very low vigor, deformed, placed in a group or in a tree alignment;
- 2 for a tree without vigor, diseased;
- 1 for a tree without amenity value (dead).

(4) Placement Index

This index is represented by a coefficient that reflects the tree's value in relation to its location within the city. This index can have the following values:

- 10 for a tree located in the city centre;
- 8 for a tree located on the outskirts of the city;
- 6 for a tree located in a rural area.

According to BEVA method, the value of the tree is obtained by multiplying these four indices together:

Index 1 x Index 2 x Index 3 x Index 4.

The **statistical analysis** was performed using the ANOVA calculation software.

The focus point of this research is the **Cantacuzino Domain from Prahova County**. At Florești, nearly 80 km from Bucharest, lies one of the most impressive noble estates of the Old Kingdom, spanning over 150 hectares. The estate includes a romantic park, utilitarian areas, and a hunting park, landscaped in the 19th - early 20th century by Carl Friedrich Wilhelm Meyer and Emile Pinard.

After the death of Gheorghe Grigore Cantacuzino in 1913 and the events of World War I and World War II, the estate's vegetation composition gradually deteriorated. Communist and post-communist interventions led to the disappearance of garden furniture and the loss of important tree specimens. Nevertheless, the estate remains a landmark on the European map of extra-urban noble gardens.

In terms of vegetation, the site is still emending at this time several spectacular specimens of *Juglans nigra* L. (black walnut), *Pinus strobus* L. (Eastern white pine), *Platanus x acerifolia* (London plane), *Populus alba* L. (white poplar) and the rare *Pterocarya fraxinifolia* Spach

(Caucasian wingnut). Among the trees preserved from the historical setup there are also parts of the tree lines composed of *Aesculus hippocastanum* L., *Juglans regia* L. and *Tilia tomentosa* Moench. (see Figures 4, 5 and 6).

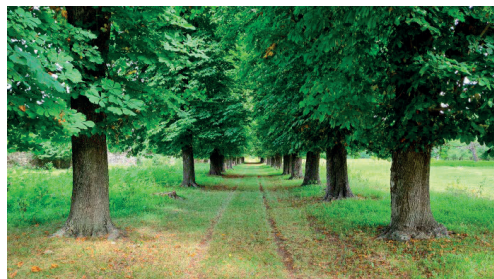


Figure 4. View of *Aesculus hippocastanum* L. tree line bordering the South pathway, toward the Western part of the hunting park: (above) in July 2022; (down) in August 2023

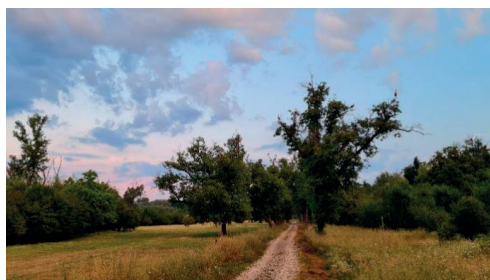
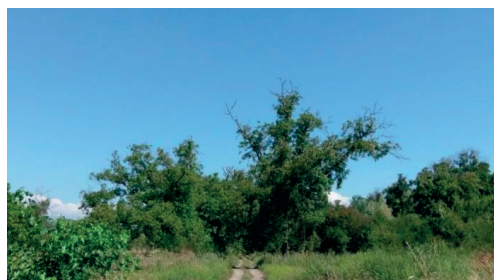


Figure 5. View of *Juglans regia* L. tree line bordering the North pathway, toward the middle part of the hunting park: (above) in August 2019; (down) in August 2023



Figure 6. View of *Tilia tomentosa* Moench. tree line bordering the access on the hunting park: (above) in August 2021; (down) in August 2023

RESULTS AND DISCUSSIONS

For this research, 98 *Aesculus hippocastanum* L., 51 *Juglans regia* L. and 36 *Tilia tomentosa* Moench. were inventoried.

Based on the measurements, the value of each tree was calculated. This value reflects the tree's

actual presence within the green infrastructure and its contribution from social, aesthetic, ecological, and cultural perspectives.

The value was obtained by multiplying the four indexes described above (tree size index, species value index, aesthetic and health value index and placement index). The result is representing the

monetary value in euros for the analysed specimens. Essentially, this value is equivalent to the cost required to replace a lost or removed tree with another specimen of similar significance within the landscape. For data processing, a mono-factorial experience was conducted, where the analysed factor was the species, with three levels: a1 for *Aesculus hippocastanum* L., a2 for *Tilia tomentosa* Moench and a3 for *Juglans regia* L. The analysed parameter was the average value of each species (see Table 2). Compared to the

species *Aesculus hippocastanum* L. (see “castan” in the chart below), the species *Tilia tomentosa* Moench. (see “tei” in the chart below) showed a higher value (€10,246.67), with a positive but statistically insignificant difference (€8,363.36). In contrast, the species *Juglans regia* L (see “nuc” in the chart below) had a lower value (€7,989.99), recording a statistically assured but insignificant negative difference.

