Theses of the doctoral (PhD) dissertation

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The importance of individual trees in the urban image

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1. BACKGROUND AND OBJECTIVES

Individual trees located in settlements are valuable in several ways, including their important contribution to urban image. Even though there are many tree evaluation methods in use today, the importance of tree in the urban image and character is usually given less consideration during analyses and assessments. However, in the past decades, Hungary saw an expansion of the regulatory and design toolkits for urban image, including urban image protection into the regulatory tools of municipalities and – in theory – making the selection and designation of individual trees with extraordinary contribution to the urban image a possibility. However, the practical results of these image and heritage protection measures are still uncertain.

Nowadays, trees are present in cities in larger numbers than ever. Public and profession interest in trees growing in built-in areas has been growing steadily in recent decades and by today it has become one of the most prominent questions of landscape architecture, urban planning and management. However, the contribution of trees to the urban image is poorly researched in Hungary. In order to make the urban image protection toolkit able to manage individual trees, a method capable of differentiating between all trees and selecting the most valuable ones must be created.

The object of my research was the individual urban tree: a living woody plant specimen with one or more trunks or trunk-like ligneous parts, located in a built-in area of a settlement in a way that it is visible by itself and has an impact on the urban image.

The main objective of my research was to develop an analysis and evaluation method to determine the urban image value of urban trees. In order to do this, I

- reviewed the historical changes of the role of trees in the urban image,
- studied current Hungarian regulations for protecting individual trees, especially from the standpoint of urban image,
- analysed the practical usability of current tree evaluation methods from the standpoint of urban image,
- reviewed the options for pre-determining trees with a potentially high urban image value, as well as studied the impact of visibility and location within the visible space on the value of trees.

My theoretical research was supported by two field studies of different scales, where I

- I studied the impact of geographical and environmental factors on the importance of individual trees,
- in a repeated field survey, I identified the factors that cause changes in the importance of trees in the urban image, as well as the main threats for urban image value,
- using a perception-based survey method, I studied whether importance in the urban image can be considered a community opinion, superseding personal preferences,
- based on the results, I analysed the properties and urban context of trees that were determined as having an extraordinary impact on the urban image.

For practical application purposes, I developed a field survey methodology for evaluating the urban image value of individual trees, and made regulatory and design recommendations.

2. MATERIALS AND METHODS

My research was based on two main pillars: theoretical research and perception-based field studies.

My **theoretical research** consists of literature review, study of the current Hungarian toolkit for the protection of individual trees, as well as analysing potential ways of laying the groundwork for field studies. As part of the literature review, by analysing 85 urban image handbooks, local urban image protection decrees and municipal building codes, I assessed the role and situation of individual trees within the urban image protection system.

To lay the groundwork for field studies, I studied the visibility of individual trees and the usability of several publicly available sources of information and databases for urban image-related analyses.

My field studies were conducted in Budapest's District XXII. and in a designated study area in Albertfalva, in District XI. of the Hungarian capital.

In District XXII., based on a 2016 study I analysed the role of geographical conditions in the value of trees, as well as how determinative building context is in delineating the set of valuable individual trees. Using the method of repeated monitoring, I identified changes in value and categorised the factors driving these changes.

My field research in Albertfalva involved a community questionnaire-based, perceptual study of the publicly visible tree stock of the study area. Using multi-factor statistical analysis, I studied how certain attributes of participants affect their preferences in trees, therefore evaluating the extent to which urban image value can be considered to be a community opinion. Afterwards I identified the properties of trees that can cause or increase their urban image value.

I evaluated the tree stock of the study area using the methodology of the Hungarian Society of Arboriculturalists (MFE) as well, and compared the results with those of the perceptual study. Based on my research, I identified the internal and external factors of urban image value in trees, the reasons behind its change, and possibilities for an urban image-based evaluation.

