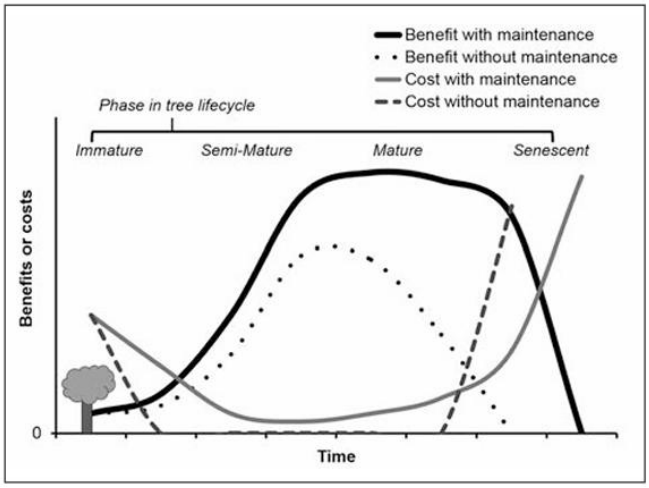
The costs of not maintaining trees

Less-than-optimal maintenance leads to fewer benefits from trees

Urban trees bring both benefits and costs to a city or a homeowner. But most research has focused on the benefits of trees. Here, we present key findings from research assessing the impacts of lack of investment in tree maintenance.

Maintenance is linked to tree success at the beginning and end of a tree's life, and also plays an important role in how much benefit a tree can confer in its lifetime. As the figure to the right shows, maintenance can extend the time that a tree spends in its mature phase, when its benefits are greatest. Lengthening a tree's life also delays removal costs.

Research continues to reveal the breadth and magnitude of the benefits of urban trees—this provides growing justification for investing in tree maintenance.



This figure shows hypothetical lifetime cost and benefit profiles of an individual street tree.

Benefits peak when trees are mature and decline rapidly with age. Costs show an inverse pattern. *Modified from Vogt et al., 2014.*

Key findings about tree maintenance:

Planting is a maintenance decision. Making sure that a tree is well suited to its site can reduce future maintenance costs. Conversely, poor planting choices can lead to higher future maintenance costs including damaging infrastructure and emitting biogenic volatile organic compounds (Vogt et al. 2014).

Early maintenance is important. Early maintenance influences the chance that a tree is successfully established. This is critical, because a tree that is well established may live longer and provide more benefits (Vogt et al., 2014). Lack of early maintenance can lead to greater deferred maintenance costs. For example, Ryder and Moore (2013) showed that early formative pruning paid for itself with lower pruning later.

Protecting trees in construction zones can improve tree condition and survival rates. Construction can increase tree mortality. In particular, construction that includes ground alteration can lead to tree root damage, which can harm tree growth (Benson and Morgenroth 2019). Preventative actions such as preserving growing space around curbs and sidewalks can reduce the negative effects of construction (Hauer et al, 2020).

Key findings about tree maintenance (continued):

Pruning is the most expensive maintenance cost. Even though tree pruning typically takes the biggest cut of municipal tree maintenance budgets, it is still often underfunded compared in to pruning needs (Sievert 1988). Pruning is shown to make trees more resistant to ice storms (Sisinni et al., 1995), and recently pruned neighborhoods have fewer priority maintenance calls (Luley et al., 2002).

Delaying pruning can lead to a later increase in structural defects (Luley et al., 2002), and deferring utility pruning leads to higher costs in four years' time (Browning and Wiant, 1997).

Tree removal is also costly. Tree removal is the second-highest maintenance cost (Vogt et al 2014), and can incur other costs. For example, early removal of a tree may result in increased heating and cooling costs (Vogt at al. 2014). Overall, delaying removal costs is a major benefit of maintenance.

Watering is often cost-effective maintenance (Koeser et al., 2016). In a study of container-grown trees at a nursery, researchers found higher mortality rates in trees not watered following transplanting, and better growth rates in trees that were watered more (Gilman 2001).

Treating for pests might pay for itself. For example, a study of the invasive emerald ash borer found justification for substantial investment to slow the spread of the insect. They also found that maintenance (i.e., treating for the pest) paid off in terms of retained benefits and delayed removal costs (Kovacs et al., 2010).

A study of Dutch elm disease found that intensive consistent maintenance (two inspections per year, prompt removal of infected trees, and deadwood pruning of all trees) yielded the highest benefit-cost-ratio of the management options they assessed (Sherwood and Betters 1981).

Maintenance may reduce liability costs (Baken 1995). Removing failing limbs on an aging tree can prevent them from falling off and damaging people or property. Conversely, less maintenance can lead to more risk and legal liability.

Maintenance costs can depend on the species. Some tree species have better cost-benefit ratios in terms of maintenance costs. McPherson (2003) analyzed 10 species growing in Modesto, California, and found that the London plane tree was the best performer, combining maximum benefits with minimum maintenance costs.

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