

Working Trees for Communities

***WORKING TREES FOR COMMUNITIES* is the adaption of agroforestry technologies to assist communities of all sizes achieve environmental, social and economic goals, especially at the rural/urban interface.**



Today, communities are challenged with accommodating new growth while maintaining the integrity of existing neighborhoods. Accommodating health, safety, transportation, quality of life, economics, environmental quality and infrastructure development can often lead to land use conflicts. Compromises are often needed to achieve a workable plan.

Today, community residents, businesses, rural landowners and local leaders must look beyond their own backyards. What is

done by one resident or business can affect the community and the watershed. The cumulative effects of many individual actions can have significant impact on the overall landscape.

WORKING TREES FOR COMMUNITIES are proven agroforestry technologies that are being adapted to meet community needs. When properly placed, *Working Trees* provide benefits to the environment and to people living in and around the community.

Trees clean the air and water, provide protection from the

wind, improve the view from our homes and provide a cool place on a hot day. *Working Trees* create green space that provides recreational and educational opportunities. They provide food, shelter and travel corridors for wildlife. Trees along streams cool the water, provide food for stream organisms, add structure to the stream channel and stabilize streambanks. A planned system unites the community and the surrounding landscape by way of *Working Trees*.

Environment



Working Trees help to conserve and protect our natural resources. In communities they help improve soil, water and air quality. They provide habitat for wildlife and recreational opportunities for people.

Nonpoint Source Pollution — As precipitation and irrigation water moves across yards, streets and parking lots it picks up turf chemicals, oils and other pollutants that eventually end up in streams and lakes. Trees, shrubs and grasses planted as bio-swales, wetlands and riparian forest buffers can filter out contaminants as they slow and capture stormwater runoff.

Streambank Stability — While sod and other ground cover hold topsoil in place, tree roots penetrate deep and spread out, anchoring large blocks of soil. Densely planted trees and shrubs can do additional duty by keeping bikes, foot traffic and motor vehicles off slopes and fragile soils that are prone to wind and water erosion.

Phytoremediation — Industrial sites can create solvent, heavy metal and petroleum residues that can leach into groundwater and wash into rivers and streams. Phytoremediation is the process in which trees, along with shrubs, grasses and soil organisms absorb and break down some of these contaminants.

Biodiversity — Green spaces should be designed with a variety of plant species to guard against major losses from insects and disease and help diversify the urban landscape. These areas can also be havens for native and rare plants and animals.

Wildlife Habitat — *Working Trees* provide food, shelter, nesting and travel corridors for wildlife.

Visual Screens — Tree plantings can screen and buffer residents from unattractive sights. Tree and shrub plantings soften the visual harshness of walls and fences that often line the urban landscape.

Noise — Combining trees and shrubs with landforms, such as earthen berms, can reduce vehicle road noise by as much as half.

Carbon Storage — When coal, gas and oil are burned, they release carbon dioxide, a “greenhouse gas,” into the atmosphere. A major consideration for rebalancing the global carbon cycle is to plant permanent vegetation to help extract carbon dioxide from the air and store it as wood fiber.

Health & Safety



Working Trees are a tool for building safe places to live, work and play. Communities are challenged to provide for the health and safety of their residents. Runoff from streets, parking lots and pesticide- and fertilizer-laden lawns can create serious water quality problems. Trees and other vegetation along streams and strategically planted in and around parking lots and drainage channels can be used to filter these contaminated runoff waters. *Working Trees* also help make roads safer by trapping blowing dirt and snow that can reduce visibility and make roads unsafe.

