TREE VALUATION

European Tree Valuation Standard

European
Arboricultural
Standards

European Arboricultural Standards

EUROPEAN ARBORICULTURAL STANDARDS

Tree Valuation Standard

2025

BG: Икономическа оценка/ Оценка на значимостта на дърветата
CS: Oceňování stromů
DA: Værdisætning af træer
DE: Gehölzwertermittlung
EL: Αποτίμηση δένδρων
EN: Tree Valuation
ES: Valoración económica de los árboles
ET: Puude väärtuse hindamine
FI: Puiden arvon määrittäminen
FR: Valorisation d'arbre
GA: Luacháil crann
HR: Procjena vrijednosti stabala
HU: Faértékelés
IT: Valutazione economica dell'albero
LT: Medžio kainos nustatymas
LV: Koku vērtības noteikšana
MT: Stima tal-valur ekonomiku tas-siġar
NL: Boomwaarde
PL: Waloryzacja drzew
PT: Valoração de árvores
RO: Evaluarea valorii copacilor
SK: Oceňovanie stromov
SL: Ocena stanja drevesa
SV: Vrednotenje dreves
UK: Оцінка стану дерев

We are very grateful for all the comments and support from national arboricultural representatives and individual arborists across Europe, who responded to the call for cooperation on the text of this standard.

This standard is intended to define the approach to valuation process of amenity trees.

Co-funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Editorial:

Standard text:
© Working group “European Consulting Standards in Treework – ECoST”, 2025

Team of authors:
Jaroslav Kolařík (Czech Republic),
Tom Joye (Belgium),
Junko Oikawa-Radscheit (Germany, European Arboricultural Council),
Gerard Passola (Spain),
Giovanni Poletti (Italy),
Henk van Scherpenzeel (Netherlands),
Daiga Strēle (Latvia),
Goran Huljenić (Croatia),
Kamil Witkoś-Gnach (Poland),
Jan Forejt (Czech Republic),
Marzena Suchocka (Poland).

Text revision:
Sarah Bryce, Simon Richmond – Arboricultural Association, U.K.

© Working group “European Consulting Standards in Treework – ECoST”, 2025

Pictures:
Olga Klubova (Latvia)

Recommended reference:
European Tree Valuation Standard (2025). EAS 05:2025. European Arboricultural Standards (EAS), Working group “European Consulting Standards in Tree Work (ECoST).

EAS 05:2025 (EN) – European Tree Valuation Standard.

If you want to translate text of the standard to other languages, please contact the project leader on info@arboristika.cz

Attribution-NoDerivatives 4.0 International (CC BY-ND 4.0), we welcome translations of the text to other languages

Obsah

1. Purpose and content of the standard **5**
1.1. Purpose 5
1.2 Main objectives 5
1.3 Stakeholders 6
2. Normative references **7**
2.1 Introduction 7
2.2 Links to general documents 7
2.3 Qualification 9
3. Values of amenity trees **10**
3.1 Introduction 10
3.2 Tree value and cost 10
3.3 Damage and loss of value 11
3.4 Loss of ecological or environmental services 12
4. Methods for tree valuation **13**
4.1 Introduction 13
4.2 Property value 13
4.3 Repair cost 13
4.4 Replacement cost 13
4.5 Tree ecosystem services evaluation 14
4.6 Biodiversity (wildlife) value 15
4.7 Disservices 17
5. Application of values in tree management **18**
5.1 Introduction 18
5.2 Repair or replacement 18
5.3 Felling licences 19
5.4 Approach to groups of trees 20
5.5 Best practices 20
6. Appendices **21**
Appendix 1 – Tree Rights Declaration 21
Appendix 2 – Axiology 22
Appendix 3 – Case studies 23
7. REFERENCES **26**

1. Purpose and content of the standard

1.1. Purpose

1.1.1 This standard was published by the working group of the ECoST project (European Consulting Standards in Tree Work) in cooperation with the EAC (European Arboricultural Council) in February 2025.

1.1.2 In the text of the standard the following formulations are used:

- where the standard says “can”, this refers to possible options;
- where the standard says “should”, this refers to a recommendation;
- where the standard says “must”, this refers to mandatory activities.

1.1.3 The aim of this standard is to showcase modern approaches to articulating the values of amenity trees, highlighting aspects that should be considered in determining the overall worth of an individual tree. This standard embodies common practices adopted throughout European countries.

1.1.4 The standard offers methodological guidance specifically tailored for individuals actively involved in arboricultural consulting and tree valuation.

1.2 Main objectives

1.2.1 This standard is intended to assist individuals and organizations in recognizing and understanding the diverse values associated with trees. It aims to ensure that the significance of trees in different settings is appropriately acknowledged and appreciated.

1.2.2 The primary goal of calculating tree value is to identify factors that should be considered when determining the worth of a tree whose value is not derived from timber production.

1.2.3 While the value of trees is often quantified in monetary terms, this approach does not capture their full value. Trees offer a variety of benefits, many of which transcend mere financial metrics.

1.2.4 This standard emphasizes the fundamental principle that **every tree possesses inherent value**. Regardless of its size, age, or location, each tree contributes uniquely to the environment and the ecosystems it inhabits.

1.2.5 Certain trees, distinguished by their age, appearance, or historical significance, warrant special attention. Such trees are recognized as biocultural heritage and should be given a superior status, which urges humans to protect them as “natural monuments”.

1.2.6 This standard provides guidelines to help make informed decisions in tree management. It ensures that the choices made are beneficial for the trees and the environment while considering the broader impact on the community and ecosystem.

1.2.7 The primary constraints of tree valuation methods are that they cannot assign a value to every characteristic of a tree, and some models may undervalue specific types of trees, such as ancient or veteran trees.

1.2.8 The intention of this document is to establish a comprehensive methodology for evaluating tree value that incorporates both tangible and intangible benefits, recognizing that while humans and other living beings make survival-based decisions, humans uniquely seek deeper understanding and values beyond monetary measures. This standard aims to reflect the broader scope of human decision-making, which often transcends financial metrics, as detailed in axiology (refer to Appendix 2 for more information).

1.3 Stakeholders

1.3.1 In the valuation of amenity trees and subsequent management actions, each party involved has a distinct and crucial role in ensuring the holistic well-being and appropriate valuation of trees.

1.3.2 **Regulatory bodies (courts, government)** should acknowledge the broader significance of tree values and encourage legislators, insurance providers, and other entities to incorporate this understanding in their decision-making.

1.3.3 **Tree owner/manager (public or private)**: The tree owner or manager is responsible for ensuring that the tree is maintained in a safe condition and can deliver its ecosystem services effectively. The final decisions regarding any management actions or interventions rest with the tree owner or manager.

1.3.4 Tree managers/owners should recognize their trees as economic entities and incorporate them as tangible assets within their financial frameworks. It is advisable for them to reference this standard in their asset protection values[1], tree regulations, and contractual agreements.

1.3.5 **Appraiser**: The tree appraiser's primary responsibility is to employ suitable valuation methods to determine the value of the tree. They should also propose relevant recommendations for tree management, if required. In situations where specialized knowledge is needed, the appraiser should consult with tree consultants to enhance their understanding, observations, and analysis.

1.3.6 **Tree consultants** understand the diverse values of trees, taking into account their mechanical integrity, physiological condition and how they fit into their growth environment, especially when evaluating potential management actions. Their expertise guarantees that when determining a tree's value, both the inherent and external worth are given primary consideration.

