



Original article

## Young urban trees as important structures in the cultural heritage of cities – a case study from Prague

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### ABSTRACT

Urban trees generate numerous ecosystem services, and these are often closely associated with the species, age and size of trees as well as with their vitality. Generally, the focus of urban and regional planning is aimed at very large trees, because very large trees are considered to be key green structures in an urban green infrastructure. However, there is a significant knowledge gap related to the importance of young trees in cities, despite their value in urban green spaces, greenways, parks, gardens, urban forests, and as components of green roofs and green walls. This study is the result of field mapping young trees in the urban area of the famous European historical city of Prague. Field mapping revealed a total of 40 individual young trees, or young tree groups, with cultural value in the study area of Prague. The results of this empirical study indicate that young trees (not just very large and old trees) can be very important structures for the provision of cultural ecosystem services in cities, and that they can be viewed as living cultural symbols. This is a new aspect in the awareness of the environmental and social roles of urban trees. This case study from Prague suggests that (i) young trees in urban areas need more attention from researchers and (ii) should be incorporated into urban planning as an important component of urban green infrastructure.

**KEY WORDS:** cultural ecosystem services, heritage trees, tree as a living cultural symbol, urban green infrastructure, very large trees

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### 1. Introduction

Numerous studies in urban environments have focused on very large trees (VLTs) because they are the main living components of green urban infrastructure (MOSER ET AL., 2017; PRETZSCH ET AL., 2017). Generally, the global decline of VLTs has been identified (LINDENMAYER ET AL., 2012). VLTs are defined as old-growth trees with a size threshold

≥ 75-80 cm in diameter at breast height (DBH) (CHURKINA ET AL., 2015). Timber production in European forest management is usually limited to trees with a DBH of 70-80 cm and over (PETRITAN ET AL., 2015), so VLTs are rare in European forested landscapes and they are usually concentrated in old-growth forests (WIRTH ET AL., 2009).

In green areas of many cities, VLTs are not limited by size because in urban locations timber

production is not important. VLTs in cities provide ecosystem services such as carbon storage, mitigation of heat island effects, pollutant filtering, recreation, shade and cooling (GROTE ET AL., 2016; HAASE ET AL., 2012; MOSER-REISCHL ET AL., 2018). VLTs in cities are often integrated into urban planning and form the basic structures of urban parks (PACE ET AL., 2018) and urban forests (ENDRENY ET AL., 2017). The high density of VLTs in urban forests is one reason for their high ecosystem services (ES), which include cultural ecosystem services (BLICHARSKA & MIKUSINSKI, 2013).

VLTs occupy a revered position in the human psyche (ANDERSON, 2004); aesthetic (RIBE, 1989) and social/cultural values are assigned to them (LINDENMAYER, 2016). VLTs are worshipped in many societies worldwide and they support the maintenance of local/regional cultural identities. The symbolic importance of VLTs has both cultural and religious aspects (DAFNI, 2006). Human-related cultural values attached to VLTs should be taken into account in conservation policies (BLICHARSKA & MIKUSINSKI, 2014), especially in urban areas where the provision of cultural ecosystem services can be strongly supported by the presence of VLTs with high social and culture value.

However, it is not only VLTs that create a green urban infrastructure. It is mainly small young trees (SYT) that form the basis of urban green infrastructure (UGI) (DE LA SOTA ET AL., 2019). UGI is described as an integrated network of natural and semi-natural areas and features, such as urban green spaces, greenways, parks, gardens, urban forests, green roofs and green walls (MEEROW & NEWELL, 2017). UGI provides a diverse set of ecological, economic and social benefits (PESCHARDT ET AL., 2012) and creates areas of extraordinarily high economic value in cultural ecosystem services (TEOH ET AL., 2018). However, there is a serious gap in knowledge concerning the significance of trees which are smaller and younger than VLTs in UGI. This is because scientific interest has generally focused only on VLTs. This prevailing focus on VLTs is not surprising – in general people prefer scenic views with larger tree trunks rather than views of many small trees (BUHYOFF ET AL., 1984; HAIDER & HUNT, 2002). Studies aimed at finding the social preferences of people in cities reveal that green areas with large trees are highly appreciated and street trees of large dimensions are perceived as preferable to smaller trees (SCHROEDER ET AL., 2006). VLTs in UGI are seen as “heritage trees” which have “transgenerational significance” (JIM, 2005).

