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

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Main groups of ecosystem services

Provisioning services

- food production
- drinking water
- pharmaceuticals
- energy
- building material

Regulating services

- climate regulation
- water purification
- flood control
- erosion protection
- pollination

Supporting services

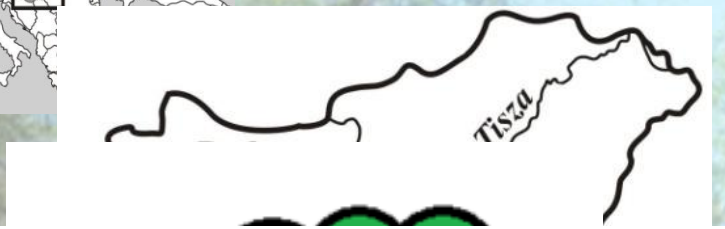
- soil formation
- nutrient cycling
- primary production

Cultural services

- recreation, ecotourism
- spiritual inspiration
- scientific value

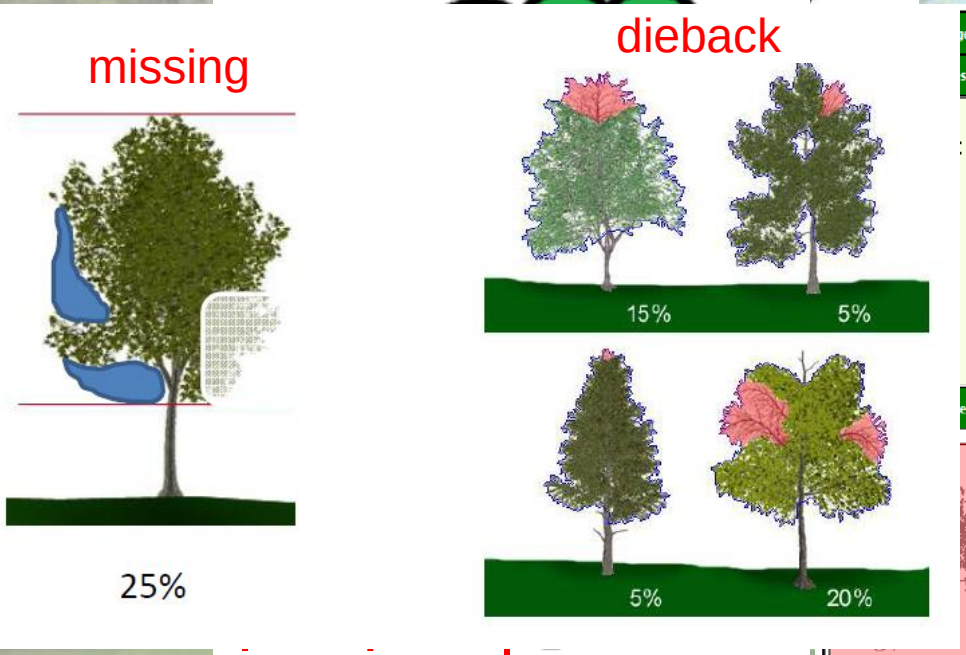
etc...