1.3.7 **Tree worker/arborist**: The tree worker or arborist is tasked with implementing the management recommendations provided by the appraiser or tree consultant. If the tree worker's observations or analysis differ, it is imperative to consult with either the appraiser or tree consultant or the tree owner/manager to seek clarification and ensure alignment in approach.

1.3.8 **Public and community**: The public and community play a vital role in recognizing and advocating for the value of trees within their environment. Their input and engagement can influence tree preservation efforts, policymaking and community-wide initiatives that promote the benefits of trees. Active participation in tree-related programmes and feedback to tree owners/managers and regulatory bodies ensures that the communal and societal values of trees are adequately considered and integrated into decision-making processes.

[1] **Asset protection values** (APV) typically refer to the monetary worth or importance assigned to assets, especially in the context of protecting them from potential threats or damages. This can be in the form of insurance, risk management strategies, or other protective measures to ensure the preservation of the asset's value.

2. Normative references

2.1 Introduction

2.1.1 This standard is complementary to other EU standards and national/regional regulations. It serves as a guide to ensure a consistent approach to the valuation of trees, while recognizing the diverse practices across the European Union.

2.1.2 Within the European Union, there is no unified practice for the valuation of trees. The approach to this subject varies significantly between member states, reflecting their unique ecological, cultural, and economic contexts. This diversity in approach underscores the importance of a standard that can harmonize practices while allowing for regional specificity.

2.1.3 To address the variability in practices across member states, national annexes have been attached to this standard. These annexes provide detailed insights into the specific practices, regulations, and guidelines followed by individual countries in the EU. Users of this standard are encouraged to consult the relevant national annex to gain a comprehensive understanding of the valuation practices in a specific country.

2.1.4 The valuation of trees should be conducted in a manner that is both consistent with EU-wide practices and sensitive to national and regional specificities. By defining general approaches to this issue, this standard aims to promote best practices, enhance the quality of tree valuation, and foster collaboration among member states.

2.2 Links to general documents

2.2.1 The European Union's political landscape, particularly the Green Deal and other related initiatives, has significantly influenced the perception and valuation of amenity trees.

2.2.2 The **European Green Deal**, introduced by the European Commission, aims to make Europe the first climate-neutral continent by 2050. It encompasses a set of policy initiatives targeting various sectors, including biodiversity, clean energy, and sustainable agriculture.

2.2.3 Within the Green Deal, trees, especially those outside forest environments, are recognized for their multifaceted contributions. They play a pivotal role in urban cooling, carbon sequestration, enhancing biodiversity, and improving air quality. This acknowledgment has elevated the importance of valuing these trees appropriately.

2.2.4 The **EU's Biodiversity Strategy for 2030** emphasizes the importance of green infrastructure, including non-forest trees, in creating resilient ecosystems. The strategy's goals indirectly promote the preservation and appropriate valuation of trees in urban and peri-urban areas.

2.2.5 Various EU directives and policies encourage member states to develop urban greening plans. These plans often highlight the economic, social, and environmental value of trees in urban settings, further emphasizing their importance in sustainable urban development.

2.2.6 The EU's political activities have underscored the need for a holistic approach to tree valuation. Beyond their economic value, trees are now increasingly recognized for their ecological and social contributions.

2.2.7 The European Commission introduced the **Nature Restoration Law** to improve ecosystems for people and the planet. This law is a key part of the EU Biodiversity Strategy. It focuses on fixing damaged ecosystems, especially areas that store carbon and help lessen the effects of natural disasters. Its main goals are to:

- Restore ecosystems, habitats, and species throughout EU's terrestrial and marine regions.
- Ensure the sustainable recovery of a biodiverse and resilient environment.
- Support the EU's climate change mitigation and adaptation goals.
- Fulfil international obligations.

2.2.8 In accordance with the Nature Restoration Law's guidance, European cities are encouraged to achieve a minimum tree canopy coverage of 10%, while further research suggests that urban neighbourhoods should target a 30% tree coverage to enhance microclimate, air quality, and public health.

2.2.9 **Directive 92/43/EEC**[2] focuses on the conservation of natural habitats along with wild fauna and flora. It specifically mentions species including *Osmoderma eremita* (a priority species), *Cerambyx cerdo*, and *Barbastella barbastellus*, which are listed in Annexes II and IV. Annex II covers animal and plant species of community interest that necessitate the designation of special conservation areas, while Annex IV includes species requiring strict protection. The survival of these species is intrinsically linked to tree habitats. Consequently, safeguarding these species entails the protection of their arboreal habitats.

2.2.10 **IPBES**[3] **Values Assessment**[4] reveals that the global biodiversity crisis is driven by political and economic decisions that rely on narrow market values and overlook significant non-market values like cultural identity and climate regulation. Even though over 50 valuation methods are available, few studies involve stakeholders, which leads to ecological and cultural benefits being undervalued. The report calls for the integration of a comprehensive typology of nature's values into decision-making and the adoption of inclusive, value-centred policies.

2.2.11 The **Sustainable Development Goals**[5] are a set of interconnected objectives setting out a blueprint for global peace, prosperity, and sustainability. These goals, ranging from eradicating poverty to climate action, highlight the intertwined nature of environmental, social, and economic sustainability. In the context of tree value perception, the emphasis on environmental sustainability, particularly in goals like "Life on land" (SDG 15), underscores the importance and value of trees in achieving these global objectives.

2.2.12 The **Convention on Biological Diversity**[6] (CBD) describes an ecosystem as a combination of living beings and their physical environment in a specific location. Essentially, it is a local web of interrelated plants, animals, and their surroundings. Humans are deeply connected to ecosystems, deriving both direct and indirect advantages, termed "ecosystem services", a concept highlighted by the Millennium Ecosystem Assessment. The CBD is the international legal instrument for "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources" that has been ratified by 196 nations.

2.2.13 The **3–30–300 rule**[7] offers straightforward benchmarks for tree presence in urban areas:

3: Each person ought to have a view of at least three large trees from their home, given the psychological well-being advantages of surrounding greenery.

30: A neighbourhood with at least 30% tree canopy offers benefits like cooling, improved microclimates, and better mental and physical health. Cities globally aim for this canopy target, emphasizing the importance of outdoor interaction for social health.

300: Proximity to recreational green spaces, ideally within 300 metres, promotes physical and mental health. The World Health Organization (WHO) emphasizes easy access to such spaces, adjusting for urban density.

2.2.14 The EU and its member states have shown various levels of endorsement for these benchmarks through urban greening initiatives, policies aimed at increasing urban canopy cover, and investments in accessible green spaces. These efforts align with broader EU sustainability and public health goals, reflecting a commitment to enhancing urban living conditions through the strategic presence of trees and green spaces.

2 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

3 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) is an independent intergovernmental body comprising 139 member governments. Established by governments in 2012, it provides policymakers with objective scientific assessments about the state of knowledge regarding the planet's biodiversity, ecosystems and the contributions they make to people, as well as the tools and methods to protect and sustainably use these vital natural assets.

4 https://zenodo.org/records/7410287

5 The Sustainable Development Goals (SDGs), also known as the Global Goals, are a set of 17 interconnected objectives established by the United Nations General Assembly in 2015.

6 https://www.cbd.int

7 Konijnendijk, C. C. (2023). Evidence-based guidelines for greener, healthier, more resilient neighbourhoods: Introducing the 3–30–300 rule. Journal of Forestry Research 34(3): 821–830.