Our knowledge about the local and regional cultural significance of SYTs in UGI is very poor because this topic is neglected in scientific literature.

In addition, traditional conservation efforts in many European countries are aimed at the establishment of VLTs, not SYTs, as specially protected trees (KILIANOVA ET AL., 2017), and thus VLTs seem to be more important than SYTs (which are not protected). Nevertheless, we believe that not only VLTs, but also some SYTs in UGI are strongly connected with local genius loci, urban landscape memory and cultural heritage. It is one reason why culturally significant small young trees (CSYTs) in UGI deserve more scientific and conservation interest. Currently in many European countries young trees are planted on the anniversaries of cultural events and become important living symbols of these cultural events. Although CSYTs in UGI do not reach the size threshold of VLTs, from the point of view of cultural heritage they can be as important as VLTs – especially in UGI, where SYTs are rightly connected with important local historical and cultural events or with the remembrance of a very important person. The aim of this article is to present the results of mapping CSYTs in UGI based on a case study of the city of Prague (the capital of the Czech Republic).

The main objective of this article is to draw attention to the neglected significance of CSYTs in urban environments. The hypothesis tested is that even young trees that do not meet the VLT size parameters can be significant bearers of cultural traditions and of particular local or regional historical stories, as well as being living symbols of local/regional identity in an urban environment. At the same time, this article stresses the need to ensure the long-term protection and management of these trees so that their symbolic cultural mission is maintained and these trees can be classified as VLTs in the future. The additional sub-objectives of this study are to test the CSYT search methodology in an urban environment and to contribute to the knowledge about very important trees in urban environments.

## 2. Methodology and materials

### 2.1. Study area

The study area is defined by the administrative boundaries of the city of Prague. Prague covers 496 km<sup>2</sup> and has a population of 1.3 million citizens. In Prague there is an average of 220 m<sup>2</sup> of UGI per capita. The total area of UGI accounts for 56.74% of the total area of Prague. This means that Prague is one of the European metropolises with the largest relative size of UGIs (KUBIKOVA ET AL., 2005).

## 2.2. Definition of CSYT in the study area

For the purposes of this study we consider a tree to be a culturally significant young tree (CSYT) when it has a DBH less than, or equal to, 80 cm, and it is no more than 100 years old, as well as having a documented cultural significance. This attribute includes all identified trees that are associated with locally/regionally significant historical/cultural events. CSYTs are symbols, or carriers, of certain cultural messages. CSYTs have been planted in memory of culturally significant personalities and on the anniversaries of certain historical events. CSYTs symbolically recall a locally significant historical event. CSYTs are a monument to the history of the place where they grow. The minimum size of the trees investigated was defined as a DBH > 10 cm.

In Prague there are 114 items recorded as memorable trees protected by law. They have been declared as protected by the competent authority of the state administration of nature conservation. All these trees belong to the VLT category (therefore they are not the focus of this study).

## 2.3. CSYT mapping methodology in the study area

The mapping of CSYTs in the study area of Prague took place between the years 2013 and 2018. The mapping involved searching for, and identifying, CSYTs and had three stages:

Stage One – a search and study of local data sources that potentially contained data on the existence and planting of CSYTs. These plantings sometimes took place within the framework of public festivities, and information usually appeared in local newspapers or in local newsletters. Other archives of unpublished materials such as local chronicles of city areas or material from local associations (e.g. volunteers from local fire departments and from the Sokol nongovernment organizations, etc.) have also been searched.

CSYTs were searched for in cooperation with local school directors, environmental department staff, public garden maintenance staff and local people (using the snowball method).

Stage Two - a direct search and documentation of the CSYTs (based on the results of Stage one, by walking or cycling through UGI areas) in the study area.

