



THE TREE PROJECT  
ENERGY • WATER • AIR

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## Value of urban forests highlighted in two environmental improvement projects in Colorado

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For communities in the Rocky Mountain region, investing in urban forests can provide multiple environmental benefits, like improving air quality, reducing the urban heat island effect, and conserving energy.

The Institute for Environmental Solutions (IES), a Denver-based nonprofit organization, is working to raise public awareness of the value of urban trees and providing real environmental improvement in two strategic forestry projects in Colorado. One project focuses on stormwater management in parking lots, while the other tackles climate change.

### **Trees for stormwater management**

Stormwater management is an enormous challenge for Colorado communities. Stormwater runoff can lead to ecological and physical degradation of riparian ecosystems. High runoff volume often results in costly mechanical remediation, such as bank stabilization. Even small quantities of the many pollutants carried by stormwater runoff can harm rivers and streams, necessitating expensive water treatment processes.

With urban development, permeable surfaces like grasslands and forests are converted into impermeable surfaces such as roofs and asphalt. As the amount of impermeable surface in a watershed increases, so does the volume and pollutant load of stormwater runoff that enters receiving waterways. Using strategic tree planting, stormwater managers may be able to decrease runoff volume and pollutant load from parking lots, reducing downstream infrastructure cost and protecting the environment.

Trees help to reduce the peak volume of stormwater by collecting the water on their bark and leaves where it can then evaporate and filtering it through their roots. On average, a medium-sized tree intercepts 2,300 gallons of stormwater runoff in a year. Landscapes with trees can have infiltration rates that are 10-15 times greater than similar treeless areas. In a typical rain event, trees can absorb about a third of the precipitation in their leaves and trunks alone. This

water never even hits the ground. Of the two-thirds that does make it to the ground, another third infiltrates into the soil, which has been made more permeable by the presence of the trees.

Trees can remove metals, nitrates, phosphorous, and potassium from polluted storm runoff, thereby improving the water quality of stormwater. Bioretention cells – systems that use special soils and plants to absorb and retain stormwater – have been found to remove up to 65% of the phosphorous and 49% of the nitrogen found in polluted runoff. IES determined that the value of the runoff volume and pollution reduction function of Golden, Colorado, street trees is more than \$50,000 per year.

To optimize the benefits of trees for parking lot stormwater management, planners and installers need detailed information regarding:

- Species selection
- Site construction and installation
- Long-term maintenance
- Costs and benefits

Trees should be selected, planted, and maintained to maximize tree health and longevity, stormwater management effectiveness, and other environmental functions. At the same time, care should be taken to minimize environmental costs, like increased ozone-forming potential and water consumption, and financial costs, such as tree replacement and root damage.

In Colorado, IES and its partners are encouraging the effective application of strategies for parking lot stormwater management that take advantage of trees' ability to increase filtration and infiltration of runoff, while optimizing trees' other environmental benefits.

Another benefit of urban forestry that is receiving increased national attention is climate change mitigation. IES is partnering with the Colorado State Forest Service, Colorado Tree Coalition, and others to help communities participate in the growing carbon market.

### **Colorado urban forestry climate coalition**

Planted and maintained strategically, urban forests can help mitigate global climate change. Carbon dioxide is a major greenhouse gas and a big part of the climate change problem. Trees sequester carbon dioxide from the atmosphere. Some is released as trees grow, but, in places like Colorado's Front Range, urban forests planted and maintained strategically can sequester and store more carbon dioxide than they release. With the growing demand for effective climate change mitigation strategies, communities with active forestry programs may now be able to earn revenue by documenting and selling the carbon sequestration function of their trees.

New developments in the structure of the carbon credit market make it possible to support urban forestry programs in Colorado and be recognized for helping to fight climate change. The Chicago Climate Exchange (CCX) and the Climate Action Reserve (California), two of the largest repositories of verified carbon credits in the U.S. market, recently developed protocols

for creating credits from urban forestry. By developing the protocols – rules for quantifying the amount of carbon sequestered or avoided by offset projects – for urban forestry, the two organizations have assured buyers on the national carbon market that urban forestry credits have real environmental and financial value. Supporters of urban forestry have always played a role in fighting climate change; now they can get the credit they deserve.

Some logistical barriers need to be overcome before urban forestry can be applied successfully as a greenhouse gas offset. Two such challenges are managing the process through which communities will decide to sell the carbon sequestration function of their forest and determining where the revenue from offset sales will go. Overcoming these barriers will require the involvement of many community members, so highlighting the extent and magnitude of the lasting, positive environmental and human health benefits that urban forests provide will be an important part of a successful offset project. Foresters can help by including local policy-makers early in the planning process and by developing a thorough understanding of the benefits of their own urban forests.

IES and its partners are developing a plan to help communities develop, aggregate, and market the carbon sequestration value of their urban forests. The new initiative is called the Colorado Urban Forestry Climate Coalition (CUFCC). Through CUFCC, businesses, local governments, foresters, and other community members can support urban forestry, improve their local environment, and mitigate climate change.

The Trees for Stormwater Management and CUFCC projects present new opportunities for advancing public awareness and sustainability of urban forestry in Colorado. For more information and to get involved, visit the CUFCC website at [www.i4es.org/climatecoalition.html](http://www.i4es.org/climatecoalition.html) or contact IES Senior Research Associate Ryan Moore at [ryan@i4es.org](mailto:ryan@i4es.org).

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