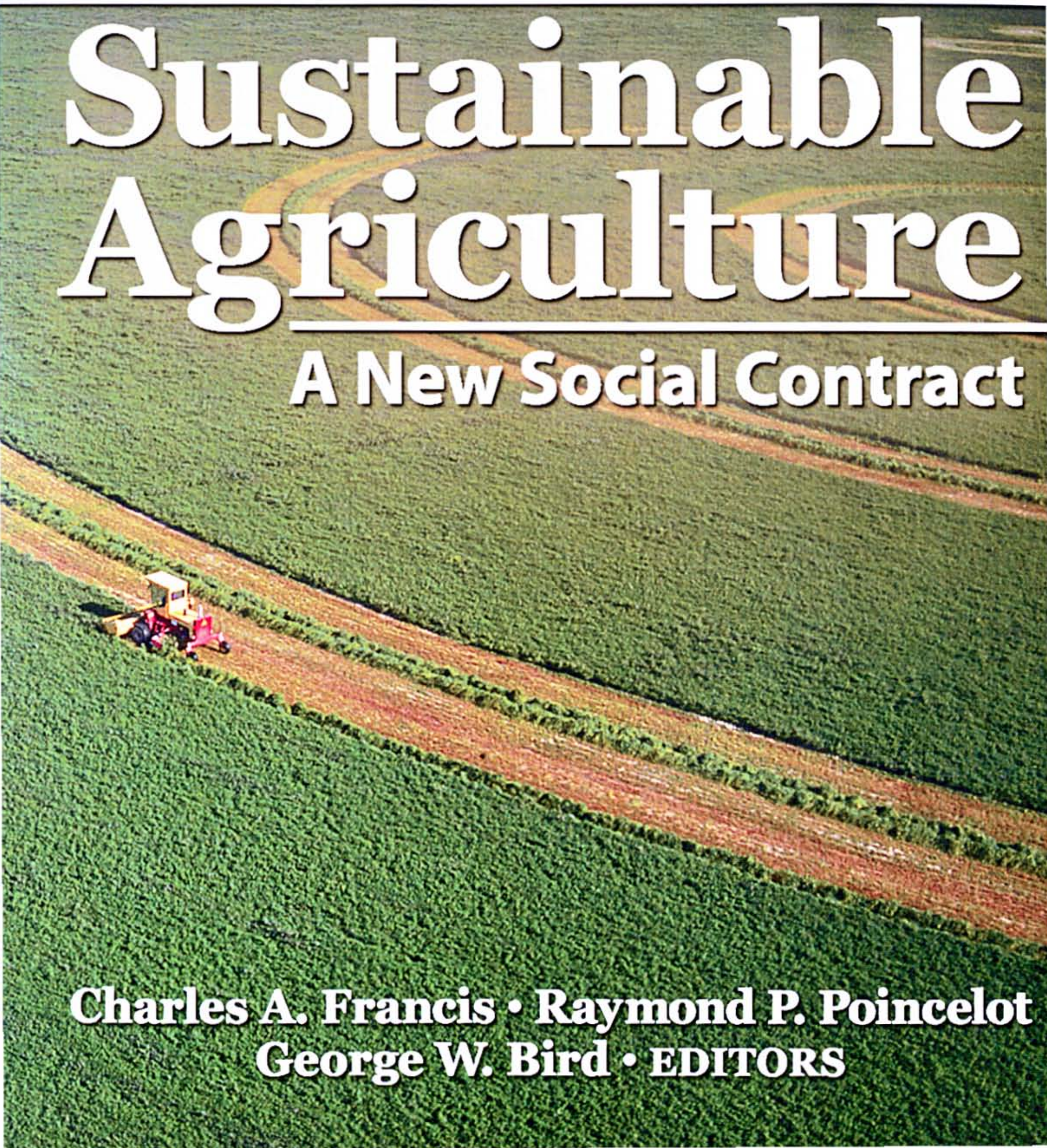
# DEVELOPING and EXTENDING Sustainable Agriculture

## A New Social Contract



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Chapter 11

# Creating Viable Living Linkages Between Farms and Communities

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## *UNIQUE RURAL/URBAN INTERFACES*

> We may have become an urban nation, but we remain an agricultural land.
> America's Private Lands: The Geography of Hope, 1996

One of the goals of sustainable agriculture is helping farmers with small- and medium-sized family operations to become more efficient in production and marketing so that they can continue to work on the land, produce crops and livestock, and make viable contributions to the food supply as well as to their local communities. Within this goal is the recognition of the role farmers also play in determining overall landscape health and producing the many nonmarket environmental goods society demands from these working lands. "Through their care and stewardship of the land, farmers and ranchers produce safe drinking water, clear-flowing streams, lakes full of fish, skies full of ducks and geese, and scenic landscapes" (NRCS, 1996). However, the connection or linkage between farm and community well-being is becoming more tenuous as fewer people in the total population have roots in the land and understand where and how these goods are pro-



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duced. This physical and sociopolitical disconnection between communities and agriculture is most keenly evident at the rural/urban interface, where conflict emerges when people from the city move onto acreages or to the edge of communities where their closest neighbor may be a working farm with crops and livestock.

