Inside Agroforestry

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CSA is Taking Conservation Forestry to Town!

By Jerry Bratton
Technology Transfer Program Leader

The Center for Semiarid Agroforestry (CSA) has developed a partnership project with State Foresters that adapts agricultural conservation agroforestry technologies to city and community environments. It advocates "taking conservation forestry to town"!

The Need

Many natural resources within cities and communities are neglected, ignored or abused! Basic natural resources (water, air, soil, plants, and wildlife) are often overlooked when communities design new construction sites or establish residential or commercial areas. Since the EPA has listed urban areas as the number two nonpoint source polluter (behind agriculture) we know this problem is common. When communities are located within agroecosystems the effect may even be multiplied.

When planning resource management, natural resource professionals often overlook or fail to recognize opportunities to apply rural conservation forestry technologies, especially to those problems associated with communities located within and dependent upon agriculture.

Islands of trees and human habitation need many of the same resource protection and management practices that we find on farms and ranches outside communities. It's just as important to protect communities from wind and snow, improve mismanaged riparian areas and wildlife habitat, and intercept fertilizers and chemicals before they enter free water systems.

The Challenge

In 1991, CSA developed a concept to adapt and apply commonly used conservation forestry practices to community environments. The project was labeled "Conservation Forestry for Communities" (CFC). The USDA Forest Service's, Urban & Community Forestry Group decided to fund 1992 pilot project to demonstrate how to adapt agroforestry technology to protect commu-

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Hands-on Experience for Montana Students

By Kim Isaacson
Technology Transfer Assistant

A windbreak *and* an outdoor laboratory! That's what Conrad, Montana, grade school students are going to get. They're excited about designing, installing, and maintaining a five- to six-row windbreak around their school that will later be used as a student learning center.

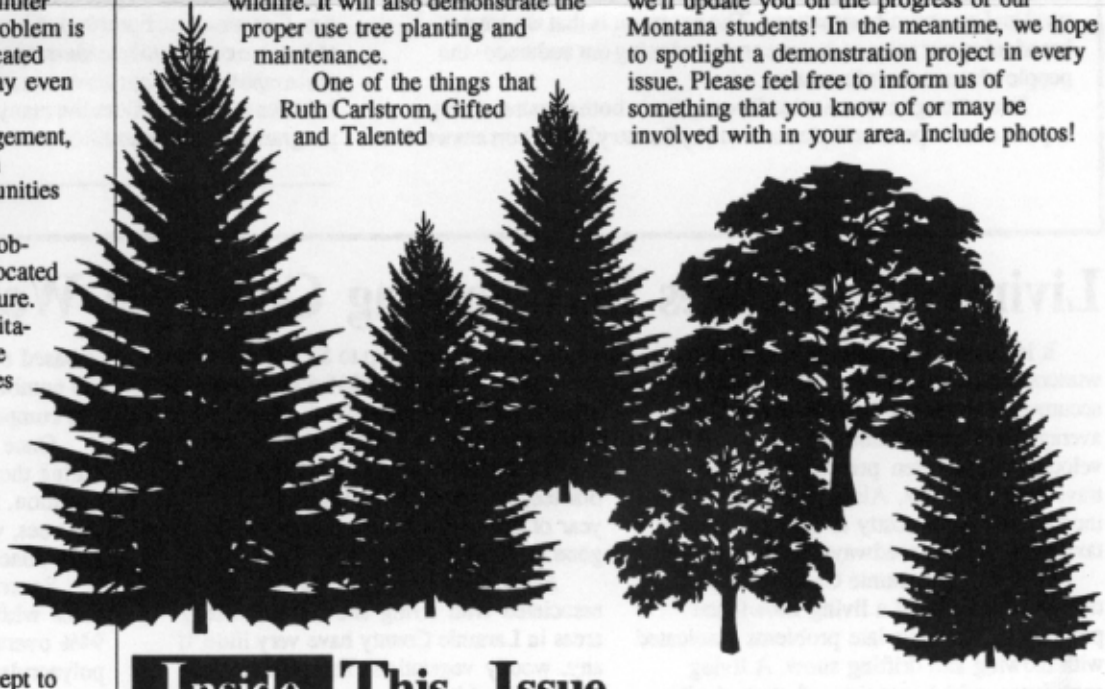
The children work with the Montana Division of Forestry who, in cooperation with the Center for Semiarid Agroforestry (CSA), have initiated a pilot project called Conservation Forestry for Communities (CFC). Though still in the planning stages, things in Montana will really start happening this spring.