2.2.15 The **Tree Rights Declaration**[8] is a relatively new, and not generally accepted, statement about the perception of trees by humans. It emphasizes that every tree has a distinct value and should be acknowledged as such. Trees are sensitive to environmental shifts and should not be viewed as mere objects but rather as beings with rights to both above- and below-ground spaces essential for their growth. Trees deserve respect throughout their long lifespans, which often exceed human lifetimes, and have the right to grow, reproduce, and die naturally. More information in Appendix 1.

2.3 Qualification

2.3.1 The process of calculating tree value is a multidisciplinary, specialized task that requires the expertise of a professional who has undergone appropriate training and possesses significant experience in the field (see 1.3.5). This ensures that the valuation is accurate, comprehensive, and reflective of the tree's multifaceted contributions to the environment and society.

2.3.2 There is currently no internationally recognized qualification scheme for tree value calculation.

2.3.3 National qualifications may be recognized locally. These qualifications are listed in the national annexes to this standard.

2.3.4 From the perspective of arboriculture, the following qualifications can help on an international (EU) level with tree-related questions connected with tree value calculation:

- European Tree Technician (EAC);
- VETcert Veteran Tree Specialist (Consulting level); and
- ISA Board Certified Master Arborist.

2.3.5 Utilizing this standard requires a comprehensive understanding of trees and their maintenance. Inappropriate application of these guidelines and the associated calculation models may result in significant discrepancies in results, potentially leading to avoidable legal disputes.

8 Tree Rights Declaration, French National Assembly, 5 April 2019.

3. Values of amenity trees

3.1 Introduction

3.1.1 The valuation of trees in urban and natural landscapes is a complex process, influenced by various factors.

3.1.2 Trees offer a range of services, some of which might be challenging to quantify in terms of monetary value. Here is a list of possible services linked to trees:

- **Ecological service:** Trees maintain ecological balance by providing habitats for various species and contributing to biodiversity.
- **Environmental service:** Trees provide shade, reduce the urban heat island effect, and improve overall environmental quality.
- **Carbon storage and sequestration service:** Trees absorb carbon dioxide, helping to mitigate the effects of climate change.
- **Stormwater management service:** Trees reduce runoff and aid in groundwater recharge.
- **Aesthetic service:** Trees enhance landscape beauty, making spaces more appealing and increasing property values.
- **Health service:** Trees improve air quality, reduce noise pollution, and have been linked to reduced stress levels and improved mental health.
- **Social service:** Trees offer recreational spaces, contribute to mental well-being, and have cultural, heritage, scientific, or historical significance.
- **Economic service:** Trees provide timber, fruits, and other products, increase property values, and attract tourism.
- **Structural service:** This refers to the replacement cost of a tree, taking into account its size, species, and condition.
- **Conservation service:** Some trees are rare or endangered, adding to their conservation value.

3.1.3 Each evaluation approach aims to provide a holistic perspective, ensuring that tree valuation is conducted with precision, fairness, and a deep understanding of the tree's role in the broader ecosystem based on the services listed above.

3.1.4 Amenity trees provide environmental advantages and services to human society. Recognizing and quantifying these services is crucial in the tree value calculation process, ensuring a comprehensive understanding of a tree's worth.

3.2 Tree value and cost

3.2.1 **Tree value:** Tree value encompasses the holistic worth of a tree, taking into account both tangible and intangible benefits.

3.2.2 **Tree monetary value:** This refers specifically to the quantifiable economic worth of a tree, expressed in monetary terms. It represents the amount of money or its equivalent for which a tree or its associated benefits can be traded or valued in the market. This might include the cost of timber if the tree were to be harvested, the influence its presence has on the value of the property it sits on, or the estimated economic benefit of its environmental services, such as air purification or stormwater runoff reduction.

3.2.3 Additionally, the monetary valuation should account for disservices, such as maintenance costs, potential damage to infrastructure from roots, or allergens produced by certain species.

3.2.4 While tree value considers a broad spectrum of benefits and contributions that a tree offers, tree monetary value focuses solely on the economic aspect, translating those benefits into a monetary figure.

3.2.5 **Cost:** Cost refers to the amount of money that is used to produce something or the price paid to obtain something. It can be understood in terms of monetary expenditure, resources consumed, or lost opportunities. Costs are often used to determine the value of products and services, and they play a crucial role in decision-making processes in business and in personal finance.

3.2.6 The monetary expression of tree values is referred to as tree costs. This means that the quantifiable economic worth of the benefits and contributions a tree offers is represented as its cost in monetary terms. Tree costs are frequently considered when assessing the value of trees and their ecosystem services, and they play a pivotal role in decision-making processes for urban planning, forestry management, and individual landscaping choices.

3.2.7 **Timber value:** Timber value refers to the economic worth of the wood derived from trees. This value is determined by various factors, including the type of wood, its quality, and the demand for it in the market.

3.2.8 Timber value primarily pertains to the economic worth derived from trees grown for their wood, especially those in forests intended for logging. However, when amenity trees are being assessed, the concept of timber value must not be the primary consideration.

3.2.9 Timber value can be significant only in the context of property value when trees on a property are not just damaged but are entirely stolen or harvested.

3.3 Damage and loss of value

3.3.1 Damage to trees refers to any harm or adverse impact on a tree's structure, health, or vitality, which can result from factors such as physical injury, disease, pests, environmental stressors, or human activities.

3.3.2 Damage to a tree (above and below ground) can be caused, for example, by:

- vehicular collisions,
- improper maintenance activities, such as incorrect pruning or mowing,
- acts of vandalism,
- construction-related disturbances, both above and below ground, including drilling,
- installation and maintenance of infrastructure like cables, sewage systems, pipelines, and more,
- alterations in the height of the soil, whether by removing, decreasing, or raising the soil level,
- shifts in groundwater levels or flooding,
- exposure to chemicals, including road salts, herbicides, gas emissions, water pipe ruptures, toxins, and the like,
- development plans or felling permit applications that prioritize other interests over tree preservation.

3.3.3 Methods to determine the form and extent of tree damage are described in the EAS 04:2025 - European Tree Assessment Standard.

3.3.4 In instances of tree damage, the guiding principle is that any harm sustained due to a damaging event may qualify for compensation.

3.3.5 For the damage to be officially recognized by any involved party, the valuation report should not be more than 6 months old.

3.3.6 In cases where there is a delay from the time when the damage is reported, a statutory interest might be applied to cover the period that has elapsed since the initial damage report.

3.4 Loss of ecological or environmental services

3.4.1 Environmental loss refers to the negative effects on ecosystems and the environment resulting from tree damage or removal.

3.4.2 This consideration plays a crucial role in the tree valuation process, ensuring that the broader ecological implications and regulatory frameworks are taken into account.

3.4.3 When a tree is removed or permanently damaged, it is not just the tree that is lost. The broader implications include:

- Ecological balance: The loss of habitat for various species disrupts the ecological balance and reduces biodiversity.
- Environmental quality: The absence of trees diminishes shade, exacerbates the urban heat island effect, and negatively impacts overall environmental quality.
- Carbon sequestration: The removal of trees reduces carbon dioxide absorption, undermining efforts to mitigate climate change.
- Stormwater management: The loss of trees increases runoff and impairs groundwater recharge, affecting water management.
- Aesthetic appeal: The removal of trees detracts from landscape beauty, making spaces less appealing and potentially decreasing property values.
- Health benefits: The absence of trees leads to poorer air quality, increased noise pollution, and higher stress levels, adversely affecting mental and physical health.
- Social services: The loss of trees reduces recreational spaces, diminishes contributions to mental well-being, and impacts cultural, heritage, scientific, or historical significance.
- Economic value: The removal of trees eliminates sources of timber, fruits, and other products, reduces property values, and diminishes tourism attractions.
- Structural value: The cost of replacing a tree, taking into account its size, species, and condition, represents a significant loss.
- Conservation efforts: The removal of rare or endangered trees undermines conservation efforts and reduces their conservation value.

