Our Urban Forests

A Valuable Community & Natural Resource

2010-2011

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The Northern Kentucky Urban & Community Forestry Council (NKCUFC) has developed this resource Guide to help government agencies and leaders, community stakeholders, and citizens access the most current information on Northern Kentucky's valuable urban forests. Council research projects and reports are also available to support quality decision making and to help rethink ways to value urban forests as essential community infrastructure.

Kentucky is blessed with an abundance of natural resources, including its forested land and more miles of running water than any other state except Alaska. Trees and forests help protect Kentucky's valuable waterways and hillside areas, and enhance the scenic character and the livability of our communities. Northern Kentucky's forests and greenspace play an important role in improving quality life for its population of 420,000 people.

"Just as our built environment is a key ingredient for competitive advantage, our natural environment is as well".

- Vision 2015 Shaping Our Future

Priority Issues and a Collaborative Call to Action

This Guide is organized in five key sections with four of the sections focusing on priority issues that surfaced from a community survey. The four sections include more in-depth discussion resulting from the 'Collaborative Forum' and supporting documentation for rational decision making. At the end of each section are specific strategies designed to encourage collaborative action as well as listed resources for additional information. The Guide's five sections are:

1. **NKUCFC Who We Are and What We Do**
   The Council is an interdisciplinary group of citizens and professionals who support the work of existing organizations and individual citizens interested in community trees. For more than a decade NKUCFC has convened stakeholders around the issues and policies impacting our urban forests.

2. **Forest - Water Quality & Quantity**
   Healthy watersheds are the basic building blocks of sound natural resource stewardship. The greatest challenge to forest and water quality may be increasing public awareness and education about forest management techniques, its long-term priority and community benefit, and the need for protecting forest canopy, increasing medium and large size tree growth.

3. **Forests - Hillside Protection**
   There is growing concern over hillside development not only because of the loss of character but also because of cost due to increased storm water runoff and landslides. In the years to come continued growth and development may pose the greatest threat to our forested hillsides.

4. **Forests - Livable Communities**
   Government officials, private businesses, and individual citizens are trying to address the quality of life in their communities and how they can sustain and improve it. Connecting forests and livability to land use planning and land use management strategies can be based on the documented benefits of urban forests.

5. **Challenges - Urban Forestry**
   The overall challenge of Urban Forestry (the care, management and planning of urban forest) is to increase awareness and understanding about the value and benefits of urban forests, the proper care of urban forests, and the need for urban forests to be considered essential infrastructure when planning and managing communities.

Partnerships and Support

The Council has conducted many scientific studies, and public education and outreach programs throughout Northern Kentucky in partnership with Kentucky Division of Forestry, University of KY's Co-operative Extension Service, the planning agencies of Boone, Kenton and Campbell counties, the Conservation Districts of Boone, Kenton and Campbell counties, Northern KY University's Center for Applied Ecology, WNKU Radio Station, Boone County Arboretum, Sanitation District #1, The Greater Cincinnati Foundation, Toyota Foundation, Nippert Foundation and many other local partners. Partnerships and support are essential to NKUCFC's work. The Council is a 501c3 organization and accepts contributions of all kinds ranging from volunteer time to financial sponsorship of our key programs and events. Your support allows us to continue our mission and bring quality programs and events to Northern Kentucky.

The evidence is clear: protecting Kentucky's urban forests requires funding and citizen involvement; collaborative decision making and increasing public awareness; interactive dialogue and proactive scientific research.

The Northern Kentucky Urban Forestry Council welcomes partnerships, information sharing, and community engagement to protect Northern Kentucky's valuable urban forests.

Let's Begin Today

Northern Kentucky Urban & Community Forestry Council

The Northern Kentucky Urban & Community Forestry Council (NKUCFC) was established in 1996. The Council is an interdisciplinary group of citizens and professionals who support the work of existing organizations and individual citizens interested in community trees.

NKUCFC's VISION - Foster healthy and beautiful Northern Kentucky communities through responsible environmental stewardship.

NKUCFC's MISSION - Create awareness in our communities about the value of urban forestry as an integral part of comprehensive planning and action for the purpose of improving our quality of life and shared landscape. The challenge is to merge the man-made and natural environment so both are accommodated and valued in the process.

NKUCFC works towards their Vision & Mission by:
- Working with communities to protect and enhance their trees and green spaces for future generations.
- Sharing information about the value of urban forests through educational programs and publications.
- Bringing people together – businesses, builders, developers, utilities, citizens, environmental organizations, and government officials – to exchange ideas.
- Advocating for future land development that values natural resources so that our trees and forests are considered, maintained, and renewed as our region grows.

Learn More

To learn more about the projects profiled here and to stay current with the work of NKUCFC please go to http://www.nkyurbanforestry.org. Or, visit us on Facebook and sign up for our email alerts.

WHAT WE DO

From Framework to Impact

For more than a decade NKUCFC has convened stakeholders around the issues and policies impacting our urban forests. From the beginning they have channeled their knowledge, passion and understanding to raise awareness that urban forests are a major part of our 'green infrastructure' and can enhance the livability of our communities. Below are a few highlights of the work that NKUCFC has accomplished over the years.