The future CFC windbreak will not only protect schoolgrounds and foster environmental education but will lower fuel costs and serve as a center for wildlife. It will also demonstrate the proper use tree planting and maintenance.

One of the things that Ruth Carlstrom, Gifted and Talented Coordinator for the Conrad School District, really likes about the program is that the State Foresters are completely involving the students. The students are involved with developing and planning the budget, choosing tree species, actual landscape design, and planting and maintaining the windbreak this spring. Media coverage will also be initiated by the children.

Carlstrom says that "the kids are so proud to be a part of improving their school grounds and the environment as a whole." Besides the fact that the school is located near a farming community and the windbreak is almost a necessity because of fierce Montana winds, she is excited about the hands-on experience that the future outdoor lab will give the children.

In a future issue of *Inside Agroforestry* we'll update you on the progress of our Montana students! In the meantime, we hope to spotlight a demonstration project in every issue. Please feel free to inform us of something that you know of or may be involved with in your area. Include photos!



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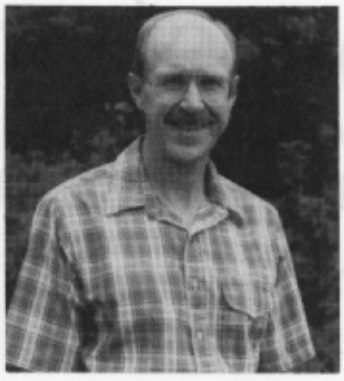

Message From the Manager

A column of important events and programs as reported by CSA Program Manager Bill Rietveld

Conservation Forestry in Communities

In this issue, we report on our "Conservation Forestry in Communities" pilot project. Basically, we found that conservation forestry technologies can be applied in communities, just as they are in agricultural systems, for most of the same reasons. The response to our pilot project was overwhelming, and we are currently developing funding proposals and partnerships to enable us to continue and expand into more states.

Why is the Agroforestry Center getting involved in conservation forestry? We were initially reluctant to cross that line, until we realized that, in our case, there really wasn't any line. Communities and people cannot be separated from agroecosystems; they are an integral part, and their needs for conservation forestry are nearly identical to those in agricultural production systems. In both situations, we add trees to environments deficient in woody plants. In both situations conservation trees protect, enrich, and sustain vital economic, environmental, human, and natural resources. Moreover, in agroecosystems in the semiarid Great Plains and West, there is a mutual need for stress and pest resistant multipurpose trees in both rural and community situations. The net result is that we are not broadening our science, but we are broadening our audience - the people who use our information.

Even though conservation forestry fits in both situations, why expand our scope to include community forestry? The short answer is that we are taking conservation forestry to the people, and we will draw on that support base to enhance applications in rural areas

"Communities and people cannot be separated from agroecosystems; they are an integral part, and their needs for conservation forestry are nearly identical to those in agricultural production systems."

surrounding communities (i.e., municipal watersheds). Let me explain. Presently 68 percent of the population lives in communities. Conservation Forestry In Communities will provide an avenue to involve community leaders, sponsors, and volunteers in projects that emphasize the conservation and environmental enhancement benefits of trees. Besides the many benefits to urban forestry programs, it has the additional benefit of educating people on the

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Living Snowfences in Wyoming Getting a Workout

It is common knowledge that Wyoming winters can be extremely severe. Snow accumulations within Laramie County average 51.5 inches annually. Snow and high velocity winds often present dangerous traveling conditions. Also, it has become increasingly more costly to Laramie County taxpayers to keep roadways clear.

In 1989, the Laramie County Conservation District initiated a living snowfence program to help alleviate problems assoicated with blowing and drifting snow. A living snowfence, which consists of strategically planted rows of trees and shrubs, will eventually provide control of blowing and drifting snow. It has numerous economical advantages over the traditional slatted fences that are commonly used for snow control.

Results indicate that living snowfences could save taxpayers up to $4,933 per mile every year. This totals $246,650 over the life of each planting. Currently, the District has 53 living snowfences throughout the County, which translates to over 15 miles of trees planted, or a possible savings of $73,995 per year of taxpayer's dollars that would have gone to snow removal.

Snow catchment isn't the only advantage associated with living snowfences. Many areas in Laramie County have very little, if any, woody vegetation. The plantings are important habitat areas for birds and provide a place for deer and other game to raise their young.