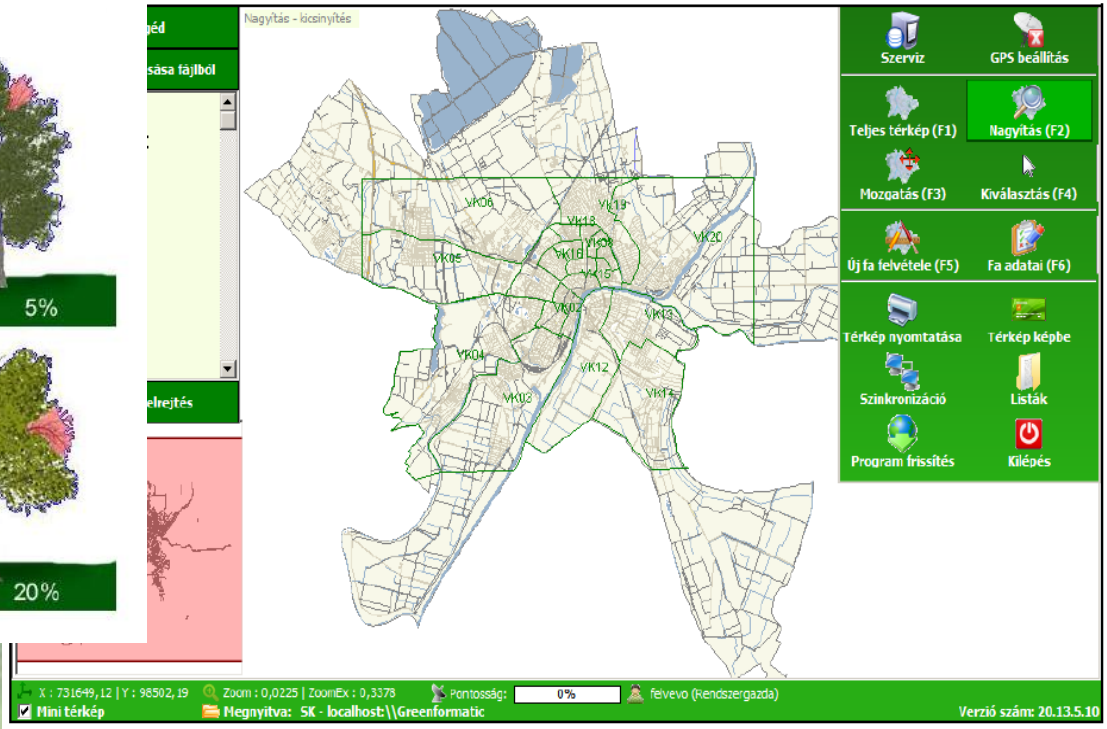
Methods and study area (I.)



Field tree cadastre

(Greenformatic)





h_{tree} h_{trunk} DBH d_{crown}

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

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

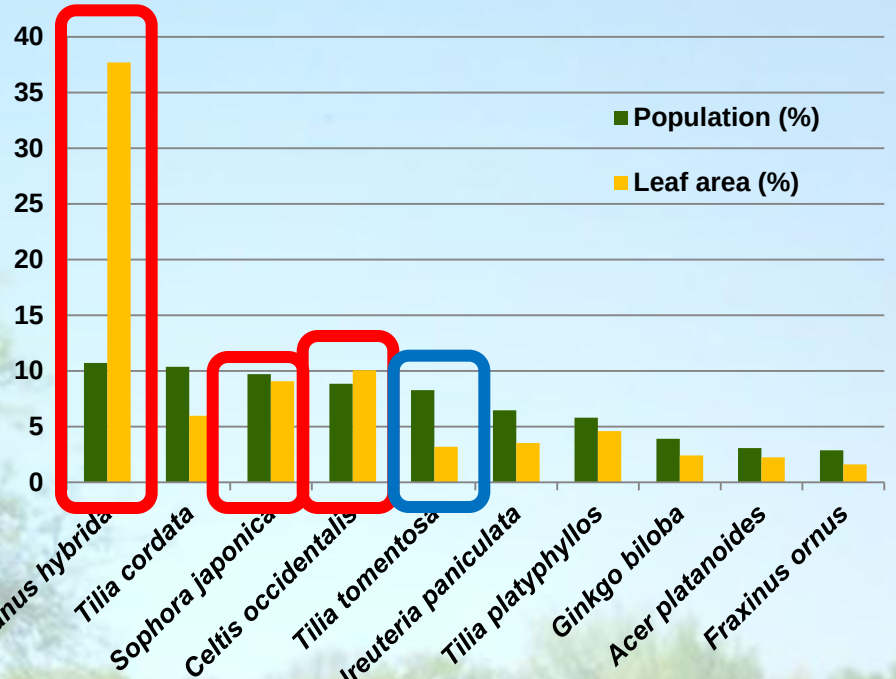
Results I.