For several years, we have been studying the problems that arise at the rural/urban interface and have summarized these challenges in a book chapter (Schoeneberger et al., 2001) and in presentations at national conferences (e.g., Bentrup et al., 2001; Francis et al., 2003). As part of the solution, we propose the use of *ecobelts*—linear arrangements of perennial vegetation that when properly planned can ecologically and socially reconnect these fragmented landscapes. Ecobelts can be integrated into working landscapes to create or enhance the multi-functionality of these lands, thereby creating a mutually beneficial situation for both the rural and urban sectors. In this chapter we summarize the problems that can occur at the interface between rural and urban activities and the potentials of ecobelts to reconnect the people with farms and with nature to enhance sustainability of our working lands. We conclude by focusing on the key to implementing successful ecobelts: *creating people linkages to create working landscape linkages.* Several brief case studies illustrate how people have worked together to create viable working landscape linkages, transforming a zone of conflict into one of cooperation and learning.

## PROBLEMS FACING OUR WORKING LANDS

The conflict between rural neighbors who are farming and those who are essentially urban people living on acreages arises from a series of very different expectations and activities. Some of the differences in perspectives between these two groups are listed in Table 11.1 (from Francis et al., 2003). Problems that can be harmful or unpleasant to urban homeowners or people on acreages are the physical damages to the immediate environment that result from farming: herbicide or insecticide drift, odors or insects from livestock, or dust from large feedlots or fields being cultivated or harvested. Others are more of an inconvenience, such as noise from equipment at odd hours or slow-moving equipment on roadways that inhibit people commuting to work. Most of these problems are seen by farmers and their families as part of the rural scene, some of the costs of doing business on the farm, and just things that go along with being a farm family. It may be difficult to understand why others do not accept them, and in fact the farm was often there first and others moved into the area. "Surely these urban people knew they were moving into farming country, or next to farms, when they pur-

TABLE 11.1. Sources of conflict and different perspectives of urban and rural residents.

| **Source of conflict** | **Urban perspective** | **Rural perspective** |
|---|---|---|
| *Agriculture-Induced* | | |
| Livestock odors | Unnatural and disgusting | Natural part of the farm environment |
| Herbicide drift | Serious danger for lawn and yard plants | Hard to eliminate or control |
| Insecticide drift | Serious danger for pets and children outside | Hard to eliminate or control |
| Dust from fields | Causes health problems and hazards for motorists | Common result of tillage activities |
| Insects from livestock | General nuisance | Accepted part of farm environment |
| Noise from equipment | Disturbs outdoor activities | Normal part of farming operation |
| Pollutants from agricultural runoff | Water quality problems pose health risks and are expensive to correct | Attempt to minimize but hard to control |
| Slow-moving equipment | Road hazard, slows traffic | Essential to reach fields |
| *Urban-Induced* | | |
| High-speed traffic | Need to commute to work | Dangerous to farm operations |
| Dogs in fields | Normal for dogs to explore | Harmful to livestock |
| Garbage in/near fields | Over-the-fence, out-of-mind | Interferes with farm operations |
| Increased runoff volumes | Increase in impervious cover part of urbanization | Creates excessive erosion and loss of farmland along streams |
| Equipment security | Kids need to explore and learn | Danger of damage to expensive equipment and facilities |
| People crossing fields | Desirable open space for hikes, skiing and snowmobiles | Invasion of private property, danger to crops and livestock |
| Gates left open | Kids will be kids and need to learn responsibility | Danger of losing livestock on roads, liability issues |
| Complaints to authorities | Normal approach to solving problems | Interrupts farm operations |

*Source:* Adapted from Stokes et al., 1997, and Schoeneberger et al., 2001.

chased lots or acreages—they should have no complaints. We have been here for several generations," a farmer was heard to say.

From the farmer's perspective there are some real problems with urban neighbors. Dogs or people crossing fields can cause harm to crops, or open gates can result in livestock running loose or even getting lost. Trash thrown over the fence onto what is *just farm land anyway* can be a nuisance when it plugs up a planter or cultivator, and when blowing plastic gets into crop fields, combines, or feedlots. Curious neighborhood children can often compromise the security of equipment or buildings, which can be difficult to control on farms and ranches. Even moving equipment from one field to another using county roads or crossing the blacktop can be a problem for traffic safety—many roads are barely wide enough to accommodate two lanes of traffic, much less a wide planter or combine header. These are challenges faced by farmers who have an increasing number of urban neighbors, and they become real constraints to those farming as conflict arises, and resources need to be invested in solving the problems. Unfortunately, litigation is often seen as the only way to deal with conflict arising from these challenges. Litigation is rampant in the United States, as we become increasingly unwilling to settle our differences in personal and reasonable ways, and the resulting lawsuits and increased insurance premiums create a lose-lose situation for all parties (Schoeneberger et al., 2001; Stokes et al., 1997). We believe that ecobelts planted between these two contrasting types of activities can help bridge the physical and conceptual gap between people with different perspectives and expectations, minimizing conflict while providing tangible and mutual benefits.

