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How to better protect trees in European cities?

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KEY POINTS

1. Urban trees are essential for well-being and to adapt cities to climate change. In many European cities, however, tree cover is decreasing.
2. Protection of urban trees in the EU is mostly regulated at city level.
3. The EU could enhance cooperation among cities and public awareness for tree protection.

SUMMARY

Trees clean the air in European cities, reduce the impact of heat waves and heavy rainfall, improve mental health, and contribute to the well-being of humans and other species in many other ways. Climate change makes city trees even more important, while at the same time threatening their lives and making it hard to grow new trees. Many European cities are experiencing tree cover loss. Despite all that, healthy trees are still frequently felled for construction projects.

In the European Union, the protection of urban trees is mostly regulated on city level. The EU promotes urban green infrastructure, for example, with the target to plant 3 billion addition trees until 2030, but does not even encourage city tree protection explicitly.

The EU could promote city tree protection, for example, by encouraging cities to share their experiences and learn from each other, and by rising public awareness with an information campaign.

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Why need urban trees to be protected?

Trees are essential for well-being, especially under climate change

About three out of four Europeans live in an urban environment [1]. They are exposed to many health risks which can be reduced by vegetation, especially by trees [2]: besides providing shadow, plant leaves directly lower the air temperature and take up pollutants from the air [3,4,5,6]. By intercepting rainfall and improving the soil infiltration capacity, trees also reduce runoff and, thus, the impact of extreme rainfall events (figure 1) [5].

Heatwaves and heavy rainfall are becoming more frequent and severe due to climate change [7]. Therefore, trees and other urban green infrastructure play an important role in adapting cities to the changing climate [1,8]. Urban trees also contribute to mitigate carbon emissions by reducing energy demands for cooling, and sequestering and storing carbon [5,6].

Additionally, researchers showed that vegetation can reduce traffic noise [9] and improve mental health [10]. A study from Leipzig, for example, found that people living within 100 metres of higher density of street trees are less likely to be prescribed antidepressants [11].

Besides improving public space for humans, trees also provide habitat for other species and, thus, contribute to urban biodiversity [12,13].

Services provided by city trees have an economic value

The costs and benefits of urban green infrastructure have been calculated and estimated in many studies and reports [6,14]. For Lisbon, for example, Soares et al. found

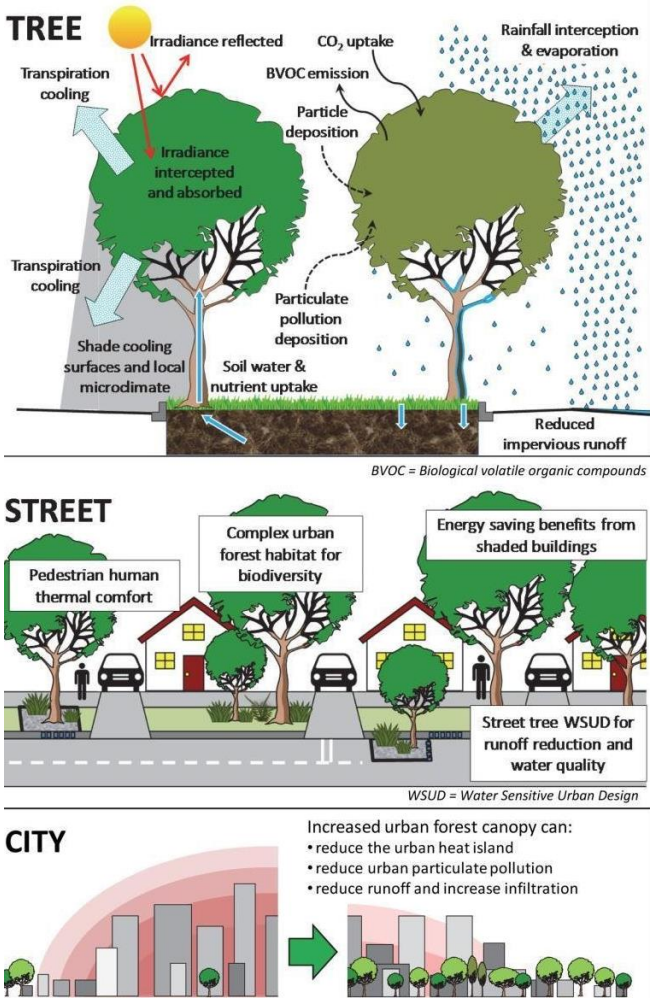

Figure 1: Positive effects of urban trees on the urban environment at different scales. Livesley et al., 2016 [5].