- **Forest Canopy Studies**

Forests are of varying ecological quality and functional value, therefore requiring professional, science-based evaluations for adequate assessment and prioritization; for this reason, NKUCFC commissioned forest quality assessments that were completed for Boone County in 2002, Kenton County in 2004 and Campbell County in 2008. There is now a green data layer for all of Northern Kentucky which will aid in the coordination of planning for land use, natural systems, and public facilities. The green data layer can also be used to do 'Ecosystem Analysis' to quantify ecological and economic benefits of our trees and related green infrastructure, to communicate urban forest values, and to support public policy decisions and promote green infrastructure in communities.

- **Grant Program**

NKUCFC works very closely with the Kentucky Division of Forestry's (KDOF) Urban & Community Forestry Program, the Cooperative Extension Service, and the planning agencies and city tree boards in Northern Kentucky. Because of these relationships NKUCFC has been responsible for an annual pass through grant program from the KDOF, with financial support

provided by the U S Forest Service, called <u>Trees in Our Community</u>. When funding is available, these small seed grants are awarded to local municipalities, nonprofit organizations, schools, etc. to support urban forestry projects. One of the objectives of this grant program is to implement strategies from Kentucky's Urban Forestry Strategic Plan – Planning for a Greener Kentucky.
http://forestry.ky.gov/ForestryPublications/Forestry%20Publications/Planning%20for%20a%20Greener%20Kentucky%20Strategic%20Plan.pdf

- **Watershed Issues in Relationship to Forestry - Banklick Analysis, Characterization and Education (BACE)**

BACE is a 2004 case study of the Banklick watershed that looks at how urban, rural, and riparian forests are critical to protecting water quality and reducing flooding in watersheds. The documentation of the approach and the results of the project will help Banklick Watershed Council, and other watershed councils, to better understand the urban forests in their watershed, involve the public, set goals, utilize available resources, and develop strategies to achieve their goals. Northern Kentucky Area Planning was the lead agency on this project with Banklick Watershed Council, Davey Resource Group, Sanitation District #1, Boone County Planning and NKUCFC as partners. The project was made possible by a grant from the National Urban & Community Advisory Council and was recognized in 2005 with the Kentucky Chapter of the American Planning Association's Outstanding Project/Program/Tool award.

- **Educational Programs**

Public Workers Seminar -   NKUCFC has conducted an annual full-day arboricultural training seminar for public workers for over a decade. Through this program, NKUCFC has forged many partnerships with local cities and municipalities, and has provided valuable hands-on training for employees responsible for the management and care of public trees. Kentucky Pesticide CEUs and International Society of Arboriculture (ISA) CEUs can be earned for attending.

ISA Certified Arborist Program - The Certified Arborist Program was started in 2004 and is designed to encourage more professionals to become ISA Certified Arborists. The NKUCFC provides scholarships and training opportunities for applicants to study, prepare for, and successfully pass the Certified Arborist examination. The program is

offered to people who are currently employed in the community forestry field and that reside or work in Northern Kentucky.

- **Reforest Northern Kentucky**

NKUCFC has worked in partnership with the Cooperative Extension Service, government agencies, nonprofit organizations, community groups, universities, and private businesses to put together annual volunteer tree planting events called Reforest Northern Kentucky. In addition to the ecological benefits of reforestation, these initiatives are designed to educate the community about the importance of trees and forests, and to encourage responsible environmental stewardship.

Multiple Reforest events have occurred in Boone, Kenton, and Campbell Counties and thousands of seedlings have been planted to restore our native forest ecosystem.

- **Tree Planting Database**

The Tree Planting Database is a project of NKUCFC in partnership with the Northern Kentucky University Center for Applied Ecology, University of Kentucky Cooperative Extension Service, Kentucky Division of Forestry, and local landscape, nursery and professional arborists. The Database was created to meet the need in Northern Kentucky for urban tree planting assistance. It compiles over 400 trees known to grow in the region into a searchable format. It can be accessed from the Council's website at www.nkyurbanforestry.org

FACING CHALLENGES - TAKING ACTION

Recently, NKUCFC completed an internet-based public opinion survey to learn what urban forestry issues were important to the public and to see how NKUCFC could do better in reaching out. Over 200 people responded with more than 20% identifying themselves as citizens, volunteers or taxpayers; adding their voices and concerns to opinions of trained tree professionals, foresters, and other community leaders. Four priority issues surfaced in this order:

1. **Water Quality/Flooding**
2. **Hillside Protection**
3. **Planning for Livable Communities**
4. **Urban Forestry Management**

Following the survey, NKUCFC organized the **'Collaborative Forum: Engaging a Spectrum of Leadership, Valuing Urban Forests'**, with almost 100 stakeholders attending. Dan Hassert, renowned for his journalism with the former Kentucky Post, gave the keynote address. Dan spoke of a large significant tree that is no longer and how that one tree had enhanced the quality of life for people and wildlife around it.