## *ECOBELTS: CONNECTING THE WORKING LANDS*

Vegetation-based buffers or corridors are one approach to reconnecting working landscapes. This basic concept has been used for many centuries from the ancient hedgerows in Europe to the shelterbelts in the Great Plains during the 1900s. More recent examples include the development of linear parkways or greenways in urban communities (Smith and Hellmund, 1993). Our concept builds on this foundation of vegetation-based buffers and greenways to create a more holistic system of green infrastructure that transforms the zone of conflict into one of shared ownership and use. We define this as the concept of *ecobelts* (Schoeneberger et al., 2001). As Figure 11.1 suggests, carefully planned and designed ecobelts can address a wide range of issues from education to visual quality, while creating a sense of place and community. Due to the diversity of potential issues ecobelts can address, they can

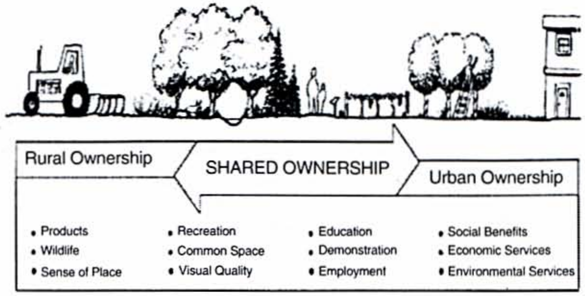


FIGURE 11.1. The rural-urban interface: A zone of shared ownership. *Source:* modified from Schoeneberger et al., 2001.

take many forms, such as community shelterbelts, living snow fences, riparian buffers, and revitalized railroad trails, to name a few examples (Bentrup et al., 2001). Exhibits 11.1 and 11.2 provide specific applications.

By adding structural and functional diversity to the landscape, these tree-based plantings can perform ecological functions that have environmental and socioeconomic significance far greater than the relatively small amount of land they occupy. Table 11.2 provides examples of specific benefits. However, realizing this potential is a complex task of determining what opportunities, limitations, and trade-offs exist in each situation, and of designing an ecobelt system that achieves the best balance among them. A planning and design strategy that is flexible but comprehensive should be used for ecobelts, such as the process described by Schoeneberger et al. (2001).

## *ECOBELT PRINCIPLES*

Ultimately, for ecobelts to be successful they must be culturally sustainable. That is, the ecobelts must elicit sustained human attention over time or else the benefits may be compromised as land ownership changes, as development pressure increases, or as different political viewpoints arise (Nassauer et al., 2001). Only with long-term agreements will ecobelts make a substantial and lasting contribution to the management of real landscapes. To promote successful reconnection of working landscapes, several key principles should be considered when designing and implementing ecobelts (Bentrup et al., 2001).

### EXHIBIT 11.1. *Working Trees*—Creating Win-Win Practices

Animal operations may have the "smell of money," but to many people, especially at the rural/urban interface, this "smell" can be a major source of conflict. Not only is it the odor, but also dust, noise, and unpleasant views created by animal operations that add to the tension between these rural/urban neighbors. *Working tree* plantings can buffer these problems, creating not only an opportunity for animal producers to demonstrate their commitment to being a good neighbor and an environmental steward but also an opportunity to increase their production efficiency. By modifying the microclimate around the operations, these plantings create better living conditions for the animals while reducing heating and cooling costs for the producers.

This win-win situation created by planting trees around animal operations was recently highlighted in Delaware's *News Journal.* In response to a complaint about the odor coming from a nearby poultry farm, Bud Malone, a University of Delaware poultry extension specialist, promoted the idea of planting trees around the chicken house. This was done not only to address the odor but also to limit the dust and feathers. By serving as wind screens, these same plantings can also help in limiting the spread of airborne animal diseases within and between farms. Like many other places across the United States, Delaware is experiencing rapid acreage or ranchette development out into farm lands, and farmers are having to become "more sensitive to complaints from urbanites who appreciate country living, but not necessarily the smell, noise or sights associated with it."

*Modified from:* Tadesse, L., "Chickens Grow with Trees." *The News Journal,* July 8, 2003.

### *Shared Ownership*

A primary tenet of ecobelts is shared ownership of the ecobelt between urban and rural residents. Shared ownership is often a necessary component to build a sense of community and responsibility for planning, implementing and maintaining an ecobelt system. If the rural or urban residents do not have a stake in the ecobelt system, the potential to replace the zone of tension with a neighborhood of cooperation is greatly diminished. Shared ownership can take many forms and does not necessarily have to imply traditional deed ownership. A sense of shared ownership can be created simply through the planning and design process that carefully incorporates rural and urban concerns. Part of the ecobelt planning pro-

## EXHIBIT 11.2. Community Shelterbelts—Western Minnesota

Community shelterbelts are plantings of single or multiple rows of trees or shrubs in a farm field, but adjacent to a community. Community shelterbelts are commonly established to minimize the negative impacts from excessive wind, and reduce blowing snow, dust, agricultural pesticides and debris to the local community. They also provide recreational opportunities, create wildlife habitat, and produce useful products for small towns and neighborhoods, reduce home heating costs for residents, enhance the aesthetic diversity of otherwise somewhat monotonous expanses, while at the same time reduce conflicts between agricultural producers and residents of the community.