that maintaining the 41,247 city trees costs 1.9 million USD per year, while their ecosystem services value at 8.4 million USD annually [15].

Trees have intrinsic value

Besides their many contributions to human well-being and economy (figure 1), it can be argued that urban trees should have a right to life – especially considering that some trees live longer in a city than any human resident.

While "rights of nature" are new to Europe [16] and trees not yet have standing [17], the intrinsic value of nature has long been recognised, for example, in the *Bern Convention* from 1979 to which the European Union and all its member states are committed [18]. Intrinsic value of nature is

also emphasised in the national legislation of several member states [16].

Healthy city trees are often unnecessarily cut down for construction projects

Trees are competing with other public and private interests and planning imperatives, like urban densification [19]. Despite all their values and benefits, trees often seem to be given little weight: in Athens, in November 2023, about 70 trees in the main square of a district were cut for a new metro station against massive resistance [20].

Also for extending a metro line, the government of Madrid announced in 2023 to cut more than 1,000 trees, but reduced this number by almost half after large-scale protest [21,22]. While the government started to cut the first trees, the public debate still goes on and involves EU institutions, too, since the project is co-financed by the European Investment Bank [22,23].

To rebuild a school in the German city of Mainz, the administration cut 37 trees in February 2023 [24] and planned to cut 105 more. After protests, the administration adapted the plans so that less trees are to be felled [25]. While the plans are still debated, tree cutting in several other locations in Mainz has sparked new protests [26].

All these are recent examples for the destruction of urban green infrastructure in favour of other infrastructure which brings public benefits, too. However, the cases from Madrid and Mainz show that it is a political decision how many trees are felled for construction projects, and with political will, plans can be adapted to cut less trees.

Urban trees are particularly vulnerable to climate change

In an urban environment, trees are already faced with many burdens and challenges, for example, sealed and compacted soils, air pollution and de-icing salt [27]. Climate stress now adds to all this: heat and drought weaken trees and make them more susceptible to diseases [27,28]. In a study from Leipzig, four out of five mapped street trees were damaged [27]. A majority of tree and shrub species in cities on the European continent are already experiencing precipitation conditions beyond their safety margin, and climate risks are projected to increase further [28].

Just planting new trees does not solve the problem

Any tree losses should “preferably be compensated through replanting at the location or elsewhere”, replied the European Commissioner for the Environment, Virginijus Sinkevičius, in January on a question by a Spanish Member of the European Parliament regarding the tree cutting for the metro in Madrid [29]. “Compensation”, however, is not simple: naturally, young trees cannot immediately provide ecosystem services to the same extent as mature ones. They need time, favourable soil and water to grow, especially under climate change: young trees are most susceptible to die from drought and heat [30].

In total, many European cities are losing trees

On the one hand, trees in European cities are cut because they are ill or dying, for construction projects and other reasons. On the other hand, local governments make efforts to plant new trees [1]. What does the balance look like?

A map published by the OECD shows a highly diverse pattern (figure 2): in several cities, especially in Central Europe, tree cover increased between 1992 and 2018. Meanwhile, many large cities, like Berlin, Warsaw, Stockholm, Marseille and Valencia, lost more than 2 per cent of their tree cover during these 26 years [31].

In Madrid, the number of trees that the local government considers "mature" decreased from about 400,000 in 2019 to 320,000 in 2022 [32]. In Mainz, during the same four years, about 2,000 public trees were cut while the city administration planted only 600 new ones [33]. In 2023, the city cut 474 trees in public areas, authorised 597 trees on private land to be cut, and planted 252 new public trees [34]. Climate change is clearly visible in the statistics from Mainz: since the first drought year 2018, more than twice as many public trees have been cut [33]. More than half of the public trees cut in 2023 were listed as dead [34].