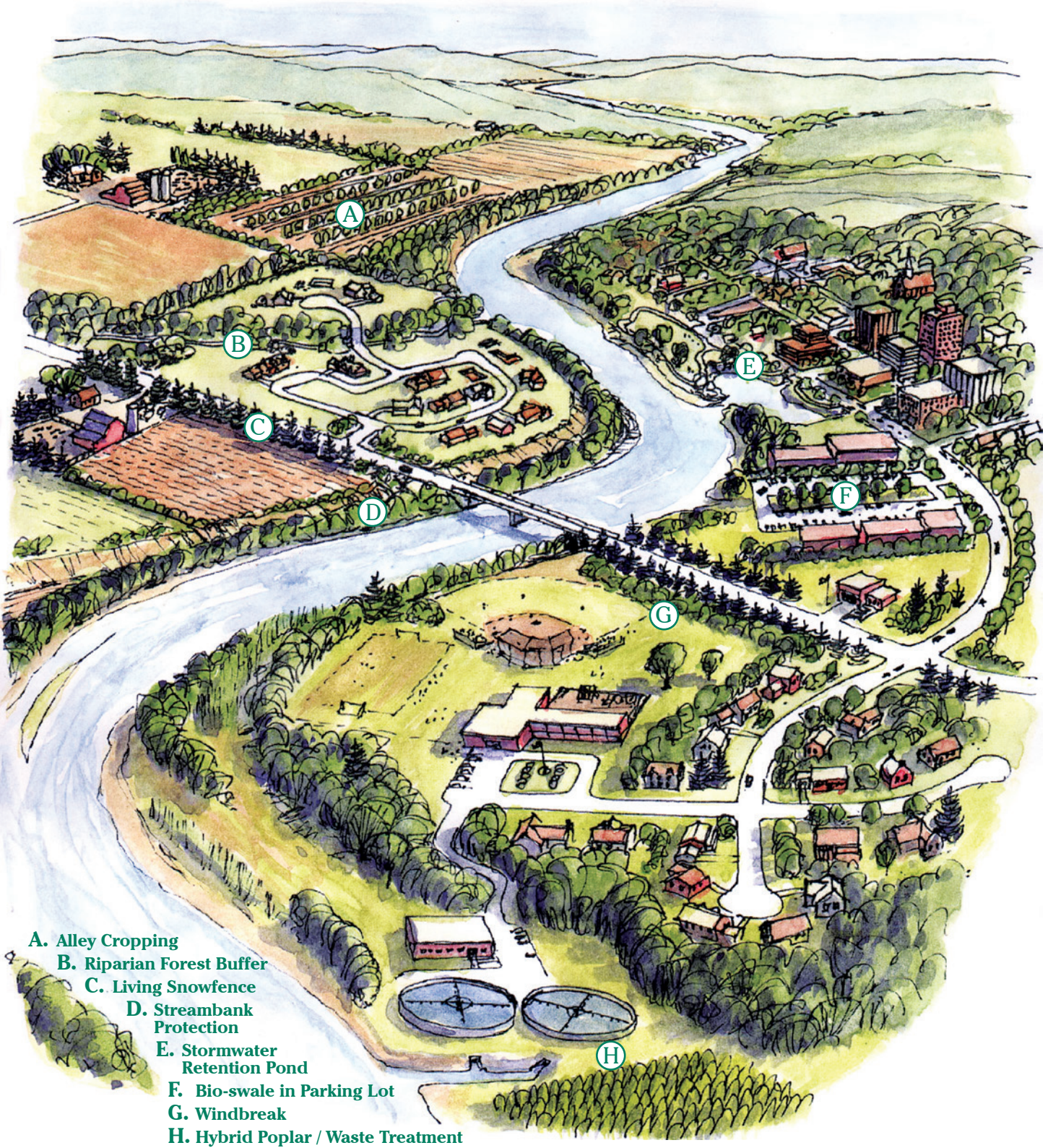
Air Quality — Leaves and needles on trees attract and absorb small particles and gasses. Cooler temperatures created by tree canopies have been shown to reduce smog levels. Also, ongoing research indicates that trees and shrubs may be an effective tool in helping to manage industrial and livestock odors.

Stormwater Management — Conventional stormwater pipes just move the problem downstream. An effective alternative is to preserve and/or re-establish natural vegetation throughout the watershed. In one study, a 32-foot tall tree intercepting rainfall reduced stormwater runoff by 327 gallons.

Waste Treatment — Management of municipal, solid and liquid waste is an increasing challenge as stricter regulations for water quality are imposed. Tree plantations irrigated with wastewater produce wood products while using nutrients in the effluent that would otherwise pollute streams.

Sanitary Landfills — *Working Trees* can trap blowing debris and keep it where it belongs — at the landfill. These same trees and shrubs act as a visual screen, helping to create an aesthetically pleasing living environment.

Snow Management — Trees and shrubs properly located on the windward side of roadways can reduce wind speed and deposit snow drifts where they do not interfere with traffic and emergency vehicle movement. These *living snowfences* reduce the amount of snow that must be removed from streets and parking lots, thereby saving money on snow removal.



- A. Alley Cropping
- B. Riparian Forest Buffer
- C. Living Snowfence
- D. Streambank Protection
- E. Stormwater Retention Pond
- F. Bio-swale in Parking Lot
- G. Windbreak
- H. Hybrid Poplar / Waste Treatment

Incorporating *Working Trees* into existing neighborhoods, new developments and the watershed can lead to more livable communities that retain the integrity and benefits of natural resources and are ultimately more sustainable.

Infrastructure

Blending Gray and Green Infrastructure



When you think of community infrastructure do you imagine roads, sidewalks, water lines, sewage disposal systems, electric power and telephone lines? This collection refers to *gray infrastructure*. Just as we depend on, and need to maintain, the gray infrastructure of our communities for daily function, so too, our communities need *green infrastructure*. Green infrastructure is the network of open space, woodlands, wildlife habitat, parks and natural features of the landscape that support healthy, functioning communities.