Since 1990, at least ten rural communities have established community shelterbelts on the agriculturally dominated plains of western Minnesota, usually on the north and west sides of town (the most common prevailing wind direction in this area). A diversity of coniferous and deciduous trees and shrubs are used to enhance aesthetics, and provide fruit, nuts and other products that are valuable to both wildlife and people. The plantings have generally met expectations, particularly for protection against wind and blowing snow. Because these are community-based and community-driven initiatives, they have built community cohesion, cooperation, and pride. Many of these communities have in the past been literally buried by drifting snow creating dangerous conditions for residents, and creating huge snow removal costs for counties and communities. The older plantings have effectively reduced snow deposition within the communities, significantly reducing the burden of snow removal costs. Indeed, a recent study on the benefits of living snow fences in Minnesota shows a benefit/cost ratio of 17/1 to 29/1 for plantings established on private lands. This analysis only considered the reduced costs of snow removal and not the reduced commerce, accidents and casualties due to blowing and drifting snow, nor environmental benefits these plantings also provide.

*Source:* Josiah S.J., L.J. Gordon, E. Streed, and J. Joannides.1999. *Agroforestry in Minnesota: A Guide to Resources and Demonstration Sites.* University of Minnesota Extension Service, St. Paul, Minnesota. www.extension.umn.edu/environment.

cess will be educational, where stakeholders learn to consider the issues from each other's point of view. This face-to-face dialogue allows a common definition of the issues to be created and addressed, instilling ownership in the ecobelt proposal.

TABLE 11.2. Examples of specific benefits of ecobelts at the rural/urban interface.

| Function | Benefit/effect | Reference |
|---|---|---|
| Provide corridors for wildlife movement. | Bears in Louisiana used wooded corridors to move between habitat patches in an area heavily modified by agriculture. | Anderson, 1997 |
| Filter pollutants from agricultural runoff. | In a modeling study of a 19,132 acre watershed in Missouri, riparian buffers had the potential to reduce atrazine from 44.44 ppb to 24 ppb for a one-time economic savings of $654,779. | Qui and Prato, 1998 |
| Improve aesthetics of the landscape. | Studies have shown that shelterbelts add positively to the scenic beauty of the Great Plains landscape. | Cook and Cable, 1995 |
| Provide short-term flood storage. | Riparian buffers along the St. Charles river in MA were calculated to provide a value of $79,655/acre for short-term flood protection. | Thibodeau and Ostro, 1981 |
| Improve stormwater management. | Existing vegetation in Salt Lake City, UT reduced stormwater runoff by 17 percent (43.2 million liters) during a 6-hour storm event. | USDA, 1985 |
| Improve air quality. | Assuming 1990 air pollutant concentrations, model simulations for Sacramento's urban forest estimated that approximately 1,457 metric tons of air pollutants are absorbed annually, at an implied value of $28.7 million. | Scott et al., 1998 |
| Provide recreational opportunities. | A study of the 26-mile Heritage Trail near Dubuque, Iowa found a total economic impact of estimated $1.3 million. | Moore et al., 1994 |
| Provide opportunities for environmental education. | Researchers in Massachusetts determined a value of $3,980/acre for nature study along riparian buffers of the St. Charles river in MA. | Thibodeau and Ostro, 1981 |
| Manage drifting snow. | For every $1 spent on living snow fences, $17 dollars are saved annually on snow removal costs, greatly improving road safety. | MNDOT, 2003 |

| Function | Benefit/effect | Reference |
|---|---|---|
| Increase property values. | A study of greenbelts in Boulder, CO, determined that property values adjacent to the buffer had an average property value 32 percent higher than property located 3,200 feet away. | Correll et al., 1978 |
| Provide employment. | The community-owned forest in Weston, MA, employs students to harvest organic produce and sap for maple syrup production. | Donahue, 2000 |
| Reduce wind erosion. | Velocity reductions for average tree shelterbelts range from 60 to 80 percent near and to 10 times the height of the shelterbelt on the leeward side. | Tibke, 1988 |
| Promote bio-control of insect pests. | Studies have shown that trees increase the abundance of natural enemies of insect pests. | Dix et al., 1995 |
| Increase crop production from microclimate modification. | Windbreaks can provide net yield increases in crops (i.e.,15 to 25 percent for winter wheat and 6 to 28 percent for soybeans). | Kort, 1988 |
| Filter dust and other particulates. | Trees have reduced dust particulates and odors from poultry houses by 50 percent. | Tadesse, 2003 |
| Source of decorative, medicinal and edible products. | Over 103 products from 73 plant species are collected by a wide variety of ethnic and socio-economic groups in Baltimore, MD, parks and greenways. | Community Resources, 2000 |
| Source of products for commercial markets. | Woody florals grown in ecobelts can yield annual net returns ranging from $400-$3500 per 1,000 linear feet for one row of plants. | Josiah and Skelton, 2003 |
| Provide energy savings. | Buffer plantings have been shown to reduce annual heating of nearby residences by 7 to 15 percent and summer shade can reduce cooling needs by 50 percent or more. | McPherson, 1988 |
| Reduce noise levels. | A 5-m buffer of evergreens resulted in a 7.5 decibel decrease at 10m behind the screen. | Cook, 1978 |

### *Problems As Opportunities*

The urban-rural interface zone and associated issues are often viewed as problems rather than as opportunities to create amenities for the community. For instance, dust originating from agricultural fields is considered a negative issue for nearby homeowners trying to keep their houses clean. However, it can be seen as an opportunity to mobilize residents into creating an ecobelt that can filter dust while also providing other environmental, social, and economic services. By reformulating the problem into a positive framework, residents can use the issue to bring resources together to benefit the larger community.