To sum up, many city trees are dying, while new trees are particularly vulnerable and cannot immediately compensate for the loss. Therefore, mature trees should be protected to ensure their ecosystem services for climate resilient European cities.

How are city trees in Europe currently protected?

The new *EU Nature Restoration Law* aims to stop net loss of urban tree canopy but does not protect existing trees

The recently adopted *Regulation on nature restoration* [35] provides that by the end of 2030, "Member States shall ensure that there is no net loss in the total national area of urban green space and of urban tree canopy cover", compared to the year of entry into force (Art. 8).

This, however, does not imply any protection of existing trees: theoretically, a

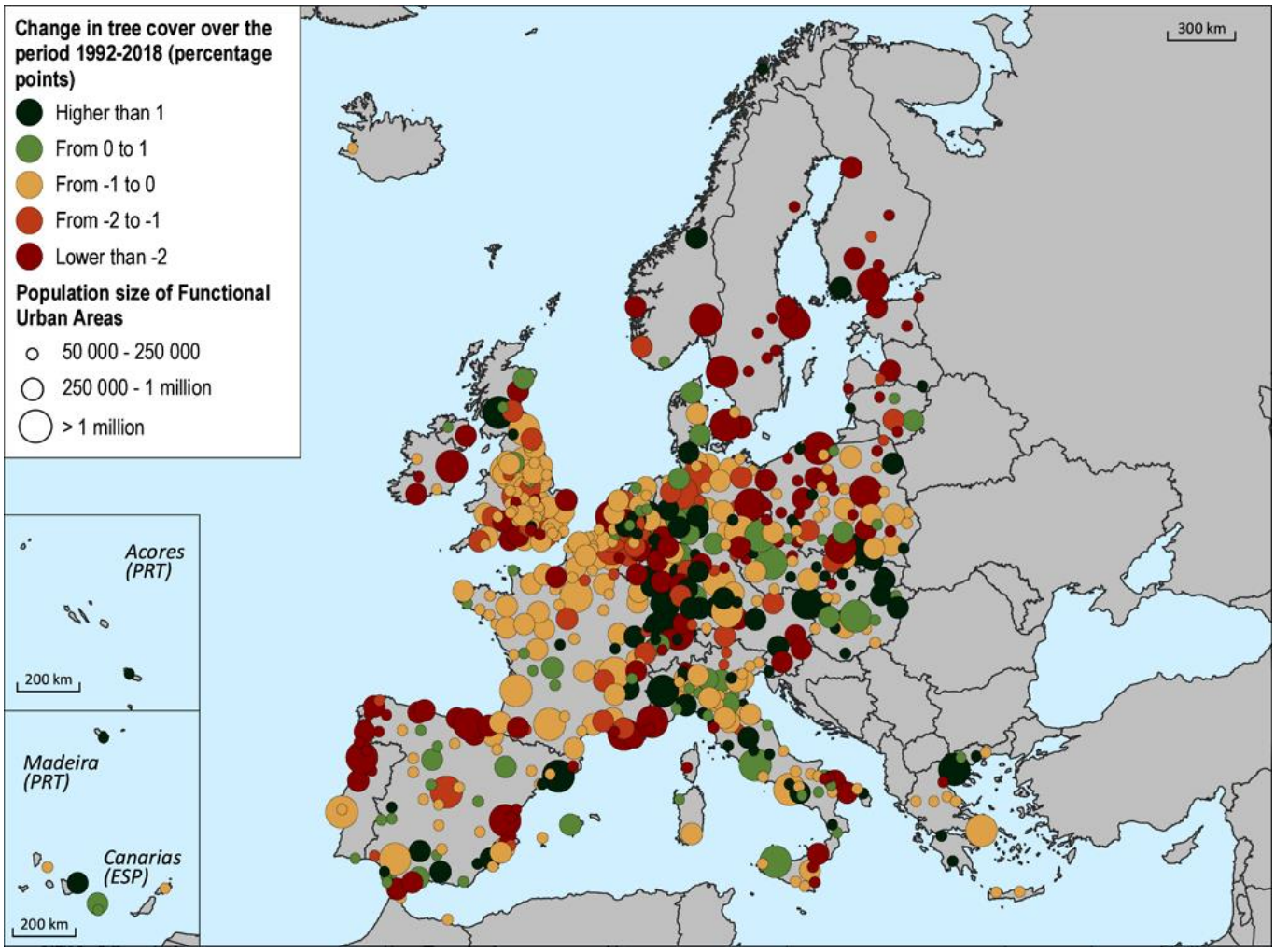

Figure 2: Change in tree cover in the European OECD states. OECD, 2020 [31].

city could be completely deforested unless sufficient new trees are planted in other cities [36]. In this point, the regulation has been substantially weakened compared to the initial proposal [37].

The EU does not even encourage city tree protection

The *Biodiversity Strategy* adopted by the European Commission in 2020 aims to "stop the loss of green urban ecosystems" [38]. However, while the Commission called on European cities "to develop ambitious Urban Greening Plans" and set out the targets to plant 3 billion additional trees until 2030 and to protect all remaining primary and old-growth forest on EU territory, it did not encourage or even mention the protection of urban trees in the *Biodiversity Strategy*, nor in the *Strategy on Adaptation to Climate Change* [39].

City trees can be part of protected areas

15 per cent of the area protected in the *Natura 2000* network, as well as many areas under national protection schemes, are at least partially located within city boundaries [38]. Trees can be part of these protected urban and peri-urban areas. Single trees or very small areas, however, are unlikely to fulfil the importance for the conservation of specific species or habitats, or biodiversity in general, required for the protection on European level [40].

City tree protection is mostly regulated at city level

European and national legislation provide a framework for nature protection, but regulations on urban trees are mostly decided on city level. Since a survey of tree protection in 25 European cities published in 2003 [41], unfortunately, the situation has not been reviewed. Back then, 19 of the analysed cities regulated trees on both public and private areas. The most frequent criterion for single tree protection was a minimum stem circumference of 60 or 80 centimetres, measured at 1 metre above ground. Forests within the city boundaries, fruit trees, and trees that pose an imminent danger were exempted from protection in many regulations. In some cities, it was not only forbidden to fell but also to damage or cut protected trees.