3.4.4 Approaches to valuation of environmental loss:

- Direct assessment: Quantify the immediate ecological services lost due to tree removal.
- Replacement cost method: Calculate the cost of restoring the ecological services to their original state.
- Opportunity cost approach: Evaluate the potential ecological benefits that would have been accrued if the tree had not been removed.

3.4.5 Challenges and limitations:

- Quantifying ecological loss: It is challenging to assign a monetary value to some ecological services.
- Subjectivity: Different experts might arrive at different valuations for the same ecological loss.

4. Methods for tree valuation

4.1 Introduction

4.1.1 Within the framework of tree valuation, the following distinct methods are used to articulate these values:

- property value associated with trees,
- repair value of trees,
- replacement value of trees,
- value associated with biodiversity (wildlife),
- value of ecosystem services provided by trees.

4.1.2 In many countries, only some of the methods mentioned above are currently in use or recognized by legislation/industry standards. To ensure no tree values are overlooked, it is advisable to consider all the principles listed above and apply the most suitable one for each specific case.

4.2 Property value

4.2.1 The property value of trees is the enhancement in the monetary worth of a piece of land or property due to the presence of trees.

4.2.2 Properties with well-maintained trees often have higher market values than similar properties without trees.

4.2.3 Trees not only enhance the value of residential properties but also elevate the worth of commercial properties, parks, and urban areas.

4.2.4 The property value calculation model for trees is closely tied to real estate appraisal or valuation; this is the process of developing an opinion on the value of real estate, usually its market value.

4.2.5 Different techniques for assessing tree value within the context of property value are employed across various countries. These methodologies are detailed in the respective national annexes.

4.2.6 When considering property value assessment, the value of timber can be included even for amenity trees, especially when trees on the property are not merely damaged but entirely stolen or harvested.

4.3 Repair cost

4.3.1 The repair cost comprises the total expense associated with addressing permanent damage to a tree. This cost is relevant when a tree can feasibly be restored following the damage.

4.3.2 The foundational tenet of compensation law is the restoration of the injured party to their prior (property) state before the damaging event occurred. This restoration is achieved through the reimbursement of costs that arise from the damage.

4.4 Replacement cost

4.4.1 Replacement cost, in relation to trees, refers to the total expense associated with replacing a tree with a new one of similar function, size, species, and quality at the same location. This cost includes the removal of the original tree, site preparation, purchasing a new tree, planting, and any initial care or maintenance required to establish the new tree.

4.4.2 This method is uniquely suited to trees that primarily serve as botanical specimens; it does not take into account certain specific services that they provide. The utilization of this valuation method is constrained due to the difficulties associated with ascertaining the replacement value of such a tree within a foreseeable future.

4.4.3 When a tree incurs significant damage that does not immediately suggest complete failure, a comprehensive investigation is mandatory. This assessment will ascertain if the tree remains safe and manageable or if preservation is no longer feasible.

4.4.4 For instances where the damage is irreversible or becomes so over time, replacement may be considered an adequate method of addressing the situation. Trees that are removed due to planning, felling, construction endeavours, redevelopment, or reconstruction are deemed to be lost.

4.4.5 **Approach 1: Actual replacement cost of a comparable tree.** This is the actual cost of replacing a removed or damaged tree with a comparable tree or trees over the next 5–10 years. This approach considers the genuine expenses associated with planting multiple new trees to substitute for the lost one, ensuring that the new trees will continue to grow, thereby increasing in value and functionality over time.

4.4.6 The replacement evaluation method is typically suited for tree species with small crowns, fruit trees, and grafted trees. The same applies to shaped trees. These trees without natural crown development can usually be directly replaced by a comparable specimen from the market.

4.4.7 For the actual replacement cost of a comparable tree, technical feasibility is a prerequisite.

4.4.8 **Approach 2: Replacement cost calculation model.** A conceptual replacement cost calculation model derives from the investments needed to secure a similar tree in the identical location. These investments include not just the expenses associated with acquiring, planting, and taking care of a young tree, but also the oversight costs leading up to the task's execution.

4.4.9 The sequence of approaches outlined in 4.4.5–4.4.8 is hierarchical because it prioritizes the most tangible and concrete method of replacement over more conceptual models. The actual replacement cost method is considered the highest priority because it provides a direct and specific valuation based on the real expenses involved in replacing a tree with a comparable one. This method is preferred when it is applicable, as it offers a clear and practical assessment of the costs required to restore the tree's presence and functionality. In contrast, conceptual replacement cost models are more abstract and less precise, making them secondary options when actual replacement is not feasible.

4.5 Tree ecosystem services evaluation

4.5.1 **Ecosystem services** are the many benefits that humans derive from natural environments and healthy ecosystems (see 3.1.2).

4.5.2 **Blue-green infrastructure** refers to the harmonious integration of water management systems (blue) with natural and semi-natural landscapes (green) to create sustainable urban environments. Trees, in this context, serve as natural sponges, absorbing excess rainwater and mitigating the risks of urban flooding.

4.5.3 The value and benefits derived from ecosystem services and blue-green infrastructure can directly impact human livelihoods or influence broader environmental conditions that indirectly affect humans.

4.5.4 Among these benefits, there are primary ones to which we can assign a value in the process of tree value calculation. They are:

- **Temperature regulation:** Trees offer substantial cooling benefits by providing shade and releasing water vapour through transpiration, which reduces urban heat islands. The economic value of this service can be assessed by calculating the energy savings from reduced air conditioning use in urban areas.
- **Carbon storage and sequestration:** Trees play a crucial role in absorbing carbon dioxide, thereby mitigating the effects of climate change. This service can be evaluated by estimating the amount of carbon dioxide sequestered by trees and assigning a monetary value based on current carbon market prices.
- **Air quality improvement:** Trees improve air quality by filtering pollutants such as particulate matter, sulphur dioxide, and nitrogen oxides. The health benefits resulting from cleaner air can be quantified in terms of reduced healthcare costs and improved public health outcomes.

- **Noise mitigation:** Trees act as natural sound barriers, reducing noise pollution and creating quieter environments. The value of this service can be determined by measuring the decrease in noise levels and correlating it with enhanced property values and improved quality of life for residents.
- **Water regulation:** Trees contribute to groundwater recharge and reduce surface runoff, thereby preventing soil erosion and mitigating flood risks. The economic benefits of this service can be calculated by assessing the savings from reduced stormwater management costs and the preservation of water resources.

4.5.5 When a tree's contribution to ecosystem services is assessed, several factors come into play:

- Species: Different tree species offer different ecosystem services.
- Age and size: Older and larger trees typically provide greater and more distinctive ecosystem services.
- Mechanical integrity and physiological condition: Healthy trees contribute more effectively to certain ecosystem processes.
- Location: Urban trees might have enhanced value due to their role in combating urban heat islands.

4.5.6 Approaches to ecosystem services valuation can include:

- Quantitative analysis: Use tools and software to quantify ecosystem services like carbon storage, air pollution removal, and stormwater interception.
- Ecosystem service valuation: Assign a monetary value to the ecosystem services provided by the tree, such as water purification, soil conservation etc.
- Societal value assessment: Evaluate the tree's contribution to societal well-being, including mental health benefits, aesthetic value, and property value enhancement.
- Cost avoidance method: Calculate the costs avoided due to the tree's ecosystem services, such as reduced energy bills as a result of shade or decreased health costs due to improved air quality.