Afterwards the forum participants broke into discussion groups based on the four survey priorities for Northern Kentucky, using issue papers developed for each priority. Discussion was about what steps and what partnerships were needed to bring about positive action.

NKUCFC is using information gathered from the survey and the 'Collaborative Forum' to give direction for their on-the-ground projects, and for their educational and marketing efforts on the value of our urban forests.

The following sections in this Guide provide background and information on the four priority issues, and suggest how you can help NKUCFC take action to make our Northern Kentucky forests and communities more sustainable now and in the future.

Forests - Water Quality & Quantity

BACKGROUND

"Healthy watersheds are the basic building blocks of sound natural resource stewardship. Without healthy watersheds, habitat deteriorates for all living things, including people. Forests play a critical role in watershed health; however, the link between forests, watershed condition, and water quality and quantity is often not recognized. " – USDA Forest Service

What is a Watershed?
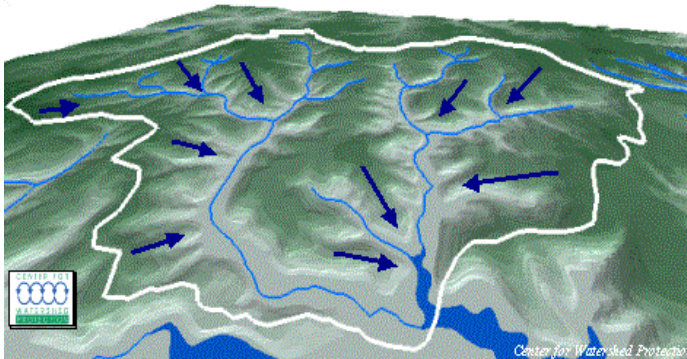
Watershed is the term used to describe the geographic area of land that drains water to a shared destination. The drainage system (and the watershed) also includes the geographic area surrounding the stream system that captures precipitation, filters and stores water, and determines water release into stream systems. The stream system is the visible, aboveground portion of a larger drainage system. A watershed, therefore, is "an area of land that drains water, sediment, and dissolved materials to a common outlet" (FISWRG 1998).

Any activity that changes soil permeability, vegetation type or cover, water quality or quantity, or rate of flow at a location can change the characteristics of a stream or even the watershed at downstream locations. Land use practices such as clearing land for timber or agriculture, developing and maintaining roads, housing and commercial developments, and water diversions may have environmental consequences that greatly affect stream conditions even when the land use is not directly associated with

a stream. Proper planning and adequate care in implementing projects can help ensure that one activity within a watershed does not detrimentally impact the downstream environment.

Kentucky Watershed Facts

Kentucky is home to over 49,000 miles of streams and rivers and over one million acres of lakes, ponds, and reservoirs, including some of the largest man-made lakes in the nation. Riparian zones are forested lands bordering streams and rivers that provide numerous water quality benefits. Of the assessed streams and rivers in Kentucky, 62% were found to be impaired. The loss of riparian habitat is the most common source of impairment, cited as the probable source of 1,334 miles or 21% of the listed impairments. - Source: Kentucky Statewide Assessment of Forest Resources

Northern Kentucky has many impaired streams and rivers, challenged by increasing stormwater runoff issues due to an ever decreasing forest canopy and increasing land development.   Specifically, the forests of the Northern Kentucky region lack a

significant amount of medium and large canopy trees associated with ecosystems capable of the greatest positive impact on improving water quality and managing stormwater runoff. For maximum watershed benefit, "canopy size matters".

Note: Kentucky Division of Water has designated Banklick Creek as one of the three highest priority impaired streams in the Licking River basin.

Banklick Creek at Pioneer Park

Forests play an important role in watershed health by providing certain benefits summarized below.

Reduce stormwater runoff and flooding

- Trees intercept rainfall in their canopy, reducing the amount of rain that reaches the ground. A portion of this captured rainwater evaporates from tree surfaces
- Trees take up water from the soil through their roots, which increases soil water storage potential and lengthens the amount of time before rainfall becomes runoff
- Trees promote infiltration by slowing down runoff and by increasing soil drainage in the root zone. The addition of organic matter (e.g. leaves) also increases storage of water in the soil, further reducing runoff
- Forested land produces very little runoff, which can reduce downstream flood flows that erode stream channels, damage property and destroy habitat

Reduce stream channel erosion

- Trees growing along a stream bank prevent erosion by stabilizing the soil with root systems and the addition of organic matter

Improve soil and water quality

- Trees prevent erosion of sediment by stabilizing the soil, and by substantially dispersing raindrop energy
- Trees take up stormwater pollutants such as nitrogen from soil and groundwater
- Forested areas can filter sediment and associated pollutants from runoff
- Certain tree species break down pollutants commonly found in urban soils, groundwater, and runoff, such as metals, pesticides and solvents

Provide habitat for terrestrial and aquatic wildlife

- Forests (and even single trees) provide habitat for wildlife in the form of food supply, interior breeding areas, and migratory corridors
- Streamside forests provide habitat in the form of leaf litter and large woody debris, for fish and other aquatic species
- Forest litter such as branches, leaves, fruits, and flowers, form the basis of the food web for stream organisms