I developed a method for evaluating trees based on their urban image value and made recommendations for integrating the topic of trees with major urban image impact into the Hungarian legal and design framework.
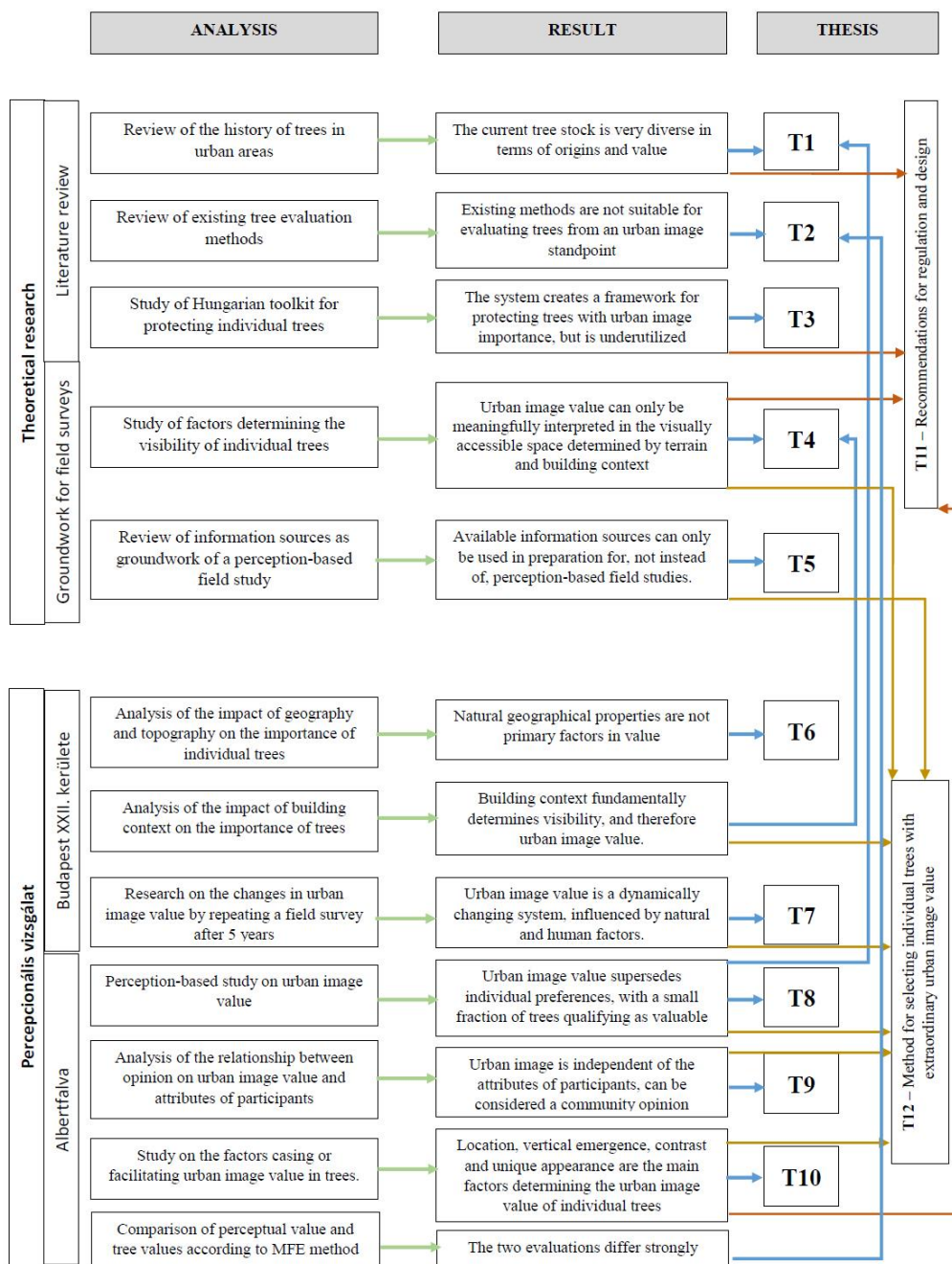
ANALYSIS | **RESULT** | **THESIS**

Theoretical research

Literature review

Review of the history of trees in urban areas → The current tree stock is very diverse in terms of origins and value → **T1**

Review of existing tree evaluation methods → Existing methods are not suitable for evaluating trees from an urban image standpoint → **T2**

Study of Hungarian toolkit for protecting individual trees → The system creates a framework for protecting trees with urban image importance, but is underutilized → **T3**

Groundwork for field surveys

Study of factors determining the visibility of individual trees → Urban image value can only be meaningfully interpreted in the visually accessible space determined by terrain and building context → **T4**

Review of information sources as groundwork of a perception-based field study → Available information sources can only be used in preparation for, not instead of, perception-based field studies. → **T5**

Percepcionális vizsgálat

Budapest XXII. kerülete

Analysis of the impact of geography and topography on the importance of individual trees → Natural geographical properties are not primary factors in value → **T6**

Analysis of the impact of building context on the importance of trees → Building context fundamentally determines visibility, and therefore urban image value.

Research on the changes in urban image value by repeating a field survey after 5 years → Urban image value is a dynamically changing system, influenced by natural and human factors. → **T7**

Albertfalva

Perception-based study on urban image value → Urban image value supersedes individual preferences, with a small fraction of trees qualifying as valuable → **T8**

Analysis of the relationship between opinion on urban image value and attributes of participants → Urban image is independent of the attributes of participants, can be considered a community opinion → **T9**

Study on the factors casing or facilitating urban image value in trees. → Location, vertical emergence, contrast and unique appearance are the main factors determining the urban image value of individual trees → **T10**

Comparison of perceptual value and tree values according to MFE method → The two evaluations differ strongly

T11 – Recommendations for regulation and design

T12 – Method for selecting individual trees with extraordinary urban image value

Figure 1: Methodology diagram of the research

3. THESES, NEW SCIENTIFIC RESULTS

<u>Thesis 1:</u> My theoretical studies uncovered that the current tree stock of Hungarian cities evolved in several waves, in large part due to spontaneous processes and now consists of individuals of highly diverse value. My two field studies confirmed that a small proportion of all urban trees can be considered valuable from an urban image standpoint.