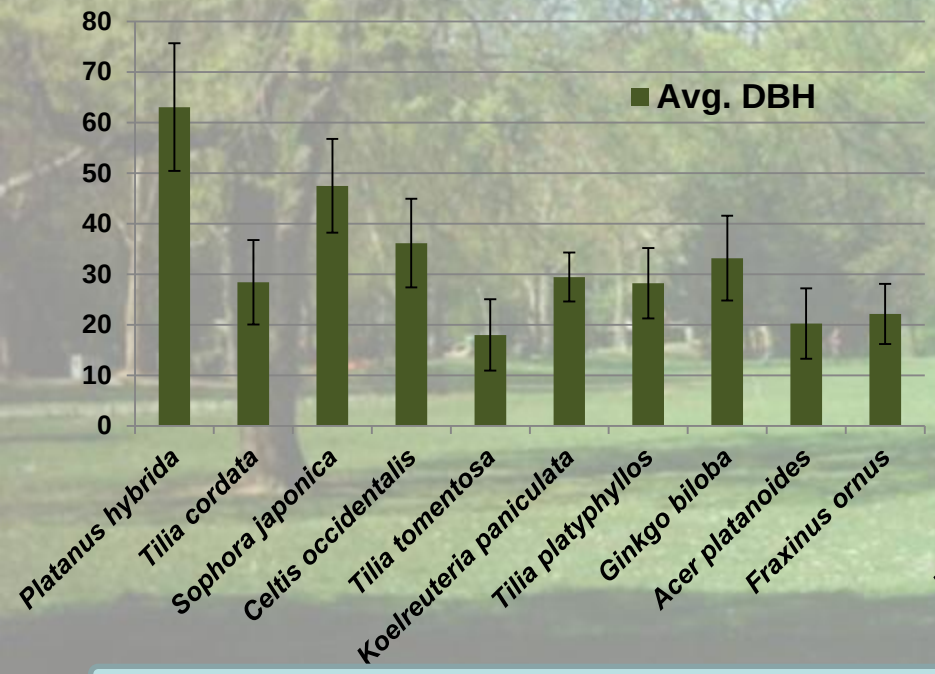
Structural attributes

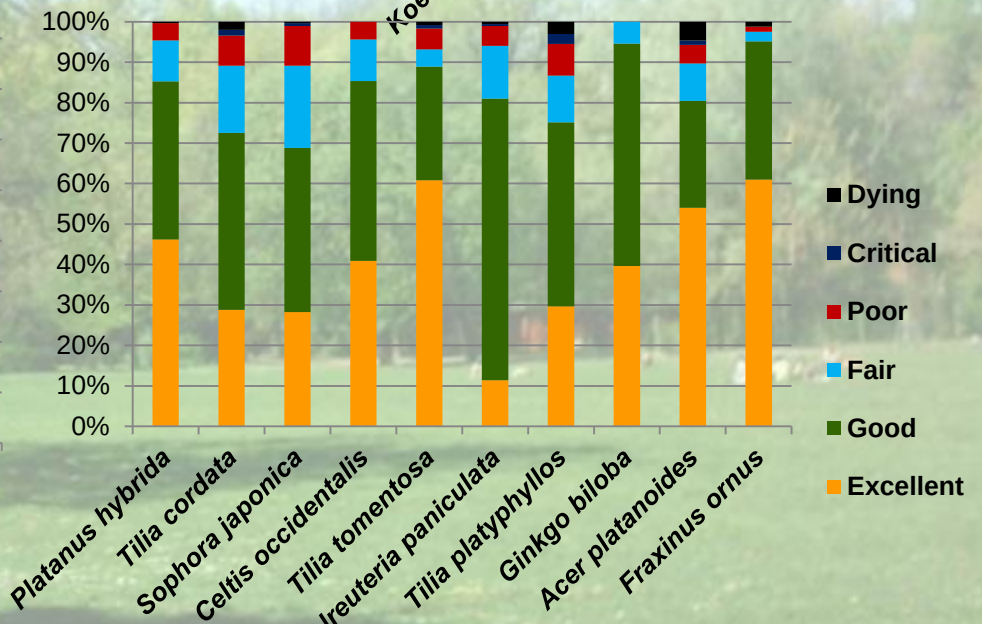
high species diversity (~100) → ES diversity