Reduce summer air and water temperatures
- Riparian forests shade the stream and regulate summer air and water temperatures, which is critical for many aquatic species
- Trees and forests shade impervious surfaces, reducing temperature of stormwater runoff, which can minimize the thermal shocks normally transmitted to receiving waters during storms

The Challenge

The greatest challenge to forests and water quality may be increasing public awareness and education about forest management techniques, its long-term priority and community benefit, and the need for protecting forest canopy and increasing medium and large size tree growth. According to a federal study, the demand for water continues to rise due to population growth, while forests acreage is declining and remaining forest lands are threatened by climate change, disease/insect infestation, and natural disaster. One of the biggest threats to forests, and the water that derives from them, is the permanent conversion of forested land to residential, industrial and commercial uses.

> **"Forests are essential to clean water – our most precious natural resource.
> About two-thirds of the nation's scarce water resource originates
> on forests which cover about one-third of the nation's land area."**
>
> **- USDA Forest Service**

Problem	If you are a……	You Can….
Public awareness	• School • Watershed Council • Conservation District	• Hold watershed awareness events. • Develop a watershed/water quality monitoring program. • Educate children and adults about watershed protection.
Storm water run-off	• School • Watershed Council •Home/Business Owner • Local/Regional Agency • Local/Regional Government	• Properly store/dispose of waste oil, toxic materials, and other chemicals. • Maintain forests and open natural areas on your property. • Sweep and pick up debris in parking lots and streets. • Develop spill prevention/clean-up plan. • Establish toxic waste disposal sites and/or collection days. • Stencil and maintain storm drains. • Improve existing storm drains.
Pesticides and fertilizers	• Farmer •Home/Business Owner • Local/Regional Agency	• Apply minimum amount necessary—follow instructions. • Use organic practices. • Implement integrated pest management. • Leave vegetated buffer strips around streams.
Animal waste	• Farmer • Individual • Local/Regional Agency	• Eliminate or limit areas for feeding waterfowl. • Require removal and proper disposal of pet waste. • Work with conservation district to alleviate animal waste problems on farms

Problem	If you are a…..	You can…..
Preservation and/or restoration of natural areas	• School • Farmer • Developer • Land Trust • Watershed Council • Local/Regional Agency • Local/Regional Government	• Establish or hold conservation easements. • Purchase or establish conservation easements on key riparian parcels. • Practice and/or encourage conservation development. • Implement land use controls (*e.g.*, riparian setbacks). • Replant riparian buffers with trees. • Fence streams to protect from agricultural practices. • Maintain wooded riparian buffers.
Erosion	• Farmer • Developer • Homeowner • Local/Regional Agency • Local/Regional Government	• Cover disturbed soils. • Practice and/or encourage the use of conservation tilling. • Limit development on steep slopes. • Implement erosion control requirements for development. • Provide public education.
Septic system failures	•Home/Business Owner • Local/Regional Agency • Local/Regional Government	• Inspect and maintain septic systems. • Investigate and encourage the use of alternative systems. • Provide public education.
Uncontrolled development	• Watershed Council • Local/Regional Agency • Local/Regional Government	• Evaluate and update comprehensive plans. • Encourage and provide tools for resource protection. • Provide education for public and officials.

Forests - Hillside Protection

BACKGROUND

The Northern Kentucky/Cincinnati region has many hillsides, especially along our river corridors. Hillsides make up about 23% of the acreage of Boone, Kenton, Campbell and Hamilton Counties. Hillsides that remain wooded provide excellent wildlife habitat and add to our quality of life by improving the air we breathe, reducing stormwater runoff, buffering traffic noise and enhancing our scenic beauty.

Andres Duany, internationally known architect who visited our area in May 2007 as a presenter for the Northern Kentucky University and University of Cincinnati lecture series on "Building a Future – Sustainable Urbanism & Green Design", said he was amazed by the beauty of our green hillsides overlooking our river valleys. He advised that this beauty along with our wealth of historic architecture is something that we should value because it is what sets our region apart from others, and contributes to our livability and desirability.

The desirability of properties that look over our river valleys, large expanses of green space or city skylines has increased the demand to build on our hillsides. Also the diminishing supply of buildable land has caused the reshaping of our hillsides. Cutting away the base of hillsides, and/or cutting hilltops and filling in valleys in order to create flat or more gradual sloped land is taking away the character and the benefits of our wooded hillsides. There is growing concern over hillside development not only because of the loss of character but also because of cost due to increased storm water runoff and landslides.

Tim Agnello, Engineering Geologist, states in an article posted on www.ohiovalleylandslides.com "Landslides are prevalent throughout the tri-state area and a 1982 map by the United States Geological Survey shows an area along the Ohio

River in southern Ohio, northern Kentucky and southeastern Indiana, as having the highest landslide incidence in the U.S.. Additionally an early 1980's study showed Hamilton County, Ohio as having one of the highest per capita costs in the U.S. for repair to landslide damage and this figure excluded the landslide damage caused by the Mt. Adams landslide in the late 1970's."

