River, Trees and City
Image Credit: Cristian M. Loan

Urban Forests: Nature as a Resource

By Jess Stevens

The following is an opening excerpt from a longer legal white paper (available here), which provides an overview global urban forest policy and extensive links to further resources.

Cities around the world are feeling the pressures of climate change and high population density. Urban forests are increasingly recognized as "green infrastructure," highlighting the quantifiable public goods they produce to combat the many problems arising from urban development and climate change.

Despite their countless benefits, urban forests face a barrage of threats including development, drought, vandalism, and lack of adequate maintenance. Tree canopy in U.S. cities has been declining rapidly over the past fifty years due to development and mismanagement. Cities must begin developing strategic plans for the long-term preservation and growth of their urban forests.

Cities at the forefront of solving this crisis have developed comprehensive urban forest plans to supplant antiquated urban tree maintenance ordinances and have set strategic goals for increasing tree canopy in their urban areas.

What follows is an examination of the benefits of urban forests followed by a guide to creating an urban forest development plan and case studies of cities that have instituted comprehensive urban forest plans.

Environmental Benefits

The term "Heat Island" describes the fact that urban areas experience higher temperatures than surrounding non-urbanized areas. Increasing global temperatures and the risk of heat wave events in urban areas represents a serious public health concern.

Heat islands disproportionately impact communities with limited adaptive capacities including those considered low income, high poverty, low education, elderly, and ethnic.

Tree planting is one of the most effective means of mitigating urban heat islands. Trees lower air and surface temperatures with shade and evapotranspiration. Mature tree canopy reduces air temperatures by about 5 to 10 degrees.

In addition to lowering air temperatures and reducing energy use, trees also reduce the amount of carbon dioxide in the atmosphere by fixing carbon during photosynthesis and storing carbon as biomass. In 2005, urban trees alone stored 643 million tons of carbon.

Urban forests help create and enhance animal and plant habitats and can act as "arcs" for endangered species.

Trees clean air by absorbing carbon dioxide, Sulphur dioxide, nitrous oxides and other pollutants. They also shade trees which reduces ozone emissions from vehicles. It is estimated that urban trees in the U.S. remove 711 thousand tons of air pollution annually. A service valued at $3.8 billion.

Urban forests can reduce annual stormwater runoff by as much as 7 percent and mature trees can store 50 to 100 gallons of water during large storms. Green streets and tree planting are 3 to 6 times more effective in managing stormwater and floodwater than conventional methods.

Urban trees and other plants help remediate contaminated soils by absorbing, transforming and containing a number of contaminants. Trees also divert captured rainwater in the soil, where bacteria and other microorganisms filter out impurities. This reduces urban runoff and the amount of sediment, pollutants, and organic matter that reach streams.

Social Benefits

The cognitive and behavioral effects of exposure to nature are far-reaching. Access to nature increases attentional capacity, positive emotion and problem-solving skills. It also aids in recovery from mental fatigue.

Urban forests also impact physical health. In urban settings, the percentage of green space near a person's home is significantly related to perceived general health. People exposed to greener environments also experienced lower levels of income-deprivation related health inequalities from all causes.

Urban areas characterized by high vegetation report fewer property and violent crimes than areas that lack vegetation.

Forest Walk, Southern Ridges (Singapore)
Image Credit: Kars Alfrink on flickr

This may be because urban green spaces contain 90 percent more people than barren areas on average. It could also be because green space creates more opportunities for social connection, cohesion and community building which leads to more vigilant supervision of neighborhoods.

Economic Benefits

Urban forestry creates jobs. In California, urban forestry supports over 60 thousand jobs and contributed more than $3.5 billion in value to the economy in 2009.

The presence of street trees increases residential property values. In several cities, street trees increased the collective value of homes by more than $1 billion. Commercial offices in green urban areas also rented for 7 percent higher. Shoppers are willing to travel further to visit urban areas with high vegetation and spend more time shopping when they arrive. Shoppers in forested urban areas also spend between 9 and 12 percent more for products than they otherwise would.