The concept of green infrastructure represents a dramatic shift in the way we think about our surroundings. In the past our idea of greenspace has been simply a public park, which was most often viewed as a community amenity, rather than a necessity. Today, a growing number of communities are recognizing that green space is a basic necessity to quality of life and a functional landscape. However, this necessary green infrastructure needs to be planned for and developed as an interconnected network of tree-lined streets, parks, natural areas along streams and waterways, golf courses, conservation areas and agricultural lands throughout the watershed and across the landscape.

By recognizing and embracing the essential need for green infrastructure, we can create sustainable communities. Sustainable communities are good for the quality of life for the people who live and work in and around these communities, good for the land and environment and good for economies.

Working Trees can help solve some of the growing pains associated with the infrastructure of a community.

Existing Development — As communities grow, existing gray infrastructure ages and requires repair or replacement. This affords opportunities to consider green infrastructure alternatives. For example, when existing pipes can no longer handle high volumes of runoff, city planners often tear up the street and install a larger pipe. Instead, the existing pipe can often be left in place if a vegetated surface drain system is installed to handle the excess flow. Or, in some cases, communities are finding it cost-effective to remove pipes altogether and restore former streams to their natural state with native vegetation for bank stabilization. Native trees, shrubs, grasses and wildflowers, rather than concrete, can allow stormwater to be retained on-site and infiltrated into the soil. These methods provide greater flexibility for managing stormwater and often increase property values adjacent to urban river walks and open space.

New Development — Planning now for future needs allows creative solutions that allow *Working Trees* to be incorporated into new developments. For example, stream channels in existing neighborhoods are often lined with concrete and storm drains are constructed that route runoff into these concrete channels. Instead stream channels could be kept natural and water collected from storm drains could be routed to vegetated retention areas where it can be detained and filtered as it soaks into the soil.



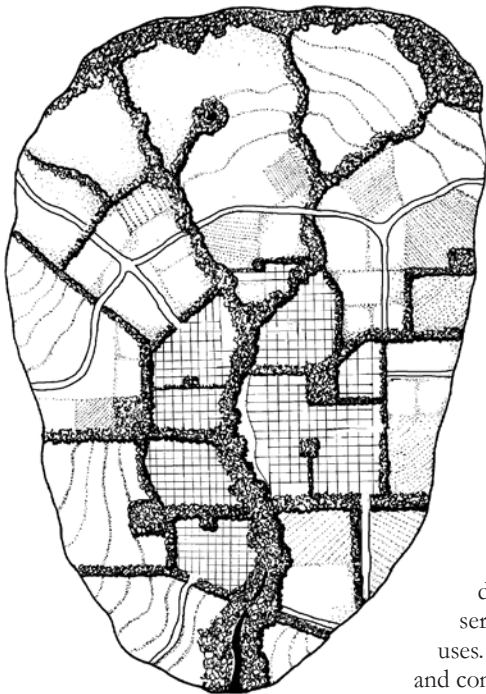
Social & Economic



Green space ranks among the top five things people look for when moving. But green space does much more than make a community look nice. When it consists of *Working Trees*, green space reduces noise, wind and blowing dirt. Green space also creates a common place for people to build relationships and a sense of community and neighborhood pride. Research in the Midwest found that people living in inner-city apartments in greener surroundings experience roughly half as many crimes.

Trees also make dollars and cents. One survey found that most people preferred patronizing commercial establishments whose structures and parking lots are beautified with trees and other landscaping. A survey of real estate appraisers reinforced that landscaping added to the dollar value of commercial real estate. According to one study, landscape amenities have the highest correlation with occupancy rates, higher even than direct access to arterial routes.

Landscape-Scale Approach



A Conceptual Watershed Plan demonstrates how *Working Trees* can be used to connect the rural and urban community.

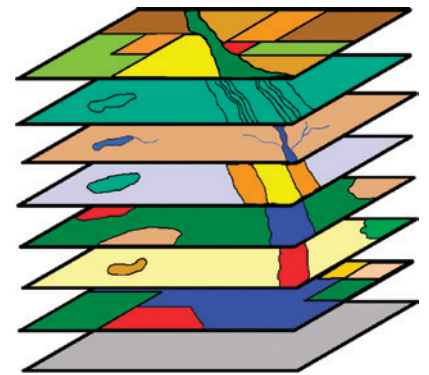
Typically, a community occupies only a portion of a large watershed.

Community residents affect their watershed and are, in turn, affected by their watershed through the activities of others. Watersheds are often shared with the surrounding agricultural community. Everyone must work together to sustain the overall quality of the entire landscape and quality of life.