Stage Three – participation of the public in the CSYTs search in Prague from 2015-2017 was done through a survey of local residents and by organizing the competition "Let's Discover the Significant Trees of Prague" (RUDL, 2016). To promote public involvement in the search for CSYTs in Prague a dedicated website on this theme was established. This publicly accessible website has been used to record and publish a database of CSYTs and VLTs in Prague.

## 3. Results

The tested hypothesis, which asserted that even SYTs (not only VLTs) can be an important part of the cultural heritage of cities, has been confirmed by the CSYT mapping results in Prague. CSYTs in Prague were found in 40 items of individual trees or tree groups (Table 1) which are important components of cultural heritage (189 individual trees in total). Most CSYTs (92 trees) were planted in memory of influential people whose lives were connected to Prague, either locally and internationally. Huge numbers of CSYTs have been planted as symbols of the importance of the European Union (63 trees) and 22 trees have been identified as symbols of the national identity of the Czech Republic. Three young trees have been planted to commemorate the Third Millennium and two young trees are symbols of peace. Some individual CSYTs have been identified as symbols of local historical events, international friendship and local cultural heritage. Examples of CSYT diversity identified in Prague are given in Figures 1-6.

Table 1. Culturally significant young trees (CSYTs) in the study area of Prague

No.	Local name of the tree(s) [in Czech] / District of Prague / Coordinates	Tree species / DBH in 2016 (cm)	Indivi- duals	Cultural importance
1	Lípa republiky v Dolních Měcholupech / Dolní Měcholupy / 50.0559636N, 14.5623378E	<i>Tilia platyphyllos</i> / 62	1	It was planted during celebrations in honour of the 80th anniversary of the establishment of the Czechoslovak Republic on October 28, 1998. It was planted by then-mayor of Prague Jan Koukal and mayor of Prague district – Dolní Měcholupy Karel Hagel.
2	Lípa republiky na Skalce / Strašnice / 50.0683889N, 14.5074039E	<i>Tilia platyphyllos</i> / 51	1	It was planted to celebrate the 80th anniversary of the establishment of the Czechoslovak Republic on October 28, 1998. It was planted by then-deputy mayor Karel Výrut and councillor Jiří Veselý.