Results from NKUCFC's 2008 Survey ranked hillside protection as the second highest priority related to urban and community forestry. In 2009 the Kenton County Mayors Group expressed concern about how hillside development was occurring. Concern from the Mayors Group has led Northern Kentucky Area Planning to gathering information and creating dialog with builders, citizens, educators, engineers, and city & county governments to understand the opportunities and constraints of our hills and landscape relative to health, safety, and welfare.
http://nkapc.org/HillsProject.html

History of Hillside Regulations
The concerns that are surfacing in Northern Kentucky seem to relate to a desire to improve hillside regulations in our region, which is reasonable considering the majority of our hillside regulations are based on earlier examples of steep slope regulations from the early 1950's.   These regulations were designed to protect lives and property from unengineered development of hillsides by requiring geo-tech analysis and engineered foundations for slopes exceeding a certain degree of slope. These types of regulations are still very pertinent but not necessarily enough.

In the 1970's another type of regulation relating to erosion and sedimentation control started to take shape due in part to the non-point source pollutant requirements of the federal Clean Water Act of 1972. These regulations were designed to prevent erosion by controlling site disturbance and vegetation removal, which makes sense since it has been proven that tree roots act to bind the soil and anchor it to the bedrock. Dr. Stan Hedeen in his book _Natural History of the Cincinnati Region_ states, "Meg Riestenberg of the College of Mount St. Joseph has found that cleared hillsides in the Cincinnati area are subject to failure at slope angles of 12 to 15 degrees, while

forested slopes may maintain angels as high as 35 degrees." In the same book Dr. Hedeen states, "Tim Agnello has found a slope is likely to fail when the natural hillside materials are lubricated by excessive amounts of water, e.g. from a broken water pipe or from storm runoff directed down the hill from a paved upland surface."

Landslide along Highland Ave above Moser's Branch in Ft. Wright, KY.

The International City/Council Management Association (ICMA) put together the webcast "*Seeing Green With Trees*" in 2004. In the webcast Cheryl Kollin, Director of Urban Forestry - American Forests, spoke about the economic and ecological benefits of urban forest. She said "Just like our roads, buildings, and utilities make up our built or gray infrastructure of our cities; trees, other vegetation, soils, water and air in our cities makes up our green infrastructure. Just as our gray infrastructure provides valuable services that can be quantified in dollars, so can our green infrastructure." Kollin explained how trees manage stormwater by capturing rainwater on their leaves and branches, allowing the rainwater to either evaporate or to be slowed down, reducing the rate and volume of storm water runoff. (Note: A recent study by the U.S. Forest Service showed that a 28-foot-tall tree intercepted 58.1 gallons or 68% of a 0.5 inch rain event that fell within its crown area.) With a reduced rate and volume, the storm water can then infiltrate into the soil where pollutants are absorbed and filtered by tree roots. The trees and their roots also reduce erosion and stabilize stream banks and hillsides.

The more recent movement in hillside regulations began taking shape in the 1980s. These regulations emphasize design guidelines to address the functional and visual effects of grading and the blending of hillside structures into their surroundings. These regulations take many forms, ranging from ordinances that specifically pertain to development on hillsides or steep slopes to those that pertain to all sensitive areas of a community.

Next Steps: Informed Decision Making

In the years to come continued growth and development may pose the greatest threat to hillside protection. Critical tools and strategies for protecting and managing hillsides and forests are:

- **Increased public awareness and education** about the importance of long-term conservation, management and protection of our significant natural resources and amenities.
- **Comprehensive planning** that consider s the value of our natural resources, the physical lay of the land and that also takes into consideration the safety, health and welfare of our community as a whole.
- **Zoning** to clearly account for the inherent complexities related to the challenges and safety of hillside development.

Here's How You Can Help	Resources
Municipal Planners • Consider trees and vegetation to insure stabilization and to manage erosion • Leverage scientific findings and GIS analysis for better decision-making for hillside protection **Elected Leaders** • Adopt public policies and zoning to direct the location of necessary infrastructure and away from steep slopes. • Restrict density related to hillside development **Communities & Citizens** • Increase awareness about the long-term impact of hillside development • Support your local tree board and local planning efforts towards sustainable communities • Participate in local planning and management initiatives	• **Northern Kentucky Urban & Community Forestry Council** www.nkyurbanforestry.org • **The Hillside Trust** actively engages in land conservation. www.hillsidetrust.org • *Kentucky Division of Forestry* http://www.forestry.ky.gov • **Partnership Resource Center** – a joint project of the National Forest Foundation and the U.S. Forest Service http://www.partnershipresourcecenter.org/ • **Ohio Valley Landslides** www.ohiovalleylandslides.com • **Northern Kentucky Area Planning Commission** http://nkapc.org/HillsProject.html • **Cincinnati's Landslide Susceptibility Study** http://www.cincinnati-oh.gov/transeng/pages/-7081-/

Forests - Livable Communities

BACKGROUND

Communities across the country, including Northern Kentucky, are increasingly more aware of livability issues. Government officials, private businesses, and individual citizens are trying to address the quality of life in their communities and how they can sustain and improve it. The awareness comes from wanting to improve livability for the people who currently live, work and visit but also wanting their communities to be recognized for their livability in order to attract new people of talent and skill.