### *Agroforestry Products*

Ecobelts can often incorporate agroforestry, which is the combination of agriculture and forestry technologies to create integrated, diverse, and productive land use systems (Garrett et al., 2000). Through careful management, products can be sustainably harvested from agroforestry systems. Such products include edible foods like berries and nuts, medicinal products such as ginseng and goldenseal, and horticultural materials such as evergreens for floral wreaths or colorful woody stems for the floral industry. An example of an agroforestry system is a riparian buffer planting that can attenuate flooding effects and protect water quality, while providing wildlife habitat and harvestable products, such as edible berries, medicinal herbs, and decorative willows. The integration of ecobelts and agroforestry systems can be a perfect combination to reconnect agriculture and urban communities. In addition to providing inexpensive and tangible goods for residents, the process of managing an agroforestry system can foster a sense of community (Corbett and Corbett, 2000). For instance, annual harvest parties can bring urban and rural residents together for a common purpose.

### *Landscape Linkages*

Ecobelts should not be created as isolated elements in the landscape but should instead be designed as part of the green infrastructure: a network of connected corridors, working lands,and natural preserves that function as a system. Based on concepts from landscape ecology, connected ecobelts will offer more benefits than fragmented ones. Environmental services such as wildlife movement, reduced flooding, and improved water quality all benefit from connectivity (Forman, 1995). Pedestrians, joggers, and cyclists also benefit from ecobelt connectivity when the corridors are designed with pathways, especially when there are minimal road crossings.

A system of ecobelts offers the flexibility to meet the desired objectives of rural and urban residents. To accommodate various objectives, ecobelts will vary in width and size, much like a road system designed to carry different traffic flows. For instance, an ecobelt in one location may be a narrow corridor primarily designed to address noise and dust issues while producing community Christmas trees. In another location, a wide corridor may be required to provide opportunities for wildlife movement and recreational benefits.

### *Economic, Social, and Ecological Integration*

Many successful community-based projects blend together economic, ecological, and social issues into a well-balanced system that addresses residents' goals for their area. Projects that emphasize one set of issues at the expense of other issues will rarely have the community support necessary to implement the plan. Community support is especially critical for ecobelts, which must satisfy a wide range of rural and urban objectives. Traditional greenway projects have succeeded in integrating ecological and social issues such as water quality, wildlife habitat, environmental education, and recreation (Smith and Hellmund, 1993). Economics is sometimes overlooked in this equation and yet may be a particularly powerful issue to reconnect urban communities and agriculture. Ecobelt economics can include employment opportunities for youth in maintenance of the ecobelts, increased property values, agroforestry products, and environmental services such as reduced costs for snow removal and water quality improvement, minimizing the need for expensive treatment. By exploring the range of economic, ecological, and social issues, the glue required to hold together divergent rural and urban interests may be discovered.

## *CREATING PEOPLE LINKAGES TO CREATE WORKING LANDSCAPE LINKAGES*

> Only in the success of our abilities to work together coupled with our skills in assessing the land, will we realize our public as well as individual conservation objectives.
>
> America's Private Lands—The Geography of Hope, 1996

The discussion of ecobelt principles reveals that the success of ecobelts depends on bringing together a multitude and diversity of interests in order to reconcile society's needs with private land rights. Options can then be developed that not only reconnect the lands ecologically but also provide benefits that reconnect the neighbors. In essence, the planning and implementation of ecobelts are as much about creating functional relationships between urban and rural residents as creating physical features in the landscape.

Partnerships among landowners and local, state, and federal agencies are critical in the delivery of successful conservation strategies including ecobelts. Innovative partnering entities, such as the Resource Conservation and Development Councils (RC&Ds) and Regional Councils of Government can serve as a bridge between federal, state, and local resource management agencies and local land managers, and provide the facilitation and leveraging of resources needed in ecobelt implementation. The payoff from these partnerships is not just getting projects implemented on the ground, it is also the synergy created—the teamwork, relationships, and buy-in established among the partners. To illustrate these types of partnerships, several brief case studies are discussed, highlighting the linkages among different stakeholder groups.

### *USDA National Agroforestry Center*

Because of its breadth of issues and projects, agroforestry is a natural activity for involving many people. Agroforestry, the basis of ecobelts, crosses many boundaries: scientific disciplines, such as agriculture and forestry, landowners and land users both rural and urban, and the agencies that develop and deliver the agroforestry technology. It must necessarily involve a large suite of participants if it is to be successfully deployed on our working landscapes to meet both landowner and societal objectives.

With its origins in the 1990 Farm Bill, the USDA National Agroforestry Center (NAC) was created in 1992 with a mission to accelerate the development and application of agroforestry technologies. The Center's model is to serve as a catalyst and facilitator in this effort, relying on partnerships rather than solely on internal infrastructure to deliver its programs. NAC began as a partnership between the research arm of the USDA Forest Service (Rocky Mountain Research Station) and the delivery arm—State and Private Forestry. In 1995, NAC expanded into a formal partnership with the USDA Natural Resources Conservation Service.