3	Lípa svobody na Krupkové náměstí v Bubenči / Bubeneč / 50.1042469N, 14.4077792E	<i>Tilia tomentosa</i> / 59	1	It was planted by Baracnici Patriotic Charitable Community to commemorate Memory Eternal of all fighters who sacrificed their lives for the liberation of Czech nation in 1939–1945.
4	Lípa svobody na Větrníku / Břevnov / 50.0894514N, 14.3507119E	<i>Tilia cordata</i> / 125	1	This Lime tree of Liberty was planted by a group of anti-fascist warriors in honour of the 50th anniversary of the Czechoslovak Republic on October 28, 1968.
5	Lípa svobody v Šáreckém údolí / Dejvice / 50.1137236N, 14.3744128E	<i>Tilia platyphyllos</i> / 162	1	It was planted on the occasion of the 40th anniversary of the end of World War II in 1985.
6	Lípa republiky v Běchovicích / Běchovice / 50.0764264N, 14.5995100E	<i>Tilia x vulgaris</i> / 17	1	It was planted by citizens of Běchovice with mayor Andrej Martan in honour of the 20th anniversary of the establishment of the independent Czech Republic on October 19, 2013.
7	Alej osobností v Evropské ulici / Liboc / 50.0927481N, 14.3209397E	<i>Platanus acerifolia</i> / 23–32	90	This London Plane Tree avenue consists of 90 trees planted on the 90th anniversary of Prague 6 and they have been named after significant personalities who lived or have been connected with Prague 6. The ceremonial opening of the avenue took place on September 4, 2010.
8	Lípa Evropy v Hostivaři / Hostivař / 50.0524150N, 14.5302892E	<i>Tilia cordata</i> / 43	1	It was planted in honour of the European Day in Prague, which was held on the 50th anniversary of signing of the so-called Schumann Declaration between France and Germany, which is considered the beginning of European integration efforts, on 9 May, 2000. This Lime Tree was planted by then-mayor of Prague 15 Jan Nádvorník with the help of Ivan Holešínský (then-head of the Environmental Protection Department in Prague 15)
9	Lípa republiky v Klementinu / Staré Město / 50.0865011N, 14.4165528E	<i>Tilia platyphyllos</i> / 116	1	It was ceremonially planted in honour of the 50th anniversary of the establishment of the Czechoslovak Republic on 5 November, 1968. It was planted by then-director of the Czech State Library Josef Vinárek together with other employees of the library in cooperation with the attending audience
10	Ústřední lípa republiky na Malé Straně / Malá Strana / 50.0831617N, 14.4020775E	<i>Tilia cordata</i> / 247	1	It was ceremonially planted on the occasion of the 50th anniversary of the Czechoslovak Republic on October 28, 1968. The Lime Tree was planted by members of the Nature Protection Body of the Society of the National Museum in Prague headed by Otakar Leiski, who simultaneously initiated the plantation of about a thousand similar trees throughout the former Czechoslovakia
11	Hrušeň tisíciletí na Vyšehradě / Vyšehrad / 50.0645239N, 14.4202828E	<i>Pyrus communis</i> / 79 (v 70 cm)	1	The plantation of this Pear Tree has restored the tradition of celebrating the Day of Trees, which has been celebrated since then on 20 October every year. This Pear Tree is the genetic descendant of the European Wild Pear memorable tree at Hrustice near Turnov.
12	Lípa Jana Nerudy na Újezdu / Malá Strana / 50.0811039N, 14.4041997E	<i>Tilia cordata</i> / 140 (v 1 m)	1	It was planted in honour of the 150th anniversary of the birth of Czech poet and journalist Jan Neruda in 1984. It was planted by the Presentation Studio of the Central Club of Education and Science of Revolutionary Trade Union Movement.
13	Alej Evropy ve Stodůlkách / Stodůlky / 50.0482400N, 14.3304286E	<i>Platanus acerifolia</i> / 35–95	59	On the occasion of the European Day in Prague (9 May 2000), the ambassadors of the EU Member States (except for the apologized Greece), as well as Poland, Hungary and Slovakia, planted the southern part of the Plane Tree Avenue. The northern part of the avenue was planted on May 28, 2003, two weeks before the Czech Republic's accession to the EU, with the participation of the head of the European Commission delegation in the Czech Republic, Ramira Cibrian, and the ambassadors of the European Fifteen, Slovakia, Poland, Hungary and Czech representative in the European Convention Jan Zahradil