Community livability refers to the perceived environmental and social quality of an area. This includes safety and health (traffic safety, personal security and public health), local environmental conditions (cleanliness, noise, dust, air quality and water quality), the quality of social interactions (neighborliness, fairness, respect, community identity and pride), opportunities for recreation and entertainment, aesthetics, and existence of unique cultural and environmental resources (e.g., historic structures, mature trees and traditional architectural styles).

Urban forests can play a major role in how communities address their livability. We believe this because urban forests not only include individual trees, parks and greenspace, trees lining streets, small remnants of woods and forests, but also the relationship of urban forests to air, water, wildlife and people. Urban forestry

programs work towards protecting, managing, enhancing and promoting urban forests with the best interest of people in mind.

Including Urban Forestry planning and management when implementing of any of the Principles for Livable Communities, established by the Local Government Commission listed below, will only enhance the outcomes.

1. The community should have a center focus that combines commercial, civic, cultural and recreational uses.
2. The community should contain an ample supply of specialized open space in the form of squares, greens and parks whose frequent use is encouraged through placement and design.
3. Public spaces should be designed to encourage the attention and presence of people at all hours of the day and night.
4. Each community or cluster of communities should have a well-defined edge, such as agricultural greenbelts or wildlife corridors, permanently protected from development.
5. Streets, pedestrian paths and bike paths should contribute to a system of fully-connected and interesting routes to all destinations. Their design should encourage pedestrian and bicycle use by being small and spatially defined by buildings, trees and lighting; and by discouraging high speed traffic.
6. Wherever possible, the natural terrain, drainage and vegetation of the community should be preserved with superior examples contained within parks or greenbelts.
7. The community design should help conserve resources and minimize waste.
8. Communities should provide for the efficient use of water through the use of natural drainage, drought tolerant landscaping and recycling.
9. The street orientation, the placement of buildings and the use of shading should contribute to the energy efficiency of the community.

Livability Based on Urban Forest Benefits

Connecting forests and livability to land use planning and land use management strategies can be based on the documented benefits of urban forests:

Economic Benefits

- **Trees stimulate downtown business –** A study conducted at the University of Washington surveyed a sample business owners and consumers of cities in the Pacific Northwest, Austin, Los Angeles, Chicago, Pittsburgh and Washington, D.C.. The survey asked participants to rate three business districts on each of four categories: amenity and comfort; interaction with merchants; quality of products; and maintenance and upkeep. The districts with street trees and other landscape elements scored significantly higher in each category than districts without trees or landscape elements. In fact, some survey participants said they would be willing to pay more for parking and goods in business districts with trees and landscape elements.

- **Trees increase property values** - Developers and homeowners can increase their property values by retaining existing trees and replanting trees following construction. Homes with maintained landscapes have property values 5-20 percent higher than non-landscaped homes. This varies with the number, size and quality of trees in the landscape.

Environmental Benefits

- **Trees improve climate and save energy** – Increases in downtown temperatures, often referred to as 'heat islands', are largely due to the increase in exposed heat absorbing surfaces, such as dark rooftops, parking lots and streets. As temperatures increase, energy demand for cooling increases, as do carbon dioxide emissions from fossil-fuel power plants, municipal water demand, unhealthy smog levels, and human discomfort and disease**.** Neighborhoods with well-shaded streets can be up to 10 degrees F cooler than neighborhoods without street trees. Three well-placed trees around a home can lower air conditioning bills by up to 30%, and windbreak trees can save up to 25% on winter heating costs.

- **Trees clean the air** – Trees remove pollutants from the air. They store carbon dioxide in their leaves, branches, trunks and roots. They absorb sulfur dioxide and nitrogen oxide, two major components of acid rain and ozone pollution. They intercept particulate matter, such as dust, ash, pollen and smoke, while releasing oxygen into the air through photosynthesis.

- **Trees manage stormwater–** Tree roots hold soil in place while tree canopies reduce the force of falling raindrops – which prevent erosion. Trees also catch and

hold rainfall – both of which can delay runoff and reduce flooding. Root growth and decomposition enable the ground to absorb more water, which also reduces flooding and helps replenish groundwater. Tree roots also help filter polluted surface runoff, preventing contaminants from entering our waterways.

- **Trees provide wildlife habitat** - Trees provide valuable food, shelter, nesting and travel corridors for wildlife.

Public Health, Safety and Social Benefits

- **Trees calm traffic and encourage walking** – Street trees provide both visual interest and obstacles near the road edge, which encourage safe speeds and quieter neighborhoods. Closely spaced trees help motorists gauge and control their speeds. Narrower streets combined with street trees also slow drivers down, while maximizing shading of heat-absorbing asphalt. Trees planted between the curb and sidewalk improves safety by adding a buffer between moving vehicles and pedestrians.