The tight coupling between research and development and with technology transfer, the leveraging of resources, and the reduction in duplication of efforts to produce agroforestry technical support by both agencies have resulted in accelerating the development and delivery of improved technologies. However, to accomplish its mission more fully, NAC further relies on a national network of partners and cooperators to conduct research, develop technologies and tools, establish demonstrations, and provide technical training. It is only with the multiplier effect obtained through these partnerships that NAC, with its small staff, has been able to develop and deliver its program nationally (see Exhibit 11.3).

## EXHIBIT 11.3. Partnering to Train Today's and Tomorrow's *Working Tree* Professionals

Agroforestry, or *working tree* technologies, has been recognized as a highly versatile land use option that can assist landowners in balancing production objectives with environmental stewardship. This is especially true to the small-to-mid resource farmers who are having a difficult time surviving today's agricultural environment. One of the primary teaching/extension delivery systems to this group, especially minority farmers, is the 1890 Land Grant Colleges and Universities. In order to increase agroforestry awareness among the 1890 universities and to encourage the faculty to incorporate agroforestry into their courses and extension efforts, the USDA National Agroforestry Center (NAC), designed and coordinated an annual workshop that provides the background, field experience, and curriculum materials for specific agroforestry practices.

Hosted by Alabama A&M University, the annual workshop is produced through a partnership with USDA Forest Service (Washington Office of Civil Rights, Southern Research Station, and Region 8), USDA Cooperative States Research Education and Extension Service (SARE), and NAC (USDA FS - State & Private Forestry and Rocky Mountain Research Station, and USDA Natural Resources Conservation Service). To date, there have been 4 workshops delivered: *Agroforestry: Blending Agriculture & Forestry* (2000), *Riparian Forest Buffers* (2001), *Silvopasture Systems* (2002), and *Agroforestry Solutions for Communities: Green Infrastructure/Stormwater Management* (2003).

The workshops already have had a tremendous multiplier effect. Several faculty members have incorporated one or more of the agroforestry sections into their existing courses. Another member has included a chapter on agroforestry in a textbook prepared for Prentice Hall. As a result of the workshop, the 1890 Agroforestry Consortium was formed by the participants. This consortium can play a key role in helping to deliver agroforestry technology to 1890 faculty and students, in particular the underserved landowners throughout the United States, greatly extending NAC's capabilities to help teach today's and tomorrow's professionals and to reach today's and tomorrow's users.

Recently, NAC has developed planning and design tools for ecobelts that foster dialogue and linkages among the stakeholder groups while providing information on the complex and dynamic interactions and potential trade-offs of ecobelts (http://www.unl.edu/nac/conservation/). These tools incorporate multiple issues because stakeholders by necessity consider a variety of economic, biophysical, and social issues in their decision-making process. End-users have been directly involved in the tool development process to prevent making ineffective tools that do not respond to users' problems and needs, creating a waste of project funds and bitter feelings between developers and users (Hoag et al., 2000; Turner and Church, 1995). Further, to encourage participation in the ecobelt planning process, tools need to allow the exchange of ideas among stakeholders without the risk of anyone being ostracized (Buchecker et al., 2003). One tool that promotes this type of collaborative environment is the computer-based visual simulation that can depict photo-realistic future scenarios. NAC is currently developing a low-cost simulation software application *(CanVis)* that will enable stakeholders to conceptualize the ecobelt proposal and make valuable contributions to the design, influencing acceptance and adoption. In essence, the right tools can facilitate the necessary people linkages to create sustainable landscapes.

### *SARE Agroforestry Producer Grants*

As with any new or changing agricultural technology, the success of technology transfer efforts, and ultimately the adoption of the technology, depends on gaining local interest and support. Early in its existence, NAC targeted part of its technology transfer and applications (TT&A) funding for establishing agroforestry demonstrations throughout the United States. These demonstration projects were recognized as an excellent teaching tool benefiting a variety of cooperators, stakeholders, and natural resource professionals. Because demonstration projects are continuously present in their locale, they are available even when a NAC agroforester is not. Consequently, they are a cost-effective way to increase public awareness of agroforestry, promote adoption by landowners, and obtain support from stakeholders. Further, agroforestry demonstrations themselves can assist in developing and furthering the technology and our understanding of its application. A demonstration of planting establishes a working example of an agroforestry technology under local conditions, showing *what* it is, *why* it is used, and *how* it functions (Irwin, 1997).