14	Lípa republiky na sídlšti Novodvorská / Lhotka / 50.0237850N, 14.4331981E	<i>Tilia cordata</i> / 115	1	This tree was planted on the 28th of December 1968 as a symbol of the 50th anniversary of the Czechoslovak Republic memory. The tree is also a remark to Novodvorska street establishment (in 1964-1969) by project of Ales Borkovec and Vladimir Jezek.
15	Lípa republiky na Vnořském náměstí / Vnoř / 50.1424956N, 14.5806778E	<i>Tilia cordata</i> / 97	1	It was planted to commemorate the 50th anniversary of the establishment of the Czechoslovak Socialist Republic on October 28, 1968 on the recommendation of the secretary of the former Local Committee of Prague 9, Mr. Sykora.
16	Lípa republiky před ZŠ Vnoř / Vnoř / 50.1464517N, 14.5816003E	<i>Tilia cordata</i> / 146	1	It was planted to commemorate the 50th anniversary of the establishment of the Czechoslovak Socialist Republic on October 28, 1968 on the recommendation of the secretary of the former Local Committee of Prague 9, Mr. Sykora.
17	Pamětní lípy na Bílé Hoře / Ruzyně / 50.0763881N, 14.3190097E, 50.0763603N, 14.3184897E, 50.0764033N, 14.3183825E	<i>Tilia cordata</i> / 200, 1968, 203 (v 1 m)	3	This scattered group of Lime Trees – Lime of Republic, Lime of Liberty and Lime of Democracy – were planted on the basis of a neighbouring initiative to commemorate the 50th anniversary of the establishment of the Czechoslovak Republic on October 28, 1968.
18	Lípa třetího tisíciletí na Zličíně / Zličín / 50.0617053N, 14.2870169E	<i>Tilia cordata</i> / 38	1	It was planted by Prague-Zlicin City Council on 15 November, 2000. It commemorates the beginning of the 3rd millennium (since 1 January, 2001).
19	Lípa republiky v Nedašovské ulici na Zličíně / Zličín / 50.0596783N, 14.2917867E	<i>Tilia cordata</i> / 53	1	It was planted to celebrate the 80th anniversary of Czechoslovakia on October 27, 1998. The pupils and teachers of Zlicin school with the help of Zlicin Hunting Association planted this Lime Tree.
20	Lípa Evropy na Zličíně / Zličín / 50.0618144N, 14.2870311E	<i>Tilia cordata</i> / 56 (v 90 cm)	1	It was planted on the occasion of the accession of the Czech Republic to the European Union on May 12, 2004. The event was attended by employees of Prague-Zlicin City Hall representatives, mayor, and representatives of fire-fighters, Zlicin Hunting Association and pupils of the local school.
21	Lípa sousedství u Sobína / Sobín / 50.0725778N, 14.2669314E	<i>Tilia cordata</i> / 59	1	It was planted on the border between Prague and Central Bohemian Region in the autumn of 2006. It symbolizes borders and at the same time links of both regions.
22	Lípa Václava Havla / Malá Strana / 50.0857128N, 14.4052419E	<i>Tilia americana</i> / 58	1	"Bench of Vaclav Havel" was ceremonially revealed at the Lime Tree in honour of the 10th anniversary of the accession of the Czech Republic to the European Union, with the participation of the leading Czech personalities, on May 1, 2014.
23	Strom dětí v Uhříněvsi / Uhříněves / 50.0309506N, 14.5993481E	<i>Tilia x vulgaris</i> / 26	1	It was planted on the occasion of the Earth Day by children from local schools with the participation of City Hall representatives on April 13, 2011. The purchase of this Lime Tree was funded from the school competition in collecting old paper.
24	Lípa svobody na Zahradním Městě / Záběhlce / 50.0309506N, 14.5993481E	<i>Tilia cordata</i> / 101	1	It was planted as a Lime Tree of Liberty by tenants of nearby residential building No. 3/2897 in the spring of 1968.
25	Lípa Evropy u Chodovské tvrze / Chodov / 50.0596039N, 14.4949900E	<i>Tilia cordata</i> / 66	1	It was planted as a Lime Tree of Europe by Prague 11 representatives on the occasion of the European Day celebration in Prague on May 9, 2000.
26	Lípa Evropy v Modřanech / Modřany / 50.0347908N, 14.4992656E	<i>Tilia cordata</i> / 77 (v 80 cm)	1	It was planted as a Lime Tree of Europe on the occasion of the European Day celebration in Prague on May 9, 2000. The tree was planted by the Mayor of Prague 12 Petr Hana in the presence of other important guests.
27	Lípa republiky v Modřanech / Modřany / 50.0050319N, 14.4176386E	<i>Tilia cordata</i> / 25	1	It was planted as a Lime Tree of Republic on the occasion of the 90th anniversary of Czechoslovakia on October 23, 2008. This Lime Tree is a genetic descendant of the ancient memorial Mikulovice Lime Tree growing near Klasterec nad Ohri.

