# Article information:

Plant water‐use efficiency as a metric of urban ecosystem services - McCarthy - 2011 - Ecological Applications - Wiley Online Library  
<https://esajournals.onlinelibrary.wiley.com/doi/full/10.1890/11-0048.1>

# Article summary:

1. Urban trees provide various ecosystem services, but in arid regions, they require supplemental irrigation which can be considered an environmental cost.

2. Water-use efficiency (WUE) can be used as a metric to evaluate the trade-off between water use and growth in urban trees.

3. The study found that whole-tree WUE is a useful measure of the balance between critical costs and benefits of irrigated urban trees and may help determine which trees should be planted to maximize growth while conserving water.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article "Plant water-use efficiency as a metric of urban ecosystem services" by McCarthy (2011) provides an analysis of the trade-off between water use and growth in irrigated urban trees. The study evaluates the use of water-use efficiency (WUE) as a metric for this trade-off, using different methods at the leaf and whole-tree scale. The study found that species with high instantaneous WUE also had the highest tree-level seasonal WUE, resulting from low water use in some species and high basal-area growth in others.

The article provides valuable insights into the importance of considering WUE when selecting tree species for urban environments. However, there are several potential biases and limitations to consider. Firstly, the study only evaluated nonnative tree species commonly planted in Los Angeles, which may not be representative of other urban environments or native tree species. Additionally, the study did not consider other factors that may affect tree growth and ecosystem services, such as pest resistance or carbon storage.

Furthermore, while the study found correlations between leaf- and tree-level WUE, it did not explore potential confounding factors that may affect these relationships. For example, differences in canopy structure or microclimate may affect gas exchange measurements at the leaf level and sap flux density measurements at the whole-tree level.

The article also makes unsupported claims regarding genetic control of WUE across species. While common-garden experiments have shown correlations between carbon-isotope discrimination (Δ) and precipitation or VPD in some species' native ranges/habitats, this does not necessarily indicate genetic control of WUE.

Overall, while the article provides valuable insights into the importance of considering WUE when selecting tree species for urban environments, it is important to consider potential biases and limitations in its findings. Further research is needed to fully understand the complex relationships between water use, growth, and ecosystem services in urban trees.

# Topics for further research:

* Factors affecting tree growth and ecosystem services in urban environments
* Pest resistance in urban trees
* Carbon storage in urban trees
* Canopy structure and its effect on gas exchange measurements in trees
* Microclimate and its effect on sap flux density measurements in trees
* Genetic control of water-use efficiency in plants

# Report location:

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