Declining budgets coupled with increasing workloads in the conservation sector prompted NAC to heavily rely on partnerships to create successful demonstrations. Since it was funded in 1988, the USDA's Sustainable Agriculture Research and Education (SARE) program has sponsored hundreds of projects to explore and apply economically profitable, environmentally sound, and socially supporting farming systems. SARE's primary landowner/producer audiences are commonly early adopters of new ideas who are willing to take risks to explore new technology; early adopters are a prime audience for NAC's TT&A efforts. Beginning in 1999, NAC began partnering with SARE to provide special opportunities to advance *working tree* technologies via the SARE Farmer Producer Grants Program. Building on SARE's national program, innovative clientele, and matching funds, NAC was able to get a wide variety of agroforestry demonstrations established throughout the four SARE Regions (Table 11.3). With over 60 agroforestry demonstration projects in place nation-wide, it was decided in 2004 to shift the partnered funding over to the Professional Development Grants Program to advance the working tree concepts. This program targets another client base, the natural resource professionals who assist producers in

TABLE 11.3. Examples of SARE Agroforestry Producer Grants (1999-2003) throughout the SARE regions.

| SARE region | State | Title of project |
|---|---|---|
| North Central Region | | |
| www.sare.org/ncrsare/ | Minnesota | Growing various species of Angelica as a forest crop in the Midwest |
| | Michigan | Building a thermal blast peeler to prepare chestnut for on-farm, value-added processing |
| | Missouri | Increasing farm production by converting fenceline brush to agroforestry |
| | Kansas | Using agroforestry to winter cattle |
| Northeast Region | | |
| www.uvm.edu/~nesare/index.html | Massachusetts | Multi-purpose windbreaks for protection of vegetable crops and production of fruit and/or nut crops |
| | Maine | Improving financial returns in an orchard's life through agroforestry |
| | New York | Enhancing meat goat production through controlled woodland browsing |
| | Connecticut | Increasing small farm profits with American Chestnut production and silvopasture |

TABLE 11.3 *(continued)*

| SARE region | State | Title of project |
|---|---|---|
| Southern Region | | |
| www.griffin.peachnet.edu/sare/ | Puerto Rico | Demonstrating the benefits of agroforestry practices on family farms |
| | North Carolina | Oriental persimmons and paw-paw: two sustainable crops for the south |
| | Kentucky | Marketing timber after adding value through the use of one-person sawmills and solar kilns |
| | Florida | Performance of various forage combinations under thinned pine canopies |
| Western Region | | |
| http://wsare.usu.edu | Guam | Evaluation and implementation of nitrogen-fixing species in hedgerow intercropping |
| | Washington | Tilth-agroforestry niche demonstration project |
| | Hawaii | Grow your own sustainable barn |
| | Northern Marianas | Luta windbreak/agroforesty project |

*Source:* USDA, 2003.

applying agricultural technology. By increasing the professional's agroforestry competence, NAC can begin to reach another producer audience, the nonsustainable agricultural producer. In addition, the newly trained resource professionals will be encouraged to utilize the existing demonstrations and practices, thus increasing the value of the demonstration. Readers are referred to *Inside Agroforestry, Summer/ Fall 2003* (http://www.unl.edu/nac/ia.html) for additional overview of this partnership.

### *Stormwater Management to Reconnect Land and People*

Agricultural activities are a primary contributor to many of the water quality problems that we face today, and many programs have been initiated to try and deal with them. Cities and towns throughout the USA are now facing similar Environmental Protection Agency (EPA) requirements to address their contributions to water quality decline, more specifically stormwater contributions. Though many communities occupy only a small portion of the watershed, they can greatly affect their watershed and are, in turn, affected by the activities of others in their watershed. The water quality goals of both rural and urban governments are often quite similar: reduce soil erosion, reduce soluble contaminants, and reduce flooding. But rarely do the same governmental agencies work together with coordinated policies and cross-boundary efforts. Water quality is an all-lands issue and can only be truly addressed when all residents, urban and rural, learn how their land-use decisions affect one another and how they might work together to achieve common goals.

*Ecobelts* can be very effective in protecting and enhancing water quality, while providing additional amenities being sought from these rural and urban working lands, such as wildlife habitat and travel corridors, and providing recreational opportunities and alternative sources of income. In 2002, the City of Topeka, Kansas, population 125,000, initiated GREEN TOPEKA to address water quality and quantity concerns (Yoko, 2002). GREEN TOPEKA, a partnership initiated with NAC along with state agencies, Kansas State University, local government, nonprofit organizations, and private stakeholders, is developing stormwater management alternatives that incorporate green (vegetative) technologies with conventional engineering approaches. More important, the approach is being applied in a more holistic manner where multiple concerns and broader landscape impacts are included in the upfront planning in order to avoid the costly retrofitting that generally results after urban growth has taken place. In the development of new ordinances and new green stormwater management projects, the City of Topeka has sought input from residential developers, local industry, and neighborhood organizations. In the process GREEN TOPEKA has developed new linkages among the city, its citizens, businesses, and their water resources, as well as fostering support for ongoing and future stormwater management activities. Besides flood and erosion control and water quality protection, GREEN TOPEKA's efforts will also provide additional walking/biking trails, interpretative paths, environmental education, wetland systems, increased wildlife habitat, and more aesthetically pleasing settings.