28	Strom milénia v Modřanech / Modřany / 50.0071606N, 14.4046694E	<i>Tilia platyphyllos</i> / 51	1	The tree was planted on the occasion of the 3rd millennium on April 19, 2001.
29	Lípa 17. listopadu v Modřanech / Modřany / 50.0071464N, 14.4045622E	<i>Tilia cordata</i> / 17	1	It was planted on the 20th anniversary of the Velvet Revolution on November 16, 2009. The original Lime Tree was replaced by a new one due to vandalism in 2013.
30	Lípa republiky na Strossmayerově náměstí / Holešovice / 50.0988314N, 14.4355256E	<i>Tilia cordata</i> / 165	1	It was planted on the occasion of the 50th anniversary of the establishment of the Czechoslovak Republic on October 28, 1968. The Lime Tree was planted by the representatives of the Pioneer Club of Prague 7 and the District House of Pioneers and Youth of Prague 7.
31	Lípa svobody v Suchdole / Suchdol / 50.1395803N, 14.3795008E	<i>Tilia x vulgaris</i> / 138	1	On October 27, 1968, 9th grade pupils of elementary school planted it on the 50th anniversary of the Czechoslovak Republic.
32	Strom válečných veteránů v ÚVN / Břevnov / 50.0905461N, 14.3606489E	<i>Quercus rubra</i> / 14	1	It was planted by World War II veterans on the occasion of the War Veterans Day on 11 November.
33	Strom míru na Vyšehradě / Vyšehrad / 50.0635064N, 14.4179289E	<i>Tilia cordata</i> / 19	1	It was planted to commemorate the need for peace in the world and religious tolerance on December 1, 2008. The initiator of the event was Indian spiritual and humanitarian activist Swami Mahaysvarananda. This Lime Tree is a genetic descendant of Sementin Lime Tree from Bohemian Paradise Protected Landscape Area.
34	Strom míru na náměstí Míru / Vinohrady / 50.0758289N, 14.4370825E	<i>Acer platanoides</i> / 21	1	It was planted as a Tree of Peace in honour of 40 years of "Yoga in Daily Life" in the Czech Republic on November 1, 2013.
35	Lípa republiky v Radotíně / Radotín / 49.9823861N, 14.3615414E	<i>Tilia cordata</i> / 97 (2018)	1	This Lime Tree of Republic was planted on the 50th anniversary of the Czechoslovak Republic on October 26, 1968.
36	Lípa republiky v Ježkově parku v Újezdu nad Lesy / Újezd nad Lesy / 50.0750233N, 14.6831036E	<i>Tilia cordata</i> / 206 (2018)	1	This Lime Tree was planted on the 50th anniversary of the Czechoslovak Republic on October 28, 1968.
37	Lípa svobody na Červeném vrchu / Vokovice / 50.0972178N, 14.3527278E	<i>Tilia cordata</i> / 129 (2018)	1	The Lime Tree of Republic was planted by former Prague 6 District Authority and the Czech Union of Freedom Fighters on October 28, 1968.
38	Lípa republiky u chvalské školy v Horních Počernicích / Horní Počernice / 50.1113833N, 14.5940372E	<i>Tilia cordata</i> / 17 (2018)	1	The Lime Tree of Republic was planted to mark the 95th anniversary of the Czechoslovak Republic. The ceremonial planting of the national tree was carried out by pupils of Stolinska Elementary School with the help of mayor Hana Moravcova on October 24, 2013.
39	Lípa slovinsko-českého přátelství na Vinohradech / Vinohrady / 50.0782600N, 14.4513419E	<i>Tilia cordata</i> / 22 (2018)	1	This Lime Tree was ceremonially planted by Prague 3 mayor Vladislava Hujova and ambassador of the Republic of Slovenia Leon Marce on June 22, 2016. The ceremony took place on the occasion of the celebration of the 25th anniversary of the Statehood of the Republic of Slovenia and, at the same time, as a support for the joint effort to include the Church of the Sacred Heart of the Lord in UNESCO World Heritage List.
40	Dřezovec trojtrnný v Karlíně / Karlín / 50.0917661N, 14.4562014E	<i>Gleditsia triacanthos</i> / 17 (2018)	1	The Honey Locust Tree was planted on April 20, 2017. It was planted in memory of the 200th anniversary of the foundation of Karlin, which was originally a village in Prague suburb. Its planting commenced anniversary celebrations that were held in June. The Honey Locust Tree became the first planted tree of dozens of new trees that were subsequently planted in the streets in honour of the anniversary.





