EVALUATING CLIMATE-RELATED ECOSYSTEM SERVICES OF URBAN TREE STANDS IN SZEGED (HUNGARY)

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# Main groups of ecosystem services

<table>
<thead>
<tr>
<th>Provisioning services</th>
<th>Regulating services</th>
<th>Cultural services</th>
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</thead>
<tbody>
<tr>
<td>food production</td>
<td>climate regulation</td>
<td>recreation, ecotourism</td>
</tr>
<tr>
<td>drinking water</td>
<td>water purification</td>
<td>spiritual inspiration</td>
</tr>
<tr>
<td>pharmaceuticals</td>
<td>flood control</td>
<td>scientific value</td>
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<tr>
<td>energy</td>
<td>erosion protection</td>
<td>etc...</td>
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<tr>
<td>building material</td>
<td>pollination</td>
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<td>recreation, ecotourism</td>
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Methods and study area (I.)

Field tree cadastre
(Greenformatic)

missing
dieback

25%

\[ h_{\text{tree}} \quad h_{\text{trunk}} \quad DBH \quad d_{\text{crown}} \]

complete tree inventory of the city centre (3000 trees), individual level assessments

9th International Conference on Urban Climate
20th - 24th July 2015, Toulouse, France
Methods (II.)

i-Tree (Eco, Streets, Hydro, Design)
(UFORE model)

• **UFORE-A: Anatomy of the Urban Forest**
  species diversity, leaf area, leaf biomass, etc.

• **UFORE-B: Biogenic Emissions**
  volatile organic compounds can contribute to the formation of \( O_3 \) and \( CO_2 \)

• **UFORE-C: Carbon Storage and Sequestration**
  allometric equations, average standardized growth rates, calculating with decomposition

• **UFORE-D: Air Pollution Removal**
  detailed quantification of deposition velocities for different pollutants, LAI
Results I. 
Structural attributes

high species diversity (~100) → ES diversity

species ~ equal age → facilitate ES quantification in wider assessments

varying tree condition
Results II.
Carbon storage and sequestration

Urban trees may sometimes store more carbon than in natural/near-natural forests.

Old-growth trees have a major role in carbon storage.

Easy to incorporate in city climate strategies.

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Results III. Air pollution removal

removal of traffic-related pollutants is dominant
service provision is resultant of structural attributes and tree condition
Results IV. - Conclusion

Benefits and costs

Total cost of tree management (~3000 individuals): ~20300 €/year

Monetary value of the two investigated services: ~7846 €/year

Conclusions

• individual-based investigations are necessary baseline data for several types of urban ES assessments

• species selection should take tree condition into account

• ES assessments are effective tools to enforce interests of urban climatology

Ongoing work
THANK YOU FOR YOUR ATTENTION!

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