The rural/urban interface around communities can become a zone of conflict between residents with different goals, expectations and life styles. Urban residents may object to agriculture's influence on the adjacent environment while farm or ranch neighbors can be resentful of urban intrusion into their day-to-day activities. Tree-based buffers serve as a zone of transition between land uses. This can help to "reconnect" agriculture and communities, creating a more sustainable landscape.

Working Trees play an important role within a community. When planning *Working Trees* in communities, consideration must be given to sources of runoff, hydrologic flow paths and uptake of water and nutrients by trees, shrubs and grasses. Buffers can be designed to both reduce stormwater volume and improve water quality for the overall watershed.

Planning now for future needs allows for creative solutions that can provide many benefits in the future.



Geographic Information Systems (GIS) Technology Can Aid Project Design

To maximize the benefits that *Working Trees* provide to communities and the landscape, planners can utilize GIS, a collection of computer hardware and software designed to efficiently store, update, analyze and display all forms of geographically referenced information. Information such as land-use, topography and soils data can be readily combined in GIS to reveal the best locations for trees to solve multiple issues like improving water quality and wildlife habitat. GIS can help ensure that public resources are spent efficiently and wisely while creating a network of *Working Trees* that achieve community goals.

Planning & Managing

When considering how or where to incorporate *Working Trees* into your community, keep the following ideas in mind.

Partnerships — A broad-based partnership provides necessary public support, funding, knowledge and skills to meet the diverse needs of any community. In order to put the right trees in the right place to achieve multiple benefits, partners need to rely on each other's expertise in social, environmental and economic issues. Partnerships should include local natural resource professionals, local government, social groups, neighborhood improvement associations, conservation organizations, tree boards and special-use districts.

Policy — City/County planners and engineers and state environmental quality specialists are invaluable in understanding regulations that may help or hinder the use of green infrastructure approaches. Sometimes it is necessary to develop policy instruments, like ordinances, or incorporate green infrastructure into community comprehensive plans to encourage a different approach to putting *Working Trees* into service.

Practice — “Practice makes perfect” is not just an old saying, it's the way we build skill, capacity, understanding and support for new ideas. Work with partners to compile a list of new development sites and existing sites where *Working Trees* can be incorporated. Then start small; install a bio-swale into an existing parking lot. Larger projects might include establishing a hybrid poplar plantation for use in treating wastewater.

Public Education — Engage the public. Educational signs along trails that are located near riparian buffers and constructed wetlands can explain how your community is taking responsibility for water quality and wildlife habitat. The same signs can give credit to all partners involved in making *Working Trees* a reality in your community. Work with local newspapers, radio and television to promote the good work of your partnership and the benefits to your community. Public education can lead to public support once people understand how they benefit.

Perspective — People, water and wildlife move in and out of every community. Consequently, how we maintain and develop our communities impacts all the resources and people around us, and in turn, our communities are impacted by the surrounding landscape. Always consider how the establishment of *Working Trees* will affect not only the specific planting site but also the surrounding area. Build a network of green infrastructure that ties your community to the larger landscape.

Where To Get More Information

For local assistance, contact your nearest USDA-NRCS office, County Extension Office, Soil and Water Conservation District, State Forestry Agency or local natural resource consultant.

For more information at the national level, contact the USDA National Agroforestry Center (NAC), 1945 N. 38th St., Lincoln, NE 68583-0822. Telephone 402-437-5178; fax 402-437-5712.

For free copies of this brochure, visit <http://nac.unl.edu/publications/order>

This brochure was developed by the USDA National Agroforestry Center (NAC) in cooperation with USDA Forest Service Cooperative Forestry, Illinois Department of Natural Resources, Kansas Water Pollution Control Division of Topeka, Kansas, and the Conservation Fund

Contact: USDA National Agroforestry Center, 402-437-5178 ext. 4011, fax 402-437-5712, 1945 N. 38th St., Lincoln, Nebraska 68583-0822. <http://nac.unl.edu>

The USDA National Agroforestry Center (NAC) is a partnership of the Forest Service (Research & Development and State & Private Forestry) and the Natural Resources Conservation Service. NAC's staff is located at the University of Nebraska, Lincoln, NE. NAC's purpose is to accelerate the development and application of agroforestry technologies to attain more economically, environmentally, and socially sustainable land use systems by working with a national network of partners and cooperators to conduct research develop technologies and tools, establish demonstrations, and provide useful information to natural resource professionals.

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program.intake@usda.gov. *USDA is an equal opportunity provider, employer, and lender.*

First Edition 1995, Second Printing 1996; Second Edition 2002; Third Edition 2008; Fourth Edition 2012; Third Printing 2016



A partnership between:
United States Forest Service
Natural Resources Conservation Service