The Conservation District, with the assistance of the Laramie County Road and Bridge Department, select sites on city, county, or state road locations. Site location is based on the severity of the snow problem, the number of people who will benefit, and the site composition (soil, grade, etc.).

Once selected, the sites are then fallowed during the fall season to aid in moisture retention. Spring disking prepares the sites for the trees, which are planted in April, May, and early June.

Several new technologies are used to assist with achieving the living snowfence's 94% overall survival rate. These include polyacrylamide, a moisture absorbent, and polypropylene weed barrier, which enables successful dryland plantings. The trees are also sprayed with an antitransparent material during the fall and winter months that coats leaf surfaces and inhibits moisture loss.

Source: Jim Arnold, Laramie County Conservation District Report on Progress, October, 1992

Conservation Forestry: An Idea Whose Time Has Come, Again

By Bill Rietveld
CSA Program Manager

The term conservation forestry is new, but the practice is not. Conservation trees came to the rescue in the Dust Bowl years of the '30's, when intensive dryland farming was found to be unsustainable. Modern farming systems have evolved to their present level by emphasizing efficiency. But we are now confronted with the high environmental costs of such systems. The need for sustainable agricultural land-use systems is unchanged.

An enduring quote from Aldo Leopold that applies as well now as it did then is: "A system of agriculture based solely on economic self interest is hopelessly lopsided. It tends to ignore, and thus eventually eliminate, many elements of the land community that lack commercial value, but are essential to its healthy functioning. It assumes, falsely I think, that the economic parts of the biotic clock will function without the uneconomic parts." Although conservation forestry was previously regarded as one of the uneconomic parts, the situation is changing now as scientists and managers realize that conservation forestry has a significant role to play in the development of sustainable agriculture land-use systems.

Our definition of conservation forestry is: "working trees in agricultural and community ecosystems to protect, enrich, and sustain our vital economic, environmental, human, and natural resources." Conservation forestry is distinguished by the fact that trees (and shrubs) are *added* to environments that are deficient in trees, and benefits are created or enhanced through their introduction.

We try to obtain tree products where possible (traditional agroforestry), but in dryland systems, the conservation and amenity values of trees (conservation forestry) are often more important and valuable than tree products.

"Working trees" are trees planted in the right place in the right design for the right purpose. Examples are windbreaks to protect crops, farmsteads, and livestock, living snowfences to control drifting snow, livestock havens in rangelands, wildlife habitat plantings, and riparian buffer systems to filter surface runoff. Conservation forestry systems provide critical habitat for wildlife. Such systems may occupy only 5% of the land area of agroecosystems, yet account for over 50% of the biodiversity.

Conservation forestry is an idea whose time has come again. This time, rather than a crisis program to reclaim and heal the land, conservation forestry is being recognized as an integral part of sustainable agricultural land-use systems, to protect, enrich, and sustain vital economic, environmental, human, and natural resources. It is one of the uneconomic parts of agricultural ecosystems that is essential to its healthy functioning.

A healthy riparian area is evidence of wise land management. Riparian areas include trees and other plants that live and grow near water on the banks of streams, rivers, and lakes to protect and improve water quality.

Forestry Facts

- The Great Plains has 90,871 total miles of field windbreaks. North Dakota ranks highest among the other Great Plains states with 40,558 total miles that protect 2,952,622 acres of cropland. Following are total miles of windbreaks for the remaining Great Plains states and the acres of cropland that they protect: Colorado, 1,064 miles protecting 77,459 acres; Kansas, 16,750 miles protecting 1,219,400 acres; Montana, 8,821 miles protecting 642,169 acres; Nebraska, 9,876 miles protecting 718,973 acres; New Mexico, 245 miles protecting 17,836 acres; Oklahoma, 3,600 miles protecting 262,080 acres; South Dakota, 8,362 miles protecting 608,754 acres; Texas, 1,149 miles protecting 83,647 acres; and Wyoming, 446 miles protecting 32,469 acres.

Soil Conservation Service, 1987

- In winter, windbreak trees can reduce heating bills as much as 30 percent. And, in summer, shade trees can save up to 50 percent of air conditioning costs.

The National Arbor Day Foundation

- *"Conservation is a state of harmony between men and land. Despite nearly a century of propaganda, conservation still proceeds at a snail's pace; progress still consists largely of letterhead pieties and convention oratory. On the back forty we still slip two steps backward for each forward stride."*

Aldo Leopold
A Sand County Almanac

Siberian Elm What's Happening to It?