<u>Thesis 2:</u> Based on my review of Hungarian and international tree evaluation methods, I found that current evaluation methods cannot be used to assess the urban image value of trees. My research conducted in Albertfalva shows that the trees identified as most valuable using the MFE method and those selected by most participants as valuable urban image elements differ significantly. Therefore, a new method is necessary to evaluate urban image value.

<u>Thesis 3:</u> By reviewing the current Hungarian legal and regulatory framework for the protection of individual trees and analysing the urban image handbooks, local urban image protection decrees and municipal building codes of 85 municipalities, I concluded that even though the legal framework exists for the protection of individual trees from an urban image viewpoint, it is currently underutilised. Therefore, the current urban image protection status of urban trees in Hungary is unsatisfactory.

<u>Thesis 4:</u> I reviewed the factors determining the visibility of trees and their appearance in the publicly viewable space, terrain and building context. Using examples and schematic figures, I confirmed that beside inherent properties of trees (size, shape), their building context determines their urban image potential. The analysis of data from the District XXII. field study further corroborates that building context, by determining publicly viewable areas, strongly impacts the importance of trees in the urban image. I concluded that during an evaluation, urban image importance can and should only be regarded in the case of individual trees standing in the publicly viewable visual space.

Thesis 5: By analysing publicly available sources of information and databases, I demonstrated that while they are valuable resources for laying the groundwork for field studies, they alone are not enough to determine the urban image impact of individual trees. I found that these sources of information can only be used to prepare for the essential, perception-based field studies.

Thesis 6: By analysing data from 698 individual trees in District XXII of Budapest designated as valuable in 2016, I determined that natural conditions (soil, elevation) are not primary factors from an urban image standpoint. I found that geographical conditions only have an indirect impact on what taxa might produce valuable trees.

Thesis 7: By repeating the evaluation of trees included in the data from 2016 in District XXII. of Budapest I concluded that individual trees with a high urban image value form a dynamic, changing system. I categorised the most important factors changing and threatening urban image value. I showed that there is correlation between construction and loss of urban image value, identifying construction as the most significant thread

Thesis 8: By conducting a perceptual, questionnaire-based study in Albertfalva, I demonstrated that certain individual trees have an impact on urban image that supersedes personal preferences. Using multi-factor statistical analysis, I concluded that the urban image value of individual trees is not influenced directly by the age, taxon-based dendrological value, nativeness or health of the tree itself.

Thesis 9: Using multi-factor statistical analysis, I demonstrated that perceptual urban image value of trees is not directly influenced by the participants' gender, age or place of residence, therefore it can be determined using community-based methods. Based on results from professionals and non-professionals, the perception of urban image value is independent from professional background and can be considered a common value.

Thesis 10: By studying the Albertfalva study area's most valuable trees from an urban image standpoint, I determined the properties that most strongly impact urban image value. Identifying these properties (prominent location, contrast, vertical emergence, unique appearance) makes it possible to pinpoint potentially valuable trees.

Thesis 11: I recommended the steps necessary to integrate the protection of valuable individual trees into the Hungarian urban image protection toolkit, legal framework and landscape design practice.

Thesis 12: Based on my analysis, I determined the necessary preparatory, field research and monitoring elements for selecting and surveying individual trees with a high urban image value and developed a participatory evaluation method.

4. CONCLUSIONS AND RECOMMENDATIONS

Based on my research, I developed a method for selecting, evaluating and surveying trees with an extraordinary urban image value. The method includes three main phases.

Steps of the preparatory phase:

1. **Delineation of publicly viewable visual space**
2. **Pre-selection**.

The fieldwork phase consists of the following steps:

3. **Briefing of participants**
4. **Field assessment and evaluation**

The following data processing phase includes the following:

5. **Verification and classification of data**
6. **Field refinement of data and extended survey**
7. **Compilation of the list of valuable trees from an urban image standpoint**

The list of surveyed trees with a profound effect on urban image must be monitored regularly.

I made recommendations for the integration of individual trees with a high urban image value into Hungarian regulation and landscape architecture practices.

My regulatory recommendations are the following:

Urban Image Handbook guidelines – and therefore the handbooks themselves – must emphasise the importance of trees. It is important that good examples include trees with high urban image value.

Guidelines for **local urban image protection decrees** should highlight the posssibility of placing the most valuable trees from an urban image standpoint under local protection.

By amending **the Government Decree on the protection of woody plants**, urban image value should be included as a potential factor when considering tree felling permits, both as a grounds for refusal and as a factor in determining replacement fees.

In **municipal building codes**, trees with high urban image valued must be included as a designation element. Regulations for the location of such trees must ensure that construction plots cannot be designated in a way that interferes with these trees.

For the landscape architecture design practice, I made the following recommendations:

When designing the **environment of existing and identified trees of high urban image value**, preserving the visibility and urban image role of these trees must be considered a priority.

When designing or restoring areas with **existing woody vegetation that does not include currently significant trees** from an urban image standpoint, the priority should be to enhance existing potential and create the possibility for such a tree to emerge.

When **designing and planning new plantations** or planting individual trees, the assessment and taking into consideration of urban image potential should be an important design tool.

5. THE AUTHOR'S PUBLICATIONS RELATED TO THE TOPIC

Journals (full paper)

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Other related works

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