4.5.7 Ecosystem services multipliers: After the initial valuation, apply eco-benefit multipliers based on the tree's environmental significance. For instance:

- Trees in polluted areas might have a higher multiplier due to their role in air purification.
- Trees in urban settings might have enhanced value due to their cooling effects.

4.6 Biodiversity (wildlife) value

4.6.1 Biodiversity, the variety of life in a particular habitat or ecosystem, is a basis for the overall health and functionality of ecosystems. Trees, as primary components of many ecosystems, are vital contributors to biodiversity on the Earth.

4.6.2 Biodiversity encompasses three distinct components:

- Genetic diversity: Variations within the genetic makeup of individuals within a species.
- Species diversity: Variety of different species present in a particular area.
- Habitat diversity: Relates to the range of different habitats or ecosystems in a given region.

4.6.3 In the context of tree valuation, our primary focus is on habitat biodiversity. This is because trees play a pivotal role in shaping and sustaining diverse habitats, providing shelter, food, and essential resources for various organisms. Evaluating trees from this perspective allows us to appreciate their intrinsic value in maintaining ecological balance and supporting a wide array of life forms.

4.6.4 When integrating biodiversity into tree valuation, it is essential to understand its significance:

- Ecological importance: Trees support various flora, fauna, and fungi, acting as habitats and food sources.
- Genetic diversity: Older trees, in particular, can be repositories of genetic material that might be rare in younger, more commercially grown trees.
- Resilience: Biodiverse ecosystems are more resilient to pests, diseases, and climate change effects.

4.6.5 When assessing a tree's biodiversity value, several factors come into play:
- Age and size: Older and larger trees typically support more species than younger, smaller ones, which holds true for naturally distributed age classes in tree canopies as well.
- Native vs non-native: Native trees often support a wider range of local wildlife.
- Location: Trees situated close to natural ecosystems such as forests, meadows, or wetlands may possess an increased biodiversity value owing to their linkage with these habitats. Conversely, standalone trees in urban settings can also hold significant value in terms of biodiversity.
- Connectivity: Trees that contribute to ecological corridors or connectivity between fragmented habitats can be of significant biodiversity value.
- Species: Diversity of tree species in a specific location.

4.6.6 Approaches to biodiversity valuation:
- Species inventory: Conduct a thorough inventory of species (flora, fauna, fungi) supported by the tree. The more species a tree supports, the higher its biodiversity value.
- Habitat quality assessment: Evaluate the tree's habitat quality, considering factors like canopy density, deadwood availability, and the presence of nesting and sheltering sites.
- Connectivity analysis: Assess how the tree enhances connectivity between habitats, facilitating wildlife movement and gene flow.

4.6.7 Biodiversity multipliers: After the initial valuation, apply biodiversity multipliers based on the tree's biodiversity significance. For instance:
- Trees supporting endangered species might have a higher multiplier.
- Trees in biodiversity hotspots or ecologically sensitive areas might also have enhanced value.

4.6.8 While biodiversity valuation is crucial, it comes with challenges:
- Quantification: Biodiversity's intrinsic value can be hard to quantify in monetary terms.
- Dynamic nature: Biodiversity is not static. Seasonal changes, for instance, can affect the species a tree supports.

4.6.9 Best practices:
- Regular monitoring: Conduct regular biodiversity assessments to keep the valuation updated.
- Collaboration: Work with ecologists and biodiversity experts for accurate assessments.
- Holistic approach: Consider the tree's entire ecosystem, not just individual species that it supports.

4.6.10 The IUCN's approach to biodiversity valuation[9] emphasizes the need to integrate diverse values into economic and development planning to ensure that the loss of trees does not lead to irreversible damage to biodiversity. By employing the IUCN Review Protocol, project managers can systematically measure their progress towards biodiversity net gain targets, ensuring that tree-related benefits are not only preserved but enhanced. This process involves rigorous assessment, stakeholder engagement, and the application of the mitigation hierarchy, which prioritizes avoidance, minimization, restoration, and offsetting of biodiversity impacts.

9 IUCN Review Protocol for Biodiversity Net Gain, https://www.iucn.org/sites/default/files/2022-11/2017-033_0.pdf

4.7 Disservices

4.7.1 While trees undeniably offer a large variability of ecological, aesthetic, and economic benefits, they can also present certain disservices or negative impacts.

4.7.2 Recognizing and incorporating these disservices into tree valuation are essential for a comprehensive and balanced assessment.

4.7.3 Tree disservices refer to the potential negative impacts or inconveniences caused by trees. These can range from structural damage to health concerns, and include production of allergens, maintenance cost, visibility and safety, introduction of invasive species, water consumption, reduced output of solar panels, and subsidence problems.

4.7.4 The monetary value of a tree is derived from a cost/benefit analysis that weighs its benefits against its disservices. When a tree presents more drawbacks than advantages, its valuation is correspondingly diminished. Thus, a comprehensive assessment ensures that the tree's value accurately reflects its net impact on the environment.

4.7.5 Valuation implications:

- Property value: While trees generally increase property value, potential disservices can offset or reduce this value.
- Maintenance and repair costs: The potential costs of addressing tree-related damage should be factored into the valuation.
- Health and safety concerns: Trees that pose significant health risks might have their value adjusted accordingly.

4.7.6 Approaches to valuation of tree disservices:

- Cost-based approach: Directly calculate the costs associated with addressing the disservices.
- Comparative analysis: Compare properties with and without the tree disservices to determine value differences.
- Stakeholder surveys: Engage local residents or stakeholders to understand perceived inconveniences and their willingness to pay for mitigation.

4.7.7 Challenges and limitations:

- Subjectivity: Perceptions of disservices can vary between individuals.
- Quantifying disservices: Unlike direct benefits, some disservices are difficult to quantify in monetary terms.
- Balancing services and disservices: It is essential to weigh the positive contributions of trees against their potential negative impacts.

5. Application of values in tree management

5.1 Introduction

5.1.1 This chapter transitions from theoretical valuation to practical management strategies, emphasizing the effective use of tree values in decision-making. It is essential that professionals and users of this standard understand and apply these values in the context of tree management.

5.1.2 Expressed tree values play a pivotal role in understanding and quantifying the variety of benefits and services that natural systems offer to humans (for methods overview see chapter 4).

5.1.3 Once a benefit or service is identified, a monetary or non-monetary value can be assigned to it using various methods. The specific valuation procedure or regulation for a given situation is defined by the relevant national annex.

5.1.4 These quantified values can then inform policy decisions, land-use planning, and conservation strategies. By integrating tree values into decision-making processes, stakeholders can make more informed choices that balance development with conservation, ensuring that the contributions of trees and ecosystems are recognized, preserved, and optimized.

5.2 Repair or replacement

5.2.1 The choice of whether to calculate a repair or a replacement value of a tree following damage (real or potential) is a critical aspect of management. Such decisions not only influence the immediate response to the damage but also have long-term implications for the health and sustainability of the tree, the surrounding environment, and associated costs.

5.2.2 For tree value calculation:

- Repair cost transparency: Any costs associated with repairing damage should be clearly outlined. Financial settlements, for instance, can be finalized shortly after an incident occurs. This represents an abstract cost calculation related to safety measures and/or repairs.
- Replacement cost assessment: If a tree cannot be salvaged due to damage or if it must be removed for planning purposes, replacement costs are incurred.