Fig. 1. The Avenue of Celebrities in European Street in Prague 6. The avenue is lined with 90 plane trees planted on the 4th of September 2010 as part of the 90th anniversary celebrations of Prague 6. The London plane trees were named after significant people who lived in Prague 6 or had a connection through their work (A. Rudl, 2018)



Fig. 2. On European Day in Prague on the 9<sup>th</sup> of May 2000, the 50th anniversary of the signing of the so-called Schumann Declaration between France and Germany, Lime Trees for Europe were planted. The Declaration is considered to be the beginning of European integration efforts. Lime Trees for Europe can be found in the Hostivar and Chodov localities (A. Rudl, 2018)



Fig. 3. A plane tree avenue in Stodulky suburb is also a reminder of the European Union. It consists of 59 individuals, the first half of which was planted on the 9th of May 2000, on European Day in Prague. The ambassadors of the EU member states, as well as representatives of Poland, Hungary, Slovakia and the Czech Republic, each planted their own tree of Europe. The second part of the avenue was planted on the 28th of May 2003, two weeks before the referendum on the accession of the Czech Republic to the EU. Again, the ambassadors of the fifteen European countries and representatives of Poland, Hungary, Slovakia and the Czech Republic took part (A. Rudl, 2018)



Fig. 4. A Millennium pear tree was planted on the 19th of October 2000 in the Vysehrad quarter of Prague in honour of the re-establishment of the traditional celebration of Tree Day. This pear tree was also planted as a symbolic millennium tree (A. Rudl, 2018)



Fig. 5. A lime tree in the Mala Strana district, dedicated to the memory of an important Czech poet, Jan Neruda, was planted in 1984 (in anniversary of 150 years of the poet's birthday) (A. Rudl, 2018)



Fig. 6. An important message is held by the Lime Tree of Vaclav Havel (former Czech president), around which a "Vaclav Havel Bench" was established on the 1st of May 2014 to commemorate the 10th anniversary of the accession of the Czech Republic to the EU (A. Rudl, 2018)

#### 4. Discussion

Many trees in urban environments symbolize important messages from history or remind people of significant events. In addition to their ecological function, these trees have a role as holders of cultural and historical heritage. It is well known that ancient trees can be used as an important source of information about historical activities and even as a means of selecting areas for protection due to their cultural heritage (OPRSAL ET AL., 2018; ÖSTLUND ET AL., 2002). As the study by BLICHARSKA ET AL. (2013) has indicated, even younger and smaller trees are important for local people as components of sacred groves. We have supported this finding through our study of the CSYTs identified in Prague (see Table 1). CSYTs in Prague can be considered as heritage trees. Heritage trees are at the centre of many local initiatives aimed at maintaining the cultural heritage they embody (ZACKRISSON ET AL., 2000).

Some heritage trees are specifically protected by law in many countries (particularly in Europe). For example in Poland, some heritage trees are protected as "monuments of nature" (PRZYBYL, 2007). The same approach has been in place in the Czech Republic since the 1920s - some heritage trees are strictly protected by a Czech conservation law (number 114/1992) as "memorable trees" (MACHAR, 2009).

However, conservation efforts are usually concentrated on VLTs (LINDENMAYER ET AL., 2012). The literature even contemplates VLT hotspots. See for example the study of beech hotspots (*Fagus sylvatica* L) in the locality of Sonian (VANDEKERKHOVE ET AL., 2018). VLT hotspots in the Czech Republic can be considered as:

- 1) Old-growth hardwood floodplain forests (SIMON ET AL., 2014), especially if the floodplain forests are managed through the application of sustainable forest management rules (MACHAR, 2010) and if the floodplain forests are included in landscape protected areas.
- 2) Natural forest reserves (MACHAR ET AL., 2016; LUTZ ET AL., 2018).
- 3) Chateau parks and gardens (LINDENMANN-MATTHIES & MARTY, 2013),
- 4) Urban parks in large cities, where VLTs are the living structures of land-architecture compositions (TRIBOT ET AL., 2018).

For CSYTs, however, cities can be considered primarily as hotspots, which is in accordance with the dislocation of cultural ecosystem services primarily bound to human habitat ecosystems (MALDONADO ET AL., 2018). This issue deserves further studies in the future. It should not be

forgotten that urban trees can also contribute to some ecosystem disservices, such as allergic diseases caused by pollen production (CARINANOS ET AL., 2014). This is why the allergenic potential of urban trees has been studied and assessed, irrespective of the size and age of the trees (JOCHNER-OETTE ET AL., 2018). Urban trees can mitigate the risks from heat island effects in urban areas (DAHLHAUSEN ET AL., 2018).