Dying Siberian elm in Bottineau County, North Dakota.

A major decline and death loss of Siberian (commonly referred to as "Chinese") elm *(ulmus premila)* trees has occurred across the Great Plains region. Siberian elm was the backbone of tree plantings in towns and windbreaks during the 1940's and 1950's. Tree inventories conducted in communities over the past ten years all reflect the dominance of Siberian elm in the landscape. But, time has finally caught up to this tree and climatic extremes (drought, temperature) are hastening its disappearance from the western prairie landscape. The loss of this tree marks the end of an era when man tried to tame fierce prairie winds with trees.

The unexpected Halloween freeze of 1991 also took a toll on Siberian elm across the Great Plains. Individual trees were killed by the freeze while others showed no damage at all. All levels of damage occurred. The Siberian elm in central through western Nebraska are 50-100 percent dead. One western Nebraska town reported 1,800 dead elms on public property (parks, street right-of-way, etc.) and at least that number on private property.

Today, homeowners and landowners "cuss" this tree unrelentlessly. After every storm there are branches to pick up. The dieback adds an unsightly appearance to the home or farmstead. Often the question "why was this tree planted?" is asked. The answer lies in the fact that Siberian elm is tough, able to grow under the harshest conditions and across a wide spectrum of environmental sites. Maybe more importantly, it grows fast!

There were many trees and areas to be planted in the Great Plains and there wasn't time for replanting. Foresters, conservationists, and landowners needed a proven performer, hence the Siberian elm. Unfortunately, it has a relatively short life span of 40-60 years which is shortened even more when grown under stress. Often, when someone plants a tree, they envision it living forever. Trees don't live forever and the majority of Siberian elms are at the end of their lifespan today.

When one looks back into the literature of early studies on windbreaks, there are several interesting references about Siberian elm. One reference from a *Farm Forestry Bullitin, April, 1944,* states, "Chinese elm has been used too extensively. It is subject to late and early frost, is easily damaged by wind, snow, and hail storms. It does grow very rapidly and it has a place in many plantings, primarily because of the limited number of tall trees that are available. It should be used on the more difficult sites, but only to a limited extent - not more than one row to a planting."

What choices face the homeowner or landowner who has dead or dying elm trees? First and foremost, elm trees that are dead will not come back next spring. Even elm trees with sparse crowns are slowly dying and their death is imminent. Whether it's a windbreak or landscape situation, treeowners need to evaluate where new trees should be planted.

Currently many tree owners are being told that their elm trees can be saved or reviatlized. Topping, the removal of a major portion of the crown, is one solution being promoted to save elm trees. Topping is not an approved or proper pruning technique and this will not save the tree, but will actually hasten the tree's decline. Another "solution" involves spraying dead/dying trees with a fungicide to revive the tree.

The bottom line is these treatments cannot effectively extend the life span of the tree and are not economical. People with elm trees that have not produced any foilage or have less than 20 percent live crown should seriously consider tree removal. This is especially critical where the location of the tree represents a hazard to property, buildings, or high use areas.

Removal of dead elm trees is truly a negative aspect of the Halloween freeze. Many small communities already have financial difficulties and removing dead elm trees can be costly. However, a positive aspect of the freeze is that Siberian elm is considered a poor choice for urban or landscape uses. Therefore, the severe damage caused presents an opportunity for communities and individuals to improve their tree resource. Removing the elms and replacing them with more desirable species will improve their community forests.

Tree owners must focus on planting new trees to replace the elms because this is a more economical and practical use of their money. Farmers and ranches should take note of dieback in their windbreaks. Time is growing short for landowners to effectively respond to this decline. Their windbreaks need to be renovated to maintain continous long term protection for farmsteads, livestock, and soils.

The Siberian elm has played a major role in the evolution of windbreaks and landscapes on the prairie. But time marches on and the future prairie landscape will not include the "Chinese" elm. New species of trees that are better adapted and longer lived will be planted to replace them. Although the elm tree will slip from its dominating role on the prairie, it shouldn't be forgotten for its place in the history of windbreak development on the Great Plains.

Sources: Adapted from, The Foresters' Log, August, 1992; Growing Green, September/October, 1992

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nity ecosystems. It was also decided to present a workshop to evaluate the potential and need for further CFC efforts.