The value determined for each tree can be observed in detail in Figure 7.

Table 2. The average value (in euros) of each species

Species	Average value (in euros)	Difference (in euro)	Significance
<i>Aesculus hippocastanum</i> L. castan	9,410.33	-	-
<i>Tilia tomentosa</i> Moench. tei	10,246.67	8,363.36	ns
<i>Juglans regia</i> L. castan	7,989.99	-1,420.34	ns

DL (p 5%) = 0.044 | DL (p 1%) = 0.103 | DL (p 0.1%) = 0.393

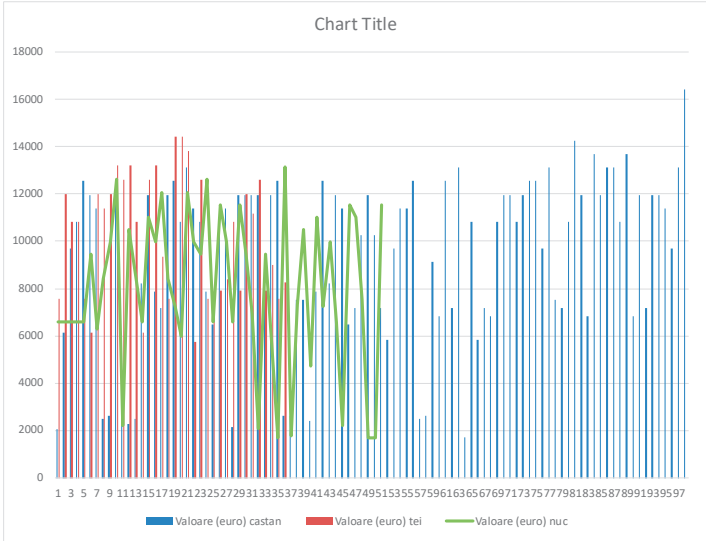


Figure 7. Value determined for each tree inventoried for this research

The total value of the trees currently part of the tree lines embedded by Cantacuzino Domain is is **€1,696,935** (Table 3) - broken down as follows:

- €920,550 for *Aesculus hippocastanum* L.;
- €407,505 for *Juglans regia* L.;
- €368,880 for *Tilia tomentosa* Moench.

It is important to note that, probably due to inadequate maintenance and various acts of vandalism, this compositional element has significantly lost its value.

For example, if in the case of the aesthetic and health value index **the specific value (5)** could be assigned for “healthy tree with medium vigor, placed in a group, a protection plantation or in a tree alignment”, the inventoried trees from Floresti Domain would be worthing **€2,145,045** today (Table 3). Thus, due to poor maintenance and vandalism actions, this tree lines from this historic domain **lost approximately €448,110** (26%) of the value it could have had under proper management.

Table 3. The current value (in euros) of each species

Species	Number of specimens	Current value (in euro)	Lost value (in euro)
<i>Aesculus hippocastanum</i> L.	98	920,550	1,157,670
<i>Juglans regia</i> L.	51	407,505	534,975
<i>Tilia tomentosa</i> Moench.	36	368,880	452,400
TOTAL	185	1,696,935	2,145,045

CONCLUSIONS

This study assesses the monetary value of tree alignments in “Cantacuzino” Park from Florești (Prahova County in Romania), using the BEVA (Bareme d’Evaluation de la Valeur d’un Arbre) method, which evaluates trees based on size, species, aesthetic and health condition, and placement within the built landscape. The research focused on 98 *Aesculus hippocastanum* L. (horse chestnut), 51 *Juglans regia* L. (walnut) and 36 *Tilia tomentosa* Moench. (silver linden), providing a financial estimate for their contribution to this historic park's green infrastructure.

The results indicate that the total value of the inventoried trees amounts to €1,696,935. Yet inadequate management and vandalism have led to a 26% loss in potential value, equating to approximately €448,110. This loss highlights the urgent need for improved tree care and strategic conservation efforts. Had proper maintenance been implemented, the total estimated value of these trees could have reached €2,145,045.

By assigning a financial worth to trees, the BEVA method provides a practical and accessible tool for evaluating green heritage elements in historic parks and urban landscapes. This valuation is essential for informing decision-making processes related to tree preservation, maintenance planning, and future restoration initiatives. The study highlights the importance of incorporating monetary assessments into conservation strategies to ensure the long-term sustainability of historic green spaces.

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At the same time, we acknowledge the contribution of specialists and researchers who have previously explored tree valuation methods, thus providing a solid foundation for our study.

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