

## Introduction

- Urban wetland forests provide climate change mitigation and adaptation services largely through carbon storage and sequestration by the vegetation and soils.
- We defined wetlands as areas that are always or often inundated by water, and have persistent tree and/or shrub vegetation characteristic of hydric soils (e.g. in Figure 1).
- We assessed the contribution of urban wetland forest trees to carbon storage and sequestration in Orlando, Florida, USA during summer of 2010 as part of a city-wide study<sup>1</sup>.

## Methods

- Data collected on ground cover, trees, shrubs, herbs, in 150 randomly selected 0.1-acre plots in Orlando, FL, USA.
- The Urban Forest Effects (UFORE) model of the USDA<sup>2</sup> used to estimate carbon storage and sequestration by the wetland forests.
- The dollar values of these ecosystem services were estimated using a central value of the social costs of carbon (\$21.40/ton of carbon in 2010 at 3% discount rate) as per the Interagency Working Group on Social Cost of Carbon of the United States Federal Government<sup>3</sup>.



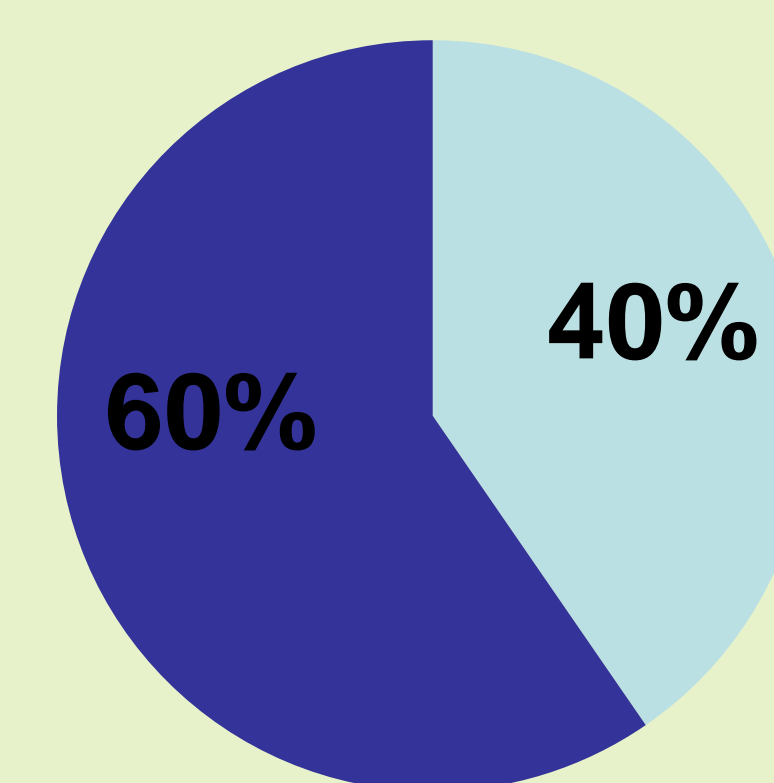
Figure 1: Wetland types in the City of Orlando, Florida, USA

## Results

- An estimated 11% of the city's land cover was classified as wetlands, 73.5% of which were forested.
- Approximately 49% of trees (about 3.7 million trees) were in wetland forests. Tree density was about 1,291 trees/ hectare.
- Most abundant tree species: pond cypress, *Taxodium ascendens*.
- Total carbon storage in wetland forest trees was estimated at 284,900 tons; and annual total of carbon sequestered by wetland forest trees was about 16,279 tons per year.
- Wetland forest trees stored about 99 tons/hectare and sequestered about 5.72 tons per hectare per year. Pond cypress stored about 20%, and sequestered about 25% of the carbon per hectare.
- Carbon storage and sequestration were respectively about 40% and 46% of all forest types combined.

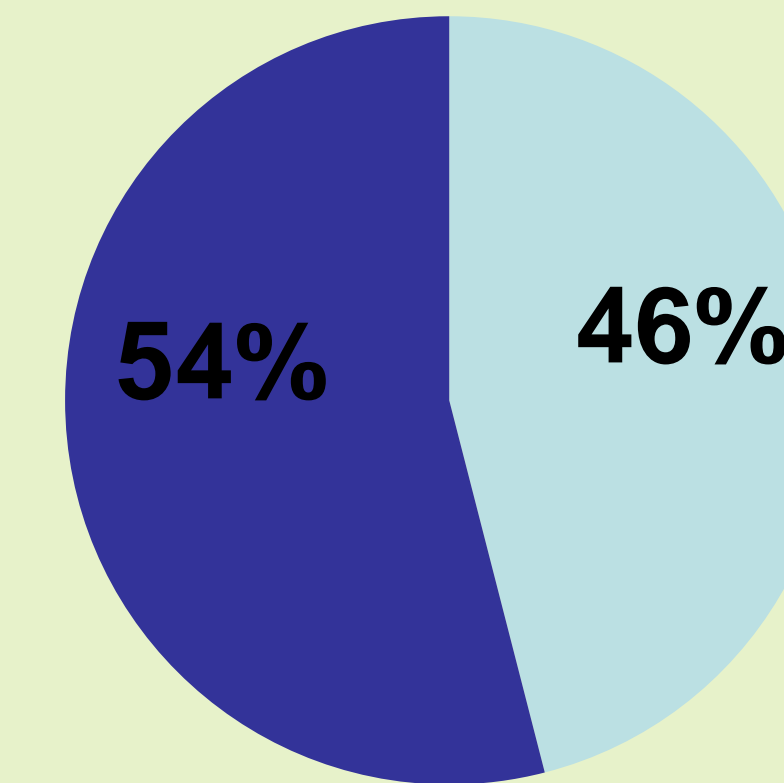
### Carbon Storage

Wetland forests Other forest types



### Carbon Sequestration

Wetland forests Other forest types



- Carbon stored by trees in wetland forests of Orlando provided services worth about \$6.1 million; and sequestered carbon provided services worth about \$350,000 dollars per year.

## Discussion

- About 8% of Orlando, FL is covered by forested wetlands.
- Recording the highest number of trees per hectare (1,291 trees/ha), wetland forests in Orlando stored and sequestered the highest carbon per hectare.
- Carbon storage and sequestration was higher in wetland forests (99 tons/ha, and 5.7 tons/ha/yr) than in dry forests (42 tons/ha, and 3.5 tons/ha/yr).
- The value of these ecosystem services is important to the city as a climate change adaptation strategy to offset carbon release.
- Justifies conservation of wetlands in the city's strategic planning for future development.
- These results are based on the UFORE model, and are part of an on-going urban carbon dynamics study in Orlando, combining plots and eddy covariance data.

## References

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- Nowak, D.J., D.E. Crane, J.C. Stevens, R.E. Hoehn, J.T. Walton, and J. Bond. 2008. A ground-based method of assessing urban forest structure and ecosystem services. *Arboriculture and Urban Forestry* 34:347-358.
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