species ~ equal age → facilitate ES quantification in wider assessments

varying tree condition

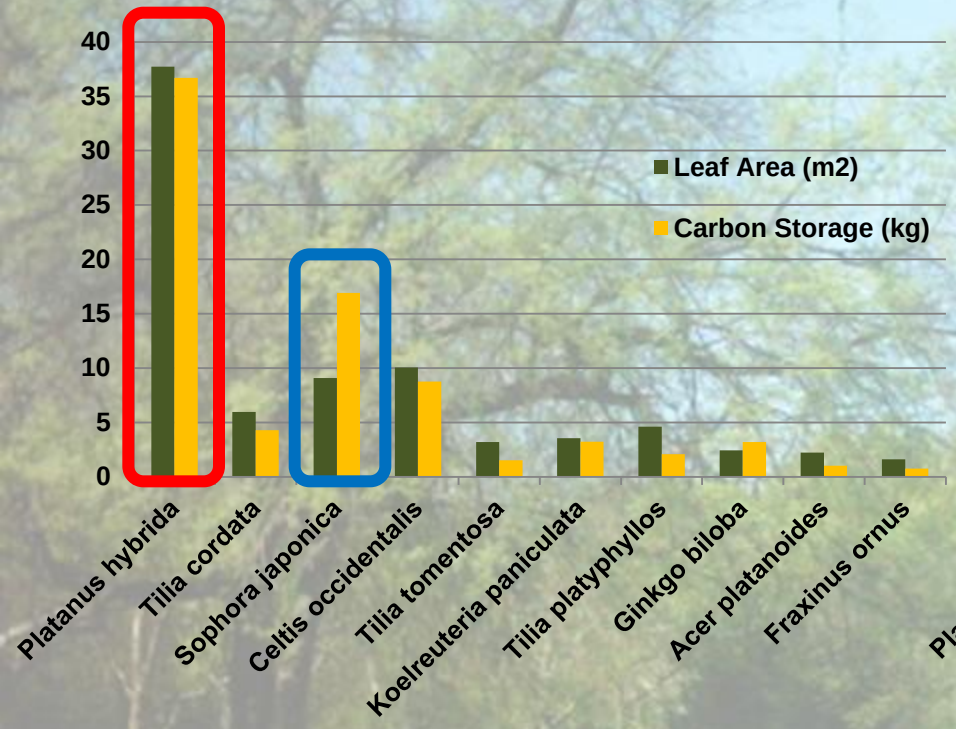


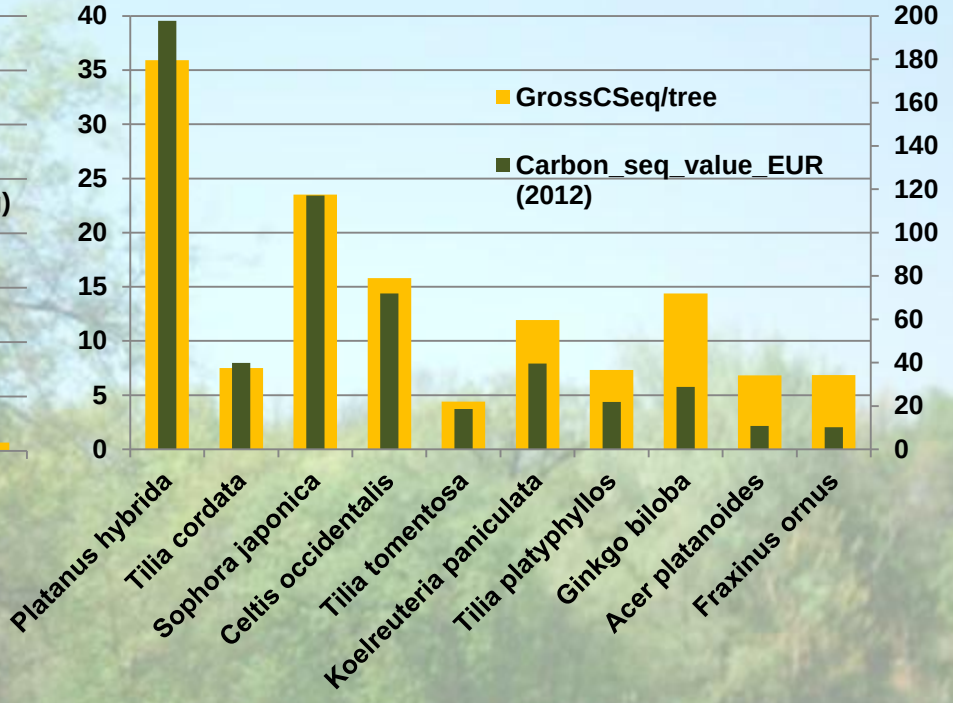




Results II.