- **Trees reduce crime and increase social ties - T**rees can play an important role in reducing crime rates and domestic violence. In a study of Chicago public housing residents, University of Illinois researchers found that buildings with high levels of greenery had 52% fewer property and violent crimes than apartment buildings with little or no vegetation. Why? Green spaces draw people outdoors, increasing surveillance and discouraging illegal activity. The green and groomed appearance of an apartment building is a signal that owners and residents care about a property, and watch over it and each other. Greener common areas also facilitated stronger social ties. The more trees and grass in the common spaces, the more those spaces were used by residents. Those living closer to green spaces enjoyed more social activities, had more visitors, knew more of their neighbors, and reported committing fewer acts of aggression toward household members than those living near barren spaces.

- **Trees reduce noise pollution** – Trees buffer and absorb urban noise, especially high-frequency sounds that are the most distressing to people.

- **Trees improve visual aesthetics**— Tree and shrub plantings can screen and buffer unpleasant views and separate incompatible land uses. Properly designed landscaping can soften the visual harshness of unattractive buildings, parking lots and high volume traffic corridors. Trees also work to frame, enhance or add scenic qualities to architecture, public spaces, pedestrian corridors and viewscapes.

Municipal Leaders: Here's How You Can Help	Resources
• Adopt **public policies**, regulations and incentives to increase and protect urban forests • Create a formal process for **measuring tree cover** and a data layer in the city's geographic information system devoted to trees – *on public and private land* • **Allocate funding** for tree maintenance and staffing of arborists or foresters • Count trees as **public utility and capital asset** • Adopt **smart growth and sustainable communities principles**	• **Northern Kentucky Urban & Community Forestry Council** www.nkyurbanforestry.org • **U.S. Environmental Protection Agency (EPA)** www.epa.gov/sequestration/faq.html • **U.S.D.A. Natural Resource Conservation Service** www.nrcs.usda.gov • **American Forests** www.amercanforests.org • **U.S.D.A. Forest Service, National Urban and Community Forestry Advisory Council (NUCFAC)** www.fs.fed.us/ucf/nucfac

Forests – Management Challenges

BACKGROUND

The overall challenge of Urban Forestry (the care, management and planning of urban forest) is to increase awareness and understanding about the value and benefits of urban forests, the proper care of urban forests, and the need for urban forests to be considered essential infrastructure when planning and managing communities. Without this awareness and understanding there will be a lack of support for implementation and funding of urban forestry programs.

Management challenges include maintaining tree and planting site inventories, quantifying and maximizing the benefits of trees, minimizing costs, obtaining and maintaining public support and funding, and establishing laws and policies for trees on public and on private land. Those charged with urban forestry best management practices also need to be champions for the discipline rather than considering it a hassle.

Urban forestry also presents arboricultural challenges of limited root and canopy space, poor soil quality, deficiency or excess of water and light, heat, pollution, mechanical and chemical damage to trees, and mitigation of tree-related hazards.

Underlying the above challenges is the challenge of integrating information from many different perspectives and coordinating the roles, responsibilities, policies and projects of city departments, utility agencies, and partners for planning and managing the urban forest.

A Place to Start – Understanding Our Urban Forests

With so many challenges, where do you start? A good start is to have professional mapping and science-based evaluations conducted of the urban forests. Canopy cover studies and tree inventories, along with analysis of the data using software such as the U. S. Forest Service's i-Tree software, is providing information valuable to land use planning and to quantifying the ecological and economic benefits of our urban forest.

NKUCFC commissioned an i-Tree study in five Northern Kentucky cities – Bellevue, Covington, Florence, Fort Thomas, and Newport.   Existing public tree inventories in these communities were used to create the dataset on which the i-Tree ecosystem benefit model was applied to estimate the beneficial environmental functions of the public trees. http://www.nkyurbanforestry.org/SitePages/download_files/i-Tree%20Benefit%20Analysis_Oct07.pdf

 NKUCFC also commissioned countywide forest canopy studies for Boone, Kenton and Campbell Counties that together work as a green data layer for all Northern Kentucky.
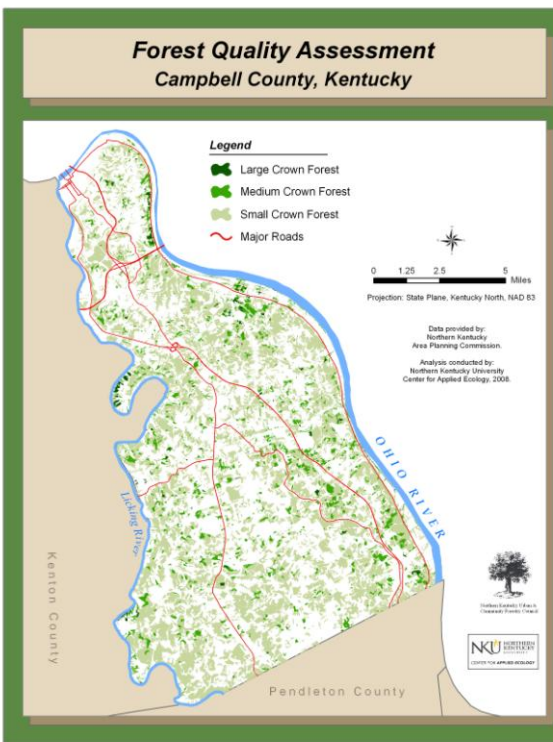
This data layer is showing the quality of the canopy cover and is being used to determine where forest protection or restoration is needed. The studies showed that 30 to 40% of all three counties are forested, but only 2 to 4% of the forests are high quality and capable of delivering the maximum benefits to our communities. The data layer is also being used to see where linkage of greenspace can be made for improved wildlife corridors and hiking & biking trails, in the planning of current and future green/open space, and in the planning of green infrastructure.

