CONFERENCE/WEBINAR ABSTRACT

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Presenter: Martin Tušer
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TITLE OF THE PRESENTATION:
Reshaping the role of arboriculture in times of climate emergency
We can't plant our way out of the climate crisis

CONTENT
Today's definitions of Urban Forestry and Arboriculture are outdated:

"Urban and peri-urban forestry is the practice of managing urban forests to ensure their optimal contributions to the physiological, sociological, and economic well-being of urban societies" (Johnston, 1996).
"The practice of arboriculture includes cultural techniques such as selection, planting, training, fertilization, pest and pathogen control, pruning, shaping, and removal."

I see an urgent need for broadening the purposes of urban forestry and arboriculture today. In the time of climate emergency, we need to shift towards protection and use trees we already have to mitigate climate change and use the current infrastructure to adapt to climate change. Mainly via maximizing the ecosystem services of trees.

Sociological research shows that 80% of people want to fight against climate change. However, the vast majority do not know how or only have ineffective measures in mind. However, it is the tree care professionals and city planners who can significantly impact the amount of ecosystem services produced by trees in urbanized landscapes. The change requires adopting two main facts:

- The larger the tree is, the greater the ecosystem services provided by the tree.
- The greater the incremental growth of biomass, the greater the ecosystem services provided.

If we accept the fact as a reality, every visitor to the Conference can become an ambassador of the new version of urban forestry. We need to fight for every larger tree in the city, and visitors to the Conference can have an enormous impact. They can shift the opinions of the tree owners and secure higher incomes by generating more high-value contracts.

There is no definitive list of ecosystem services. However, even if we only talk about the most commonly quantifiable ones, it is clear that the larger and denser the tree, the more it buffers noise, the more it retains and evapotranspires water, and the more it cools its surroundings. Everyone can prove that, e.g., via i-TREE Eco.

Most noticeable, but also most shocking, is this dependence demonstrated for carbon storage and sequestration. We must begin to calculate the biomass of individual trees before we can imagine how hugely important large trees are in cities.

In October 2020, a new study (1) was published by a team of the world's leading scientists, including William R. Moomaw, the Professor Emeritus of International Environmental Policy at the Fletcher School, Tufts University. He is the lead author of the Nobel Prize-winning Intergovernmental Panel on Climate Change.
"The recent study examining carbon storage in Pacific Northwest forests demonstrated that although ***large-diameter trees (≥ 21 inches) only comprised 3% of total stems, they accounted for 42% of the total aboveground carbon storage.*** *The researchers highlight the importance of protecting large trees and strengthening existing forest management policies so that large trees can continue to sequester carbon and provide valuable ecosystem services as a cost-effective natural climate solution in worldwide forest ecosystems."*

Based on the information mentioned above, Martin Tušer and Robert Leverett, a US expert on calculating the amount of carbon stored in trees, published a paper (2) answering a simple question: how many trees do I have to plant to replace the benefits provided by one large tree, which was felled down. To replace one 30-meter in height, 1,3-meter in diameter oak, which stores almost 7 tons of carbon, we must plant an app. 3068 trees usually planted in cities (5 cm in diameter, 3 meters in height). If the newly planted trees are smaller (usually of size planted in suburbs, extra-urban areas, or fruit trees), the number skyrockets to 48 061 trees with a necessity of 0% mortality rate!
The numbers given above do not include the following carbon footprints:

- Seeds collection
- Planting in nursery
- Planting to the final stand, including transport
- Aftercare including watering
- Logging, transport, and processing of the large tree.
- The carbon footprint of all necessary items needed to raise, plant, and care for the new trees.

On top, if the original large tree is burned, it means that the carbon stored on the tree is emitted into the atmosphere, the numbers must be doubled to get the same effect as the large tree continues to grow.

Similar data can be provided for carbon sequestration.

From these numbers it is clear that, in the case of CO2 sequestration and storage, the large trees are unbeatable, and we cannot replace their function by any replacement planting of new trees. It applies to almost all ecosystem services provided by trees. However, that is not all:

There is another study (4) that confirms the data mentioned above.
The study calculates the age at which a tree changes from being a carbon emitter to carbon-neutral after planting in a city (Chicago). Even though the planting material was transported only from a 62 km distant nursery, the breakeven point is 26 to 33 years, depending on the

aftercare scheme. However, we cannot grow long-living trees in cities anymore. Even if we have a chance to plant a tree where the big old tree was cut down, the lifespan of trees in cities, according to various sources (3), is only 7-28 years.

A proactive approach to tree care is essential in mitigating climate change. Almost any defect or pest can be stopped ten years before it becomes a problem.

(1) Mildrexler David J., Berner Logan T., Law Beverly E., Birdsey Richard A., Moomaw William R. (2020). Large Trees Dominate Carbon Storage in Forests East of the Cascade Crest in the United States Pacific Northwest , USA. Frontiers in Forests and Global Change, 3/2020, PAGES=127,
https://www.frontiersin.org/article/10.3389/ffgc.2020.594274
DOI=10.3389/ffgc.2020.594274
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(2) Leverett Robert, Tušer Martin. (2021). WE CAN'T PLANT OUR WAY OUT OF THE CLIMATE CRISIS. Website publication www.treeib.com.
https://www.treeib.com/carbon-storage-in-trees-metric-robert-leverett in metric units
https://www.treeib.com/carbon-storage-in-large-trees-by-robert-leverett in imperial units

(3) Roman, Lara & Scatena, Frederick. (2011). Street tree survival rates: Meta-analysis of previous studies and application to a field survey in Philadelphia, PA, USA. Urban Forestry & Urban Greening - URBAN FOR URBAN GREEN. 10. 269-274. 10.1016/j.ufug.2011.05.008.
https://www.researchgate.net/publication/238003598_Street_tree_survival_rates_Meta-analysis_of_previous_studies_and_application_to_a_field_survey_in_Philadelphia_PA_USA

(4) Aaron C. Petri, Andrew K. Koeser, Sarah T. Lovell, Dewayne Ingram; How Green Are Trees? — Using Life Cycle Assessment Methods to Assess Net Environmental Benefits. Journal of Environmental Horticulture 1 December 2016; 34 (4): 101–110. doi: https://doi.org/10.24266/0738-2898-34.4.101

(5) Körber, Klaus. (2021). In the future, the saving of older trees will become much more important for our society. Website publication www.treeib.com.
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