The second case study is a look at how this model of linking a community to its watershed through stormwater management issues and ecobelts can be scaled up to link multiple governments, organizations, and businesses in multiple watersheds. The Mid-America Regional Council (MARC) is the metropolitan planning organization for the 116 city and eight county governments in the bi-state Kansas City region of which 70 percent of the planning area is agricultural (Figure 11.2) (Yoko, 2002). Using water quality and storm-

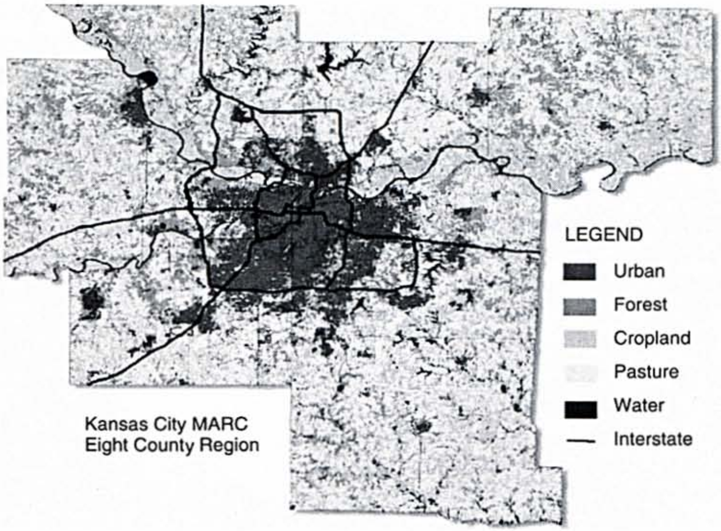


FIGURE 11.2. The Kansas City metro planning region depicting the urban/rural interface and mixture of land uses that need to be brought into the planning exercise when addressing environmental issues like water quality.

water issues as a catalyst, MARC is working in close partnership with GREEN TOPEKA, the EPA, the American Public Works Association (APWA), the University of Missouri Center for Agroforestry, and NAC to develop best management practices (BMPs) and engineering guidelines for applying green infrastructure technologies to manage stormwater. MARC had just celebrated a successful Metro Green initiative of developing a network of linear corridors along streams, railroad right of ways, and other greenways, where a number of groups took advantage of an opportunity to develop this new partnership. The public's new-found appreciation of the Metro Green trail system made an easy transition into promoting the use of these same greenways as a link in the larger green infrastructure for stormwater conveyance and other watershed functions. Metro Green became the foundation of linking the management of urban parks, school grounds, waterways, and other public open space to the management of adjacent rural lands and to the rural farm programs.

Through the new green infrastructure partnership MARC is coordinating a strategy to build a capacity within stakeholders for implementing vegetative stormwater management strategies. Three primary components of this strategy are (1) the development of a GIS data set of existing green spaces,

(2) a grants program to establish stormwater demonstration projects that utilize vegetated solutions, and (3) hosting design charettes to build capacity within the local engineering community for green stormwater solutions.

Through a GIS-based planning framework, natural systems and processes considered at the landscape level can help guide the location of ecobelts and other vegetated plantings that can better connect the landscape ecologically. MARC's history of effectively working across multiple government boundaries, including rural and urban entities, will position communities within the Kansas City Metro area to talk with rural watershed partners about shared goals and priorities which can hopefully lead to greater targeting of federal cost-share investments, such as the Conservation Reserve Program (CRP), Wildlife Habitat Improvement Program (WHIP), Environmental Quality Improvement Program (EQIP), as well as EPA programs for clean water.

The establishment of stormwater management demonstrations, such as the SARE funded agroforestry demonstrations, will build a foundation of experience and educational opportunities to expand the utilization of green infrastructure for water quality. EPA funding through MARC initially supported the green stormwater solution projects. A call for proposals went out to county, city, and nonprofit groups to find opportunities to modify traditional gray or hard infrastructure stormwater projects with ecobelts or other technology utilizing vegetation. As a part of the call, applicants were informed that engineering redesign assistance would be provided through MARC. At the same time MARC sent out a request for qualifications to the local engineering consulting community to enlist a firm or firms to provide the expertise necessary for redesigning the selected stormwater project proposals.

The third aspect of the capacity building strategy focused on the engineering community involved with residential and industrial development and consulting for local governments. MARC will host two or three design charettes in the first two years of the initiative and invite engineers and consultants working in the Metro area to participate. Each charette will educate the participants as they work through the development of the design specifications for an actual stormwater project or new development. MARC's demonstrations, training, and common GIS data are encouraging people and governments throughout the metro region to utilize similar technologies in addressing shared goals of water quality throughout their common watershed.

## *CONCLUSIONS*

Based on the practical community applications of woody buffers and multifunctional areas that grew from the initial concepts of ecobelts, we are convinced that this type of initiative is a viable option in establishing a positive interface between different types of human activities. The challenge becomes more real every day, as cities expand and both city-edge subdivisions and acreages create ever more interfaces between people with different and often conflicting activities and basic values. There is a need to provide some logical and acceptable boundary between these people and their different lifestyles. It is also desirable to provide some tangible limits to physical spread of cities, and a need to explore creative ways to infill and increase urban density (Olson and Lyson, 1999).

The case studies in Topeka and Kansas City metro areas provide tangible evidence that innovative partnering and design of green space can effectively reduce conflict at the rural-urban interface as well as serve multiple functions for the local community. By further expanding and testing the idea of ecobelts, we can find additional ways of helping our complex society cope with the complexities of spatial organization of human activities for the future. By recognizing that the most important linkages are those among people who share limited space, we can focus on the process necessary to bring people together to seek common understanding and work in unison to solve the community's problems. Ecobelts can be an important part of these solutions.

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