In all 25 cities, an official authorisation or license was required to fell a protected tree. Cutting was authorised, for example, when a tree represented a threat to persons or goods, or when it had to be removed because of public interest or other law provision. Penalties for unauthorised felling in nine cities ranged from 15,000 to 42,000 Euro. Regulations of 21 cities included replacement planting. According to the survey, a felled tree was mainly replaced by one new tree.

Tree protection regulations often do not protect trees

Research on regulative mechanisms for tree protection worldwide suggests that these are often not effective or efficient, and that their success depends on the local context, capacities and resources, public attitudes, and political will [19]. This is also underlined by the recent cases in Madrid and Mainz described above: the seemingly restrictive laws to protect urban trees in both cities [42,43] did not prevent local authorities from planning large-scale clear-cutting.

Policy recommendations

A vision for European city trees

Departing from the evidence summarised in this paper, a vision for the protection of urban trees in Europe could look like this (figure 3): because of their intrinsic value and important contributions to people, it is of high public

interest to preserve trees. Construction projects should be planned in such way that existing trees are not felled or damaged. Otherwise, the respective trees should be relocated. Only if that is not possible either, trees can be felled, but for each cut tree, several new ones must be planted under conditions that increase their chances to survive.

In public projects, decisions about tree cutting should be taken with high democratic legitimacy, ensuring that the public is informed and involved throughout the process, especially residents near the affected area. On private ground, the protection of trees should be ensured by a restrictive authorisation process and accompanied by support and positive incentives to preserve trees.

The EU cannot enforce such a vision, but it could release, for example, a strategy or guidelines for tree protection as a roadmap towards the "no net loss" target of the *Restoration Law*. Several measures at European level could promote the vision.