5.2.3 To be able to distinguish between repair cost and replacement cost calculation methods, four levels of tree damage can be defined:

5.2.4 **Repairable without measures:** When a tree sustains damage but does not need any repair or compensatory actions, it is considered “repairable without measures”. In this case the appraiser should only account for the initial, direct value loss. The damage extent in this situation:

- poses no safety threats,
- does not result in a reduced lifespan for the tree and does not reduce its future functions,
- there are no associated monitoring costs or future management expenses,
- there are no significant changes in the conditions of the growing site.

5.2.5 **Repairable with management measures** – when a tree incurs damage that potentially affects its lifespan or safety but does not necessitate its replacement. There are no significant alterations in the growing site conditions.

5.2.6 In the case of repair with management measures, it is essential to ascertain the costs related to management and/or oversight.

5.2.7 **Further investigation in case of doubt:** When the viability of a tree is uncertain, advanced assessment (i.e., to determine whether it can be safely recovered or if it is beyond salvage) and a more in-depth examination are mandated. This may involve specialist tree or soil research to ascertain whether the tree can be preserved. The objective is to determine whether the costs associated with treatment and future management are justified compared to the costs of replacement.

5.2.8 **Irreparable damage – replacement:** If a thorough assessment finds the tree to be irreparably damaged this signifies that the tree cannot be safely recovered, or its original form and appearance cannot be restored. Such trees are deemed completely lost. This level of damage also includes trees that are removed due to planning, felling, construction activities, redevelopment, or reconstruction.

5.2.9 For trees that fall into the irreparable damage category, the damage assessment primarily focuses on determining and quantifying the costs required to replace and establish a similar tree at the original location.

5.2.10 Key principles to consider when determining which of the four levels of tree damage applies:

- Replacement and repair: Any component that can and should be replaced will be replaced. Compensation may include costs associated with measures to encourage and support the self-repair of the timber stand, as well as other direct costs stemming from the damage.
- Concrete calculation: Damage should be quantified as precisely as possible. However, an abstract calculation might be employed when considerations of efficiency and reasonableness dictate.
- Liability and reimbursement: A party deemed liable is obligated to cover either the replacement costs or the repair costs. It is essential to note that measures promoting repair might be deemed appropriate even if their costs surpass those of replacement.
- Additional compensation rights: Beyond the primary damages, the right to compensation for various ancillary damages should also be recognized. These can include costs to mitigate or prevent further damage, research expenses, extrajudicial collection fees, valuation costs, and accrued interest.

5.3 Felling licences

5.3.1 Felling licences are formal authorizations provided by regulatory authorities, permitting the removal of trees within specific guidelines. These licences are not just administrative formalities: they are integral to ensuring that urban and rural landscapes are managed sustainably.

5.3.2 Serving as essential regulatory instruments, felling licences:

- Advocate for the conscientious and informed removal of trees, ensuring that each felling is justified and carried out with minimal harm to the environment.
- Act as a safeguard against indiscriminate tree removal, thereby helping to maintain ecological balance and biodiversity.
- Often come with stipulations that necessitate actions to counterbalance the environmental void left by the felled trees. These can include mandates for replanting, ensuring that for every tree removed another is planted, or compensatory afforestation, where multiple trees might be planted to compensate for the loss.

5.3.3 The introduction and enforcement of felling licences underscore the importance of trees in our environment. By regulating their removal, these licences ensure that tree felling is a last resort, only undertaken when absolutely necessary and always followed by measures to restore the green cover. This approach not only preserves the ecological integrity of an area but also emphasizes the intrinsic value of trees in urban planning, development, and overall environmental health.

5.4 Approach to groups of trees

5.4.1 For the valuation of tree groups, the assessment may factor in either the extent of canopy coverage or the number of stems, tailored to the specific question at hand. It is recommended that assessment emphasizes the impact on canopy coverage rather than simply the quantity of trees removed, particularly in operations such as thinning.

5.4.2 When assessing the value of a large number of trees, for example using the replacement cost method, certain fixed costs (like transportation) can be spread between many trees, reducing the per-tree value.

5.4.3 When a tree is removed from a group, the impact or loss in value is likely to be less significant in proportion to the value of the entire tree group than the removal of a standalone tree of the same size or species. This is because similar trees within a group often share and distribute their ecological and aesthetic contributions collectively. The absence of one tree in such a setting might be compensated for by the presence of its neighbours.

5.4.4 However, removal of a single tree from a group/canopy can have adverse effects on the entire assembly, particularly impacting the trees in close proximity. This is because trees in a group often share resources, support each other, and maintain a balanced ecosystem: removing one can disrupt this balance.

5.5 Best practices

5.5.1 Recognizing the multifaceted nature of amenity trees, the tree value calculation process underscores the importance of a holistic assessment and therefore requires the application of a variety of approaches (see chapters 4 and 5).

5.5.2 **Interdisciplinary collaboration for sustainable urban development:** Foster a robust interdisciplinary collaboration by involving not only urban planners, ecologists, and local communities but also architects, sociologists, economists, and other experts in the valuation process.

5.5.3 **Adaptive management for tree valuation:** Incorporate adaptive management principles into the process of calculating the value of trees within urban environments. Recognize that the value of trees is not static, and it evolves over time due to changing environmental conditions, urban development, and societal needs.

5.5.4 **Community engagement and empowerment:** Go beyond simply involving local communities and empower them as essential stakeholders in the valuation process. This can be achieved through participatory decision-making processes, educational initiatives, and community-driven projects that align with ecological goals.

5.5.5 **Data-driven approaches:** Leverage technology and data analytics to facilitate collaboration among different disciplines. Utilize Geographic Information Systems (GIS), remote sensing, and big data analytics to gather and analyse information that informs decision-making, helping urban planners and ecologists work together more effectively.

5.5.6 **Policy development and advocacy:** Engage legal experts and policymakers to translate the interdisciplinary insights into actionable policies and regulations. By working together, these stakeholders can create a legal framework that supports sustainable urban development, incentivizes eco-friendly practices, and enforces responsible land use.

5.5.7 **Long-term monitoring and adaptation:** Establish mechanisms for continuous monitoring and adaptive management of urban projects. Ecologists and local communities can play a pivotal role in tracking the ecological impacts of development over time, allowing for adjustments and improvements as needed to maintain the balance between urban growth and environmental preservation.are removed due to planning, felling, construction activities, redevelopment, or reconstruction.

Appendix 1 - Tree Rights Declaration

The Tree Rights Declaration[10] suggests that every tree should be recognized and assigned a specific value.

- Trees are living entities that simultaneously inhabit two environments: the atmosphere and the ground.
- Trees utilize roots to absorb water and minerals from the ground and a canopy in the atmosphere to capture carbon dioxide and solar energy.
- Due to their occupation of dual environments, trees play an essential role in maintaining the planet's ecological balance.
- Trees, being sensitive to environmental changes, must be recognized and respected as living beings.
- Trees shall not be treated as mere objects. They possess inherent rights to the airspace and underground space necessary for their growth.
- Trees are entitled to the preservation of their physical integrity, including their aerial (canopy, trunk) and underground (roots) components.
- Any disruption to these components or exposure to harmful substances, such as pesticides, can significantly weaken trees.
- Recognizing the longevity of trees, which often surpasses that of humans, they must be respected throughout their entire life cycle.
- Trees have the right to grow, reproduce, and experience natural death, irrespective of their location (urban or rural).
- Trees shall be recognized as legal entities, subject to laws that also govern human property.