http://www.nkyurbanforestry.org/SitePages/download_files/NKUCFC_Forest%20Canopy%20Presentation.pdf

Using computer models with the necessary data, we can now quantify the savings of using tree canopy to address air pollutant removal and stormwater runoff instead of building gray infrastructure to manage it. The value of tree canopy cover cannot be underestimated when working towards ecological, economic and social sustainability in our communities. A study by American Forests, **"The State of Our Urban Forests"**, recommends the following averages for tree canopy cover goals for areas east of the Mississippi:

Metro Area ………………….. 40% (equivalent of approximately 20 large trees per acre)
Suburban Residential …… 50%
Urban Residential ………… 25%
Central Business …………… 15%

Cost/benefit analysis can provide justification for more attention and funding for urban forestry planning, design, management, and maintenance. The science behind this type of analysis is sound and has been published in peer-reviewed journals. The challenge now is to apply the science to enhance the quality of life in our communities by improving the condition and extent of the urban forest.

Additional Challenges

Additional challenges to address that are impacting our urban forests:

- Lack of appropriate tree planting spaces due to increased densities and more impervious surfaces
- Pressure to develop on hillsides and stream corridors where tree clearing will reduce significant benefits to communities, and can jeopardize health and safety
- Invasive non-native plant species are seriously threatening urban forest ecosystems
- Pest, such as Emerald Ash Borer, and disease can have sudden and devastating effects, especially in areas that lack species diversity
- Limited selection of tree species that work well in urban conditions
- Need qualified certified arborist and urban foresters
- Tree topping being accepted and allowed

Here's How You Can Help

Municipal Planners
- Support implementation of a ground-breaking Regional Park Plan and Regional Green Infrastructure Plan with forest canopy inventories, grant programs and greater awareness of the value of urban forest.
- Work with a cross-section of community stakeholders to adopt specific priorities for each area.

Elected Leaders
- Leverage the best management practices and proved sustainability models of Livable Communities Initiatives and Smart Growth that value trees and forestry as important infrastructure
- Support increased funding to better management Kentucky's forests and watershed
- Develop a broad and up-to-date awareness about forestry-related public policy including, smart growth, the value of trees, safety impacts and hillside protection, and "fact-based decision making" for Kentucky's at-risk forests and hillsides

Communities & Citizens
- Seek out opportunities to engage audiences and stakeholders that are not familiar with the importance of urban forestry.
- Carry your message to the local Chamber of Commerce, faith-based groups, trade associations, seniors.
- Partner with NKUCFC in expanding a regional reforestation effort on a grand scale with a focus on:
    - Enhancing our natural systems
    - Our interstate corridors
    - Urban neighborhoods and parks

Resources

**University of KY's School of Agricultural - Department of Forestry Research
- "**Teaching and extension programs will effectively enhance sustainable economic, ecological, and social benefits of forests and related natural resources in Kentucky and beyond. Our programs will elevate the quality of life by: Enhancing the integrity, stability, and health of forests and related biotic communities; and increasing the long-term value added, sustainable income, and sustainable flow of services from forests and natural resources."
http://www.ca.uky.edu/Forestry/mission_vision.php

Kentucky Division of Forestry
http://www.forestry.ky.gov

Boone County Arboretum
 www.bcarboretum.org

Center for Urban Forest Research
http://cufr.ucdavis.edu

Green Infrastructure
http://www.greeninfrastructure.net

Guidelines for Developing and Evaluating Tree Ordinances Site Map
http://www.isa-arbor.com/publications/ordinance.aspx

Kentucky Div. of Forestry - Urban Forestry Assistance Program
http://www.forestry.ky.gov/programs/urban

Local Government Environmental Assistance Network-Urban Forestry
http://www.lgean.org/html/hottopics2.cfm?id=20

The Metropolitan Tree Improvement Alliance
http://www.ces.ncsu.edu/fletcher/programs/nursery/metria/

National Association of Local Government Environmental Professionals
http://www.nalgep.org

National Tree Trust
http://www.nationaltreetrust.org

The National Urban and Community Forestry Advisory Council
http://www.treelink.org/nucfac/

Tree City USA
http://www.arborday.org/programs/treecityusa.cfm

Tree Link
http://www.treelink.org

Urban Forestry South Expo
http://www.urbanforestrysouth.org

USDA National Agroforestry Center - Urban & Community Applications
http://www.unl.edu/nac/communities.html

USDA Forest Service - Urban & Community Forestry
http://www.fs.fed.us/ucf

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