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

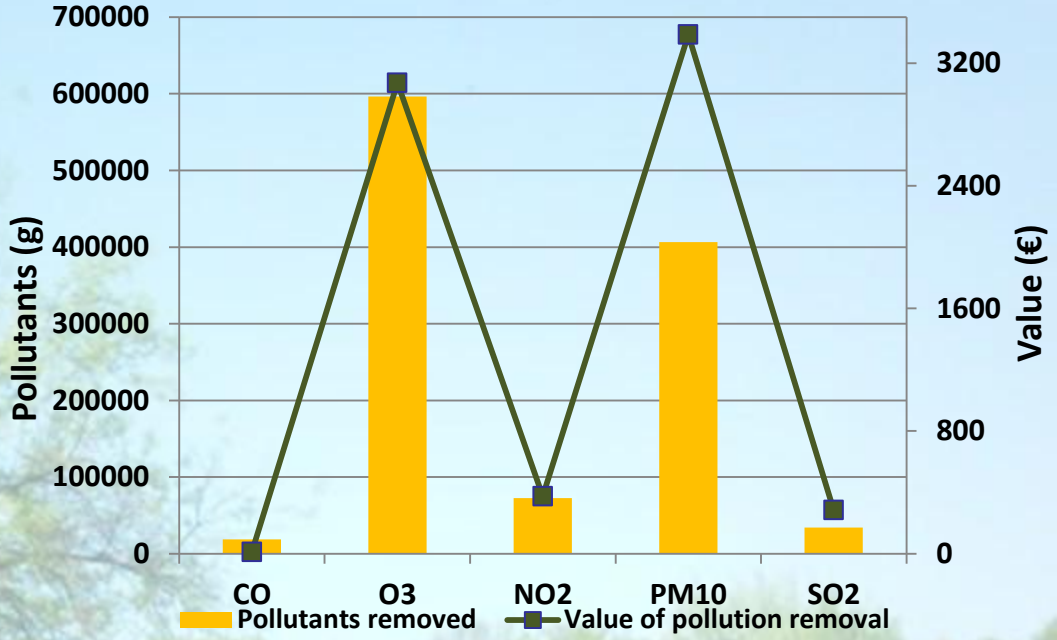
easy to incorporate in city climate strategies

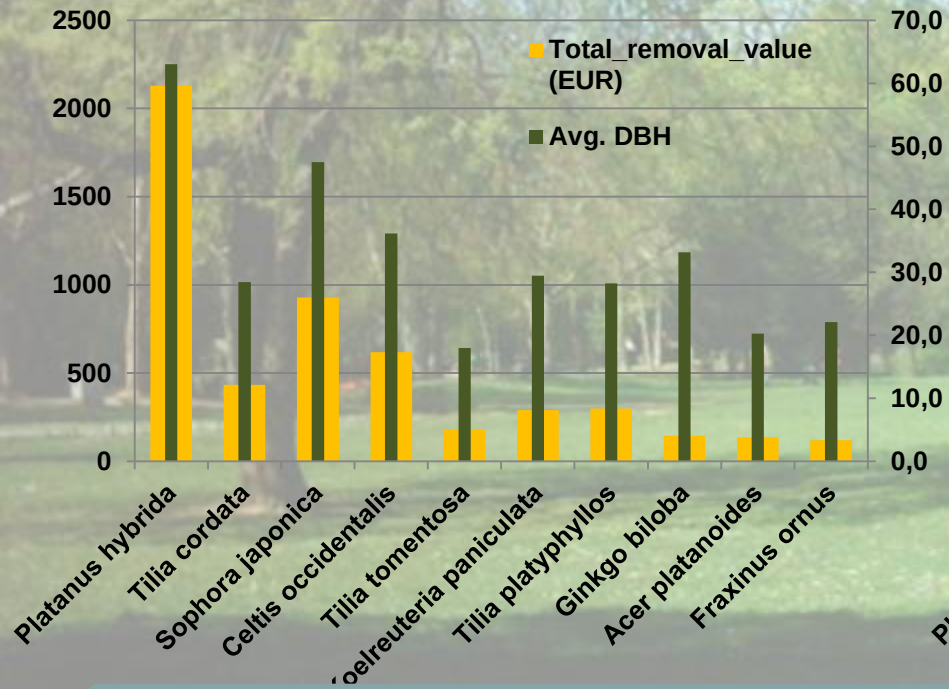
Results III.