The CSYT mapping methodology used for the tree search in Prague also involved the co-operation of the public in the third stage. The facts provided in this third stage were very important - thanks to the involvement of the public in the field mapping, 16 CSYTs were newly identified and documented which would otherwise have been omitted. In addition, public involvement in the search for, and protection of, CSYTs in urban environments can be considered an important part of environmental education and upbringing (MILLARD, 2010; LINDENMAYER ET AL., 2013).

We believe that identifying and creating an inventory of these trees is a basic step in their long-term protection. In addition, the records of CSYTs, mapped in the form of publicly accessible websites, increases public awareness of the cultural significance of these trees. This public awareness should be enhanced by the installation of information panels or QR codes for individual CSYTs. It is also important to take into account that VLTs need to have prepared "followers" of younger trees for the long-term sustainable fulfilment of many of their ecosystem functions (KILIANOVA ET AL., 2012). In this respect, the potential of current CSYTs has not yet been fully appreciated in urban environments. CSYTs should be protected and specialist management should provide them with the optimal conditions for growth in order that CSYTs can deliver their cultural message for as long as possible. These trees can imprint a unique character on public spaces in cities and can become living memorials of events that should not be forgotten with regard to the maintenance of local identity in cities. Thus, based on the results of this study, we suggest that special conservation concern should be targeted at CSYTs in UGI (SIMON ET AL., 2015). Most CSYTs in Prague are living symbols of influential people and are connected to important cultural anniversaries related to both the European Union and the history of the Czech Republic.

In this article, we defined the mapped CSYTs in contrast to the emerging VLT definition (URADNICEK ET AL., 2017). For VLTs, we can find other synonyms in the literature, such as veteran trees (if the VLTs showed at least three "veteran tree characteristics",



such as rot hole, hollowing and dead wood, etc.), but an accurate definition of a VLT is still being debated (SMITH & BUNCE, 2004). For the purposes of this article we consider CSYTs to be trees  $\leq 100$  years old because the Czechoslovak Republic (the legal predecessor of today's Czech Republic) originated as an independent state in 1918. The trees over 100 years old in the Czech Republic already approach the VLT category with their size parameters. However, this is only a regional view of the issue, limited to the territory of the Czech Republic. Of course, when assessing individual tree species, whether they belong to the VLT category or not, we must also respect biological tree species, as shown for example in the results of the mapping of veteran trees in the UK (READ, 1999).

The synonyms for the term CSYT suggested by us are not generally known, only perhaps the term "young heritage trees". We could introduce the term "significant trees" (STs), so it might mean that  $ST = VLT + CSYs$  in a wider concept of culturally important trees (if we do not distinguish the age and size of the trees). However, the consolidation of unambiguous terms will require further expert discussion.

The study presented here from Prague has shown that cultural and historical messages are not only held by the oldest trees, but also by many younger trees. Juvenile trees are prone to damage and require special care. In the absence of care there is a risk of these trees dying, therefore the rate of loss of the trees' messages is increasing. If the importance of a tree is well known, it is easier to take professional care of it and it is protected from damage or even unnecessary removal.

## 5. Conclusions

We have highlighted that it is not only VLTs that are part of human identity and cultural heritage. CSYTs are also important living symbols of historical and cultural events, as we have found in this study in Prague. We identified the occurrence and the amount of CSYTs in Prague during the survey in 2013-2018. Currently, these young trees with cultural significance are incorporated into urban planning and conservation policies in the urban area of the city of Prague. The sustainable conservation management of these CSYTs is necessary in order to maintain their cultural significance in the future.

This case study from Prague was probably one of the first studies focused on the field mapping of young heritage trees in an urban environment. The results from Prague indicate the great cultural potential of CSYTs in UGI generally, and it would be desirable to conduct similar research in other

European cities to improve our knowledge and awareness of the cultural ecosystem services of young trees in urban areas.

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