

## **Urban forest ecosystem services : A case study assessment in Corvallis, Oregon**

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### **Background/Questions/Methods**

One EPA research focus is quantifying ecosystem services, benefits that ecosystems provide to humans, in order to promote informed natural resource management decisions and to assess the effectiveness of existing environmental policies. A case study was conducted to assess ecosystem services throughout the Willamette River Basin, Oregon, and to develop methods to examine potential effects of stressor and policy scenarios on them. As part of that study, we examined benefits that trees in urban environments provide relating to air and water quality, climate moderation, and aesthetics. Our target area was public lands within the Urban Growth Boundary (UGB) of Corvallis, Oregon. Ongoing management programs have developed inventories of trees on the main campus of Oregon State University (OSU; >4300 trees) and of street trees in the City of Corvallis public right of way (>13,200 trees). To supplement these data bases, we sampled 97 0.2-acre plots randomly located on other public lands within the UGB. Collectively these data sets give us a complete picture of trees on all public lands in the Corvallis UGB. Inventory data were analyzed with i-Tree Streets and plot data were analyzed with i-Tree Eco, two urban forest models developed by the USDA Forest Service and collaborators.

### **Results/Conclusions**

Based on tree measurements, air quality monitoring data, and climate data, the models estimate air pollutant reductions for four air pollutants ( $O_3$ ,  $NO_2$ ,  $SO_2$ ,  $PM_{10}$ ), carbon sequestration, stormwater runoff reduction, building energy savings due to shading, and for city street trees, aesthetic value as measured by trees' effect on private real estate value. These were evaluated in both biophysical units and their economic value. The annual economic benefits were estimated at \$68/tree and \$44/tree for the City and OSU inventories, respectively, \$7/tree for other public lands, and \$9/tree overall. The greatest portion of this value was attributed to aesthetic value for city street trees, and to mitigation of infrastructure costs for dealing with stormwater for the other areas and overall. Total annual benefit estimates were about \$190,000 for OSU, \$900,000 for city street trees, \$3 million for other public lands, and \$4 million overall. Ecosystem service assessments like this can help in defining "the big picture" of benefits provided by natural resources and in doing cost/benefit evaluations of different policy or management options.