Concept Meets Approval

Six states took the challenge to participate in the pilot CFC demonstration program on a cost-share basis. Oklahoma, Kansas, Nebraska, Iowa, North Dakota, and Montana collectively proposed 13 CFC demonstrations. All 13 were found to be excellent projects, have been funded, and are presently in some stage of implementation.

The demonstrations involve a wide range of ideas. Montana developed a combination windbreak planting designed to protect a school grounds. The windbreak will reduce fuel consumption, wind, and snow accumulation, and offer an outdoor laboratory experience. Another project in Iowa will establish a "living snow fence" to protect the emergency entrance and grounds of a hospital. A project in Nebraska will focus on protecting a riparian area within a city park. There are many other good projects too varied to mention.

Many of the projects are being implemented with volunteer labor (school youth, Eagle Scouts, community organizations, etc).

"One positive aspect of this project is the development of a strong volunteer effort. Nearly all of the projects are being implemented with volunteer labor."

CFC Workshop A Success

After the first stage of the CFC pilot project, CSA turned attention to developing a workshop. The workshop was designed to evaluate the merit of the CFC concept and whether there was need to further develop and expand it. The National Arbor Day Foundation also became a cosponsor of the two-day meeting.

Attendance involved persons with experience in developing the original CFC concept and those that participated in the pilot demonstration projects. Twenty-five resource professionals attended, representing five State Forestry Agencies, National Association of Conservation Districts, National Arbor Day Foundation, National Tree Trust, three Universities, Soil Conservation Service, one North Dakota city, a state wildlife agency, and CSA.

The group overwhelmingly endorsed expansion of the concept as one means to advance toward total community ecosystem management. A committee composed of several of the attendees has developed a white paper with recommendations for future expansion of the CFC concept and project.

The Future Looks Bright

There are multiple plans and proposals being developed, even as you read this article. Various partnerships between the Forest Service, State Foresters, Soil Conservation Districts, private contractors, and citizens are being proposed. Funding appears to be the limiting factor, so CSA is looking into the potential for partnerships involving corporate sponsors and citizen volunteers.

We have an opportunity for conservation forestry to assist in sustaining communities in much the same way conservation forestry technologies assist in sustaining agriculture. Be looking for more information regarding this exciting program - Conservation Forestry for Communities program.

Let us know about conservation forestry news in your area, we'd love to share it!

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value of conservation forestry and ecosystem sustainability. Based on our success with community conservation forestry projects, we hope to expand the support, sponsorship, and volunteer efforts into surrounding agricultural lands.

In concert with the Conservation Forestry in Communities applications project, our in-house research program (RM-4551) is now officially part of the Forest Service urban forestry research program. That means that our conservation forestry research pertains to both rural and community situations. Specifically, our contributions to the overall Forest Service urban forestry research program are in urban tree genetics and technologies to maintain and improve tree health. Our research is focused on tree species that have strong customer interest in both rural and community conservation forestry. Again, we are not broadening our science, but we are broadening the audience of people who use our information.

As you can see, we are establishing complementary conservation forestry research and applications programs for both rural and community situations. This has been made possible by the Center's Research/State and Private Forestry partnership. The rural technology transfer and applications program consists of a State and Private Forestry sponsored public education program called "Conservation Trees for Your Farm, Family, and Future" delivered by the National Arbor Day Foundation, plus our in-house State and Private Forestry supported demonstration program. The community applications program is the Conservation Forestry for Communities project, for which we are currently developing partnerships and sponsors.

As we set out to do at the beginning, the Center works through cooperation and partnerships to expand resources and expertise to attain common goals. We are making clear progress in that direction. The process is not without its challenges, but we hope the results will be far worth the effort.

Plastic Trees to Make Rain

Early pioneers had fond visions of turning the dry Great Plains into a rainy, agricultural paradise if only they could get enough crops and trees growing to prime the rain cycle.

Well, grab an umbrella and watch as Libya tries the same thing with 40,000 plastic trees. Brainchild of Spanish inventor Antonio Ibanez, the devise is described by *Europe Magazine* as a palm-like tree with polyurethane roots and perforated plastic and foam trunks, branches, and leaves.

The principle is that cooler ground temperatures will generate rain. The tree's upper portion is said to absorb moisture from dew and frost during the cold, desert night, then slowly release it during the day, thereby cooling the surface air. In coastal desert areas, the hope is that the change will be enough to squeze rain from the air. Once the cycle begins, real trees can be planted to keep it going.

Source: Arbor Day, July/August, 1992