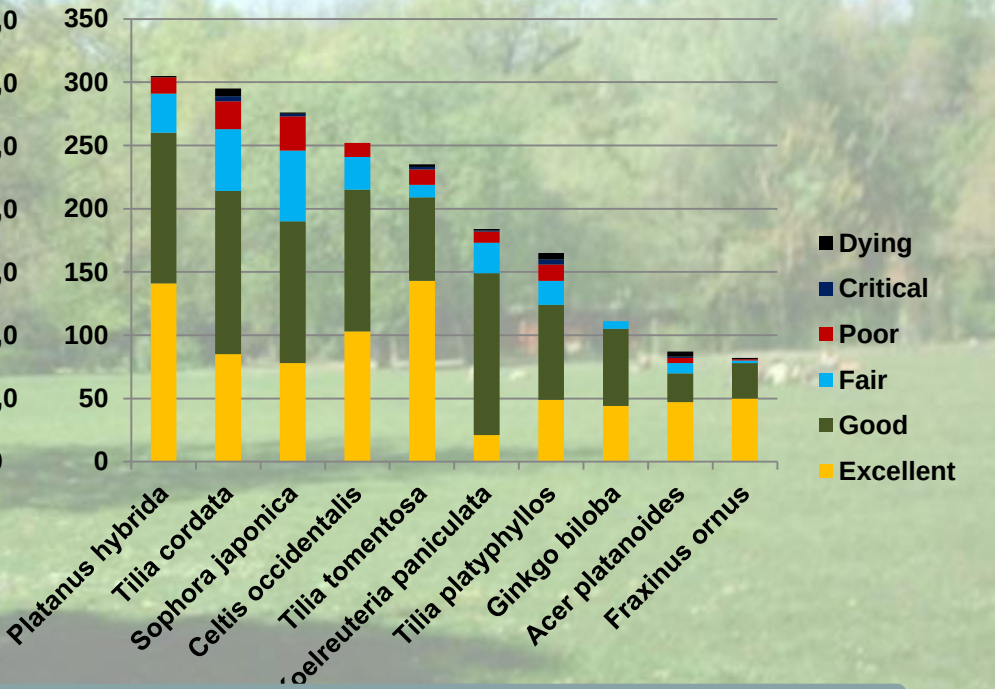
Air pollution removal

removal of traffic-related pollutants is dominant

service provision is resultant of structural attributes and tree condition







Results IV. - Conclusion

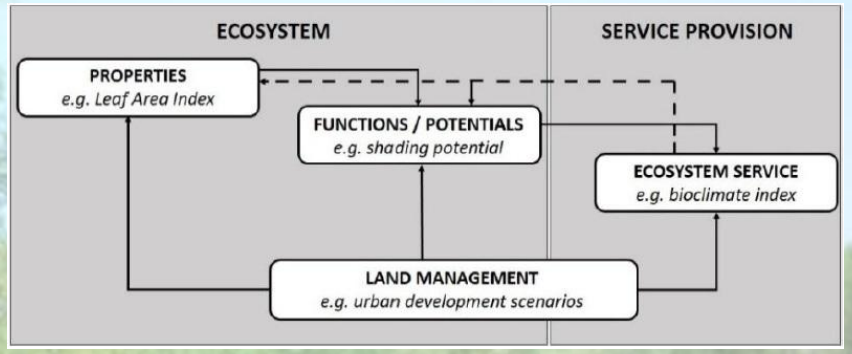
Benefits and costs

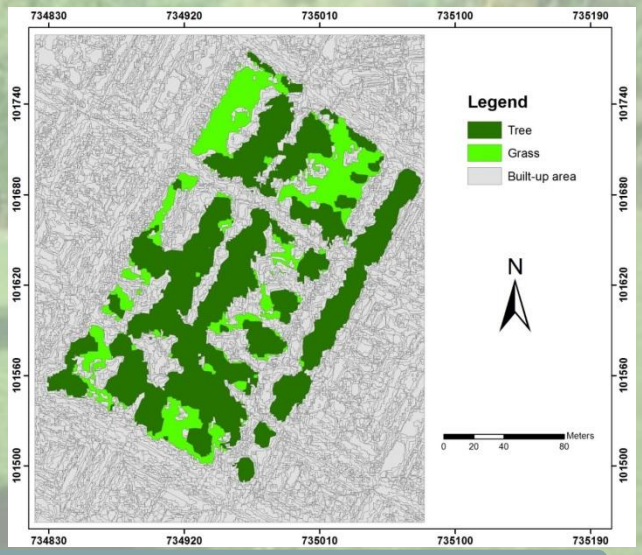
Total cost of tree management (~3000 individuals): ~20300 €/year

! 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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