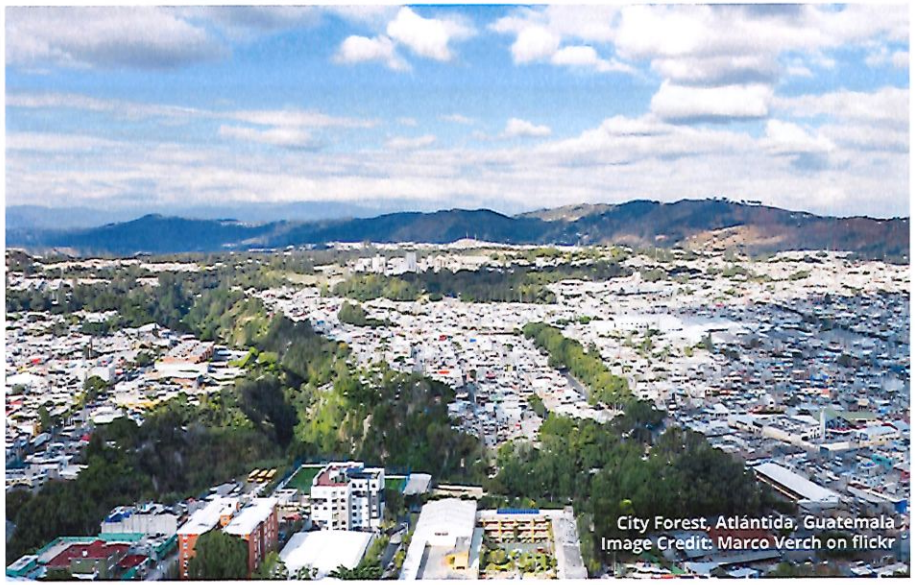
Tree shade lowers temperatures and may reduce energy consumption and spending. Properly placed trees can reduce cooling costs by 30 percent or more.

Urban forests could lower the economic costs associated with traffic accidents. Studies have shown that drivers drove slower, had less road rage and had fewer accidents when roadways were naturally landscaped. Tree shade also reduces pavement fatigue, cracking, and other distress which saves on repair costs.

From City Tree Ordinances to Urban Forests

As understanding of the ecological and economic values of trees increases, so does recognition of the importance of urban forest management. Almost all cities in the U.S. have adopted tree management ordinances. Yet often cities are unable to allocate resources to urban forest management or implement even the simplest of management plans.

Comprehensive urban forest management should consider all trees and greenery across the jurisdiction to adequately address a diverse landscape held by numerous land owners. Effective urban forest management must necessarily go beyond simple tree care ordinances to encompass a strategic forestry plan based on the heterogenous characteristics of the city and its inhabitants.



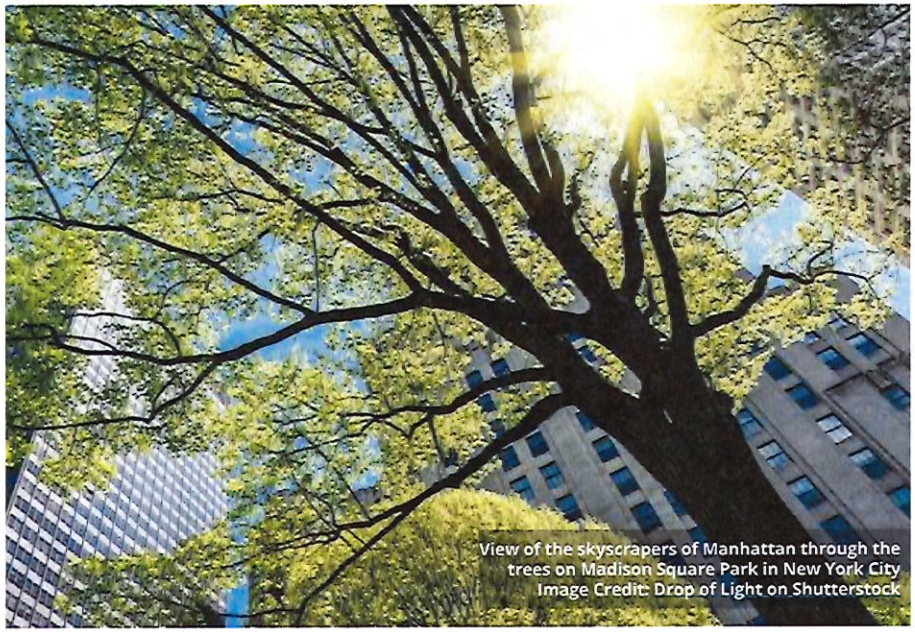
City Forest, Atlántida, Guatemala
Image Credit: Marco Verch on flickr

Successful urban forest management plans require workable tree ordinances that give broad discretion to those overseeing urban forest development. Those tasked with forest management should create a strategic "Green Infrastructure Plan" based on research conducted in the given urban area.

This research should include substantial public outreach to members of the community to gauge their interest in promoting urban forestry and their knowledge of its benefits.

The plan should include management's strategy, its goals and a timeline for achieving the goals. The plan should be flexible and able to adapt to the changing circumstances of the city.

The Urban Forest Planning Guide provides step-by-step instruction to cities that want to develop their own "Urban Forest" or "Green Infrastructure Plans" based on insights from cities at the forefront of urban forest planning.



View of the skyscrapers of Manhattan through the trees on Madison Square Park in New York City
Image Credit: Drop of Light on Shutterstock

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