Knowledge sharing and transparency

There are many research gaps, especially on the efficiency of different tree protection policies [19]. It is striking that, since 2003, no academic research on tree protection in European cities has been published. The diversity of regulations holds a high potential to learn from best practice that apparently remains untapped. Tree protection orders are available online but often only in their national languages [42,43], making it hard to compare them.

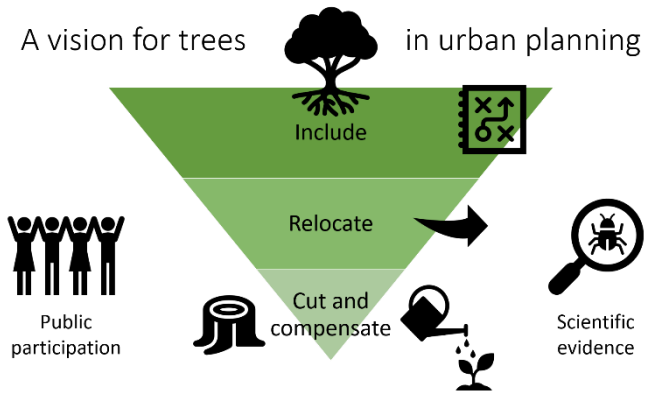

Figure 3: Vision for tree protection in European cities (own elaboration).

Like *Trees for Life*, a call by the European Committee of the Regions (CoR) to cities and regions to contribute to plant 3 billion trees [44], the EU could also encourage cities to better protect urban trees and share their experiences with existing policies. Institutions like the CoR or the Covenant of Mayors could provide internal networks for decision-makers to exchange knowledge and learn from each other, and set up a public, multi-lingual database which makes information on tree protection regulation in European cities easily accessible and comparable. Statistical data on the trees of each city could be included, too. This transparency would enable researchers to conduct empirical studies on the outcome of different policy approaches and enable the public to critically observe and contribute to the process.

Positive incentives

Researchers suggest that positive, usually financial, incentives could complement regulatory approaches of tree protection [19]. The EU could provide funding for cities to support more ambitious tree protecting policies. Additionally, the EU could award prizes to innovative new constructions – be they public or private – that incorporate existing trees.

Public awareness and information

To better protect trees on private land, but also to enhance acceptance of tree protection on public areas, researchers have pointed at the importance of involving the public [19]. For example, adopt-a-tree programs like in Athens [1] can increase citizens' awareness and responsibility. Compared to efforts for

planting new trees, like the pledge to plant 3 billion additional trees by 2030, it might be less "catchy" to draw up a campaign for tree protection, but no less significant.

Promote protection of urban areas

The EU is committed to the "30x30" target of the global biodiversity framework to place at least 30 per cent of land and sea area under protection by 2030 [38]. Towards this target, the EU could encourage member states to protect more urban and near-urban areas.

Challenges

Besides all good reasons to protect adult city trees and the potential to enhance European cooperation, there are also challenges.

Local contexts in the EU are highly diverse. Tree cover in the functional urban area ranges from 5.5 per cent in the Spanish city Almería to 85.4 per cent in Savona, Italy [45]. Property rights and other legislation or planning frameworks can limit or counteract protection efforts [19].

Urban trees not only provide important ecosystem services but can also have negative impacts: pollen can act as allergens, city trees can be invasive species, some have toxic components, branches or entire trees can break during storms which become more likely due to climate change, and in some cases, instead of cleaning the air, trees can even lead to higher pollutant concentrations by reducing ventilation [1]. All these reasons might decrease the public interest to protect city trees and should be considered in policy making.

A policy mix for European city trees

The complexity of the issue clearly shows that there is no single solution to protect trees in European cities. In line with the principle of subsidiarity, local governments should stay responsible for tree protecting policies. However, there is a high potential for European cooperation that seems to be untapped. The EU could provide resources, tools, platforms for exchange and other support to develop a policy mix which combines regulations and incentives to preserve trees in European cities most effectively.

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