10 This text is based on the declaration made in the French National Assembly on 5 April 2019. It aims to provide guidelines on the rights, respect, and protection that can be accorded to trees in various environments.

Appendix 2 - Axiology

Axiology, derived from the Greek word “axios” (meaning worthy), is a modern philosophical discipline that delves into the evaluation and understanding of values.

Human beings, unlike mere observers, are constantly evaluating and making choices, distinguishing between what is good and bad, better or worse.

Every living being, to the extent of its ability to influence its fate, must make choices based on evaluations (e.g., seeking food, avoiding danger).

Sensory tools primarily serve living organisms, including humans, for practical purposes, ensuring survival through choices and evaluations.

Only humans can abstain from evaluations and strive for theoretical knowledge, as seen in scientific endeavours.

The concept of evaluation, especially in an economic context, was developed by theorists like Adam Smith and Jean-Baptiste Say, examining human preferences, trade-offs, and value attributions.

Money serves as a universal medium for economic valuation. However, humans frequently make choices in contexts where monetary value is not the primary metric.

Appendix 3 - Case studies

This appendix sets out specific examples of tree form and management situations. Such examples can highlight the considerable variability among trees when their value is determined.

For context, the reference point for all tree evaluations should be a park tree that has grown consistently in a single location.

Pollarding
Pollarding is a pruning system in which the upper branches of a tree are removed to promote a dense head of foliage and branches. Pollarding is typically started once a tree reaches a certain height, and then repeated at regular intervals, with new shoots growing from the stubs left after the previous pollarding. This practice has been used for centuries as a way to produce small-sized timber, firewood, or fodder for livestock. Over time, regularly pollarded trees develop a distinctive, gnarled appearance with thickened trunks and a crown of dense branches and foliage.
Issues to consider:

- maintenance expenses rise due to frequent pruning;
- the harvested items can offer advantages;
- very unlikely to be replaceable (based on age and size);
- enhanced biodiversity value, related to age and size;
- reduced crown size may lead to a diminished ecological benefit value.

Shaped trees (topiary)
Shaped trees, commonly referred to as topiary, are created by the horticultural practice of training and pruning by clipping foliage and twigs to develop and maintain clearly defined shapes, whether geometric or fanciful.
Issues to consider:

- maintenance expenses rise due to frequent trimming;
- elevated replacement cost due to premium prices at nurseries;
- no direct influence on the biodiversity value, depending on the tree's location and size;
- reduced canopy size but with a higher leaf area index (LAI).

Veteranization
The veteranization of trees is the deliberate process of accelerating or introducing features of veteran or ancient trees in younger trees.[11] The objective of this practice is to create or enhance habitats quickly rather than waiting for natural processes to take decades or even centuries. Veteran trees, by nature, have unique ecological and aesthetic values because they provide specialized habitats for various fauna and flora, especially certain rare and endangered species.
Issues to consider:

- goal is to increase biodiversity value, which may have potential impact on other values.

Canopy thinning
When a tree is removed from a group, the impact or loss in value is likely to be less significant than the removal of a standalone tree of the same size or species. This is because trees within a group often share and distribute their ecological and aesthetic contributions collectively. The absence of one tree in such a setting might be compensated for by the presence of its neighbours.

Specific forms of veteran/ancient trees
In this scenario, we refer to the diverse shapes that trees take on during the advanced stages of ontogenetic development. At these stages, trees begin to exhibit distinct features, such as separated functional units, layered branches or stems, and what is known as Fenix regeneration. Identifying these forms can be challenging for those without specialized knowledge. Determining the value of such trees requires a comprehensive, holistic approach in every case.
Issues to consider:

- typically, these trees exhibit exceptionally high biodiversity and can also possess significant cultural value;
- based on the location, there may be increased management expenses due to site maintenance, inspections, and other factors;
- essentially, the replacement of older trees is not feasible due to their unique characteristics and age.

[11] A tree subjected to improper maintenance should not be confused with veteranization.

Stabilized trees

Stabilized trees are those that have undergone specific interventions to enhance their structural integrity and stability. These interventions include:

1. Upper crown reductions: This is a pruning technique where the top or outer canopy of a tree is reduced to decrease leverage on the tree's structure, potentially reducing the risk of branch or stem failure. As a result, the tree's overall height may be reduced to a more manageable and stable size, especially if the tree has been previously compromised, see EAS 01 : 2025 – European Tree Pruning Standard.
2. Installed cabling/bracing: Cables and braces are hardware systems installed in trees to provide supplemental support to branches or trunks that may be structurally weak or compromised, see EAS 02 : 2022 – European Cabling/Bracing Standard.

Stabilized trees, therefore, are those that have been modified or supported using these techniques to ensure their longevity, safety, and health.

Issues to consider:

- elevated maintenance expenses due to frequent inspection cycles, monitoring, and potential replacement of cabling/bracing,
- determining the replacement cost can be a very complex task,
- likely reduced canopy size,
- possibly reduced disservices, such as a decreased likelihood of breakage or collapse,
- aesthetics might be compromised to some degree.

Special plantings

The term special plantings refers to specific and often advanced techniques and setups used to plant trees in environments where traditional planting might be challenging or where there is a need to address specific issues, like urban environments with limited soil volume or potential for soil compaction. Examples of such solutions are soil cells and bunkers:

1. Soil cells: Modular systems made of rigid plastic or other materials, designed to support surface loads (like sidewalks or roads) while providing uncompacted soil volume for tree roots beneath the surface. Soil cells offer urban trees access to a larger volume of soil, promoting healthier growth in an environment that would otherwise be hostile to large tree growth due to soil compaction and limited space.
2. Bunkers: In the context of tree planting, "bunkers" refers to specialized pits or containers that are designed to protect tree roots from adverse conditions, such as poor drainage, heavy compaction, or potential contamination. They could also be structures meant to prevent tree roots from interfering with nearby infrastructure, such as sidewalks or building foundations.

These special plantings are essential tools in the modern arborist's and urban planner's toolkit, allowing for the integration of healthy trees into challenging or non-traditional environments. They help in ensuring that trees get the necessary nutrients, water, and root space to thrive even in urban or constrained settings.

Issues to consider:

- the cost of replacement largely depends on the specific type of special measure employed, but is generally on the higher side,
- these measures are often difficult to identify visually. It is necessary to consult the tree owner and/or the described history of the tree in question (tree management system), see EAS 03 : 2022 – European Tree Planting Standard.

Crown lifting (traffic)

Crown lifting, also known as crown raising, is a tree management practice that involves the removal of the lower branches of the crown to increase the clearance between the ground and the lower canopy. When it is used beside roads, the primary objective of crown lifting is to ensure that traffic, including pedestrians, can pass beneath the tree without obstruction.

Issues to consider:

- elevated maintenance expenses,
- increased replacement cost value,
- typically, reduced canopy size,
- fewer disservices, such as eliminating traffic interference.

Deadwood in tree crowns/dead trees

Deadwood refers to the parts of a tree, such as branches or sections of the trunk, that have died but remain attached to or within the tree. Deadwood in tree crowns can be a result of natural ageing, disease, environmental stress, or damage.

Issues to consider:

- maintenance expenses vary based on the site,
- deadwood serves as a crucial habitat for diverse species like birds, insects, fungi, and lichens, all of which contribute significantly to ecosystem health and nutrient circulation,
- as a disservice, dead branches in tree canopies can be hazardous, especially in populated areas, due to their potential for falling and causing harm to individuals or property.

Transplanted large trees

Transplanted large trees are mature trees that have been moved from their original growing location to a new site. Transplanting is typically done for a variety of reasons such as landscape design, construction needs, or conservation efforts.

Issues to consider:

- property value comprises the inherent value of a standard tree plus the additional expenses associated with transplantation,
- it is often challenging to identify visually so it is necessary to consult the tree owner and/or the described history of the tree in question (tree management system).

7. References

Binner, A., Smith, G., Bateman, I., Day, B., Agarwala, M., & Harwood, A. (2017). *Valuing the social and environmental contribution of woodlands and trees in England*, Scotland and Wales (Forestry Commission Research Report 27, p. 120). Edinburgh: Forestry Commission.

Bütler, R., Lachat, T., Krumm, F., Kraus, D., & Larrieu, L. (2020). *Field guide to tree-related microhabitats: Descriptions and size limits for their inventory.* Birmensdorf: Swiss Federal Institute for Forest, Snow and Landscape Research WSL.

Cullen, S. (2007). Putting a value on trees – CTLA guidance and methods. *Arboricultural Journal* 30: 21–43.

Davies, H. J., Doick, K. J., Handley, P., O'Brien, L., & Wilson, J. (2017). *Delivery of ecosystem services by urban forests* (Forestry Commission Research Report 26, p. 34). Edinburgh: Forestry Commission.

Fay, N. (2002). Environmental arboriculture, tree ecology and veteran tree management. *Arboricultural Journal* 26. 10.1080/03071375.2002.9747336.

Food and Agriculture Organization [FAO] (2016). *Guidelines on urban and peri-urban forestry*, by F. Salbitano, S. Borelli, M. Conigliaro and Y. Chen (FAO Forestry Paper 178, p. 169). Rome.

Forestry Commission/Defra (2015). *Air quality: Economic analysis.* Retrieved October 11, 2017, from https://www.gov.uk/guidance/air-quality-economic-analysis.

France: The French Declaration of Tree Rights (2019). Available at: https://www.ancientandsacredtrees.org/post/the-french-declaration-of-tree-rights [accessed 29 October 2023].

Groves, C., Neugarten, R. A., Langhammer, P. F., Osipova, E., Bagstad, K. J., Bhagabati, N., Butchart, S. H. M., Dudley, N., Elliott, V., Gerber, L. R., Gutierrez Arrellano, C., Ivanić, K.-Z., Kettunen, M., Mandle, L., Merriman, J. C., Mulligan, M., Peh, K. S.-H., Raudsepp-Hearne, C., Semmens, D. J., Stolton, S., & Willcock, S. (2018). Tools for measuring, modelling, and valuing ecosystem services: Guidance for Key Biodiversity Areas, natural World Heritage sites, and protected areas (Best Practice Protected Area Guidelines Series No. 28).

Helliwell, D. R. (2008). *Visual amenity valuation of trees and woodlands:* The Helliwell system (4th edn, p. 44). 2020 reprint. Guidance Note 4. Stonehouse: Arboricultural Association.

IUCN Business and Biodiversity Programme. (2017). *IUCN Review Protocol for Biodiversity Net Gain: A guide for undertaking independent reviews of progress towards a net gain for biodiversity.* Gland, Switzerland: author. https://doi.org/10.2305/IUCN.CH.2017.08.en

Kolařík J., Szórádová, A., Holešová, H., Mikulášek, J., Kaprová, K., Karel, J., Smolová, E., & Jareš, R. (2022). *Oceňování dřevin rostoucích mimo les, Prague: AOPK ČR, ISBN 978-80-7620-099-9*

Konijnendijk, C. (2008). The Forest and the City: *The Cultural Landscape of Urban Woodland.* Berlin and New York: Springer. https://doi.org/10.1007/978-1-4020-8371-6

Konijnendijk, C. C. (2023). Evidence-based guidelines for greener, healthier, more resilient neighbourhoods: Introducing the 3–30–300 rule. *Journal of Forestry Research* 34(3): 821–830.

Kraus, D., Bütler, R., Krumm, F., Lachat, T., Larrieu, L., Mergner, U., Paillet, Y., Rydkvist, T., Schuck, A., & Winter, S. (2016). Catalogue of tree microhabitats – Reference field list. Integrate+ Technical Paper.

London Tree Officers Association (nd). Capital Asset Value for Amenity Trees (CAVAT). Retrieved from https://www.ltoa.org.uk/documents-1/capital-asset-value-for-amenity-trees-cavat. [accessed 29 October 2023].

Mertz, O., Ravnborg, H. M., Lövei, G. L., Nielsen, I., & Konijnendijk, C. C. (2007). Ecosystem services and biodiversity in developing countries. *Biodiversity and Conservation* 16: 2729–2737.

Natural England. Natural England Commissioned Report NECR126: Green Infrastructure – Valuation Tools Assessment. September 27, 2013. Accessed at https://www.naturalengland.org.uk.

Price, C. (2007). Putting a value on trees: An economist's perspective. *Arboricultural Journal* 30: 7–19.

Regini, K. (2000). Guidelines for ecological evaluation and impact assessment. *In Practice* 29: 1–7.

Nederlandse Vereniging van Taxateurs van Bomen. (2024). Richtlijnen NVTB 2023. Nederlandse Vereniging van Taxateurs van Bomen. Obtained from https://www.boomtaxateur.nl/images/pdf/Richtlijnen-NVTB-2023-def.pdf

RICS (2010). Valuation of trees for amenity and related non-timber uses (1st edn, p. 12). RICS Guidance Note. Coventry.

Szczepanowska, H. B., Sitarski, M., Suchocka, M., Kosmala, M., Rosłon-Szerzyńska, E., Borowski, J., Olizar, J., Pstrągow-ska, M., Dmuchowski, W., Latos, A., Białecka-Kornatowska, B. (2009). Metoda wyceny wartości drzew na terenach zurbanizowanych dla warunków polskich. Warsaw: IGPIM.

©Working group ECoST – European Consulting Standards in Tree Work, 2025

ARBORISTICKÁ AKADEMIE	ČSOP Arboristická akademie	Sokolská 1095, 280 02 Kolín 2 Czech Republic	www.arboristickaakademie.cz
inverde	Natuurinvest	Havenlaan 88 bus 75 1000 Brussels, Belgium	www.inverde.be
INSTYTUT DRZEWA	Instytut Drzewa Sp. z o.o.	Al. Armii Krajowej 61 50-541 Wrocław Poland	www.instytut-drzewa.pl
EUROPEAN ARBORICULTURAL COUNCIL EAC	European Arboricultural Council e. V. (EAC)	Alexander-von-Humboldt D-53604 Bad Honnef Germany	www.eac-arboriculture.com
BOOMTOTAALZORG Boomspecialisten	Boomtotaalzorg B V	Lange Uitweg 27 3998 WD Schalkwijk Netherlands	www.boomtotaalzorg.nl
	Doctorarbol	Carrer Solsones 4 Igualada, Spain	www.doctorarbol.com
LATVIJAS KOKKOPJU ARBORISTU BIEDRĪBA	Latvian Arboriculture Society	Viestura iela 6 k-3 LV-2010 Jurmala Latvija	www.kokiem.lv
INSTITUT FÜR BAUMPFLEGE HAMBURG	Institut für Baumpflege	Brookkehre 60, 21029 Hamburg Germany	www.institut-fuer-baumpflege.de
	Giovanni Poletti	Via Piangipane 69 44121 Ferrara FE Italy	
URBANI ŠUMARI	Urbani šumari d.o.o.	Velika Bršljanica 15a 43280 Velika Bršljanica Croatia	www.urbani-sumari.hr