Inside Agroforestry

Rocky Mountain Research Station, Center for Semiarid Agroforestry

Summer, 1994

Over 150 youth gathered at the new Denver International Airport to plant nearly 3,000 trees and shrubs, creating a "living snowfence" along Pena Boulevard, the main entrance to the airport.

Youth and "Working Trees" - A Great Combination

A new partnership involving young people and trees will soon be improving our communities and our environment. "Working Trees for Tomorrow's Communities" (WTTC) is a new program that the USDA Forest Service, Rocky Mountain Research Station, Center for Semiarid Agroforestry announced during tree planting ceremonies on May 7, 1994, at the new Denver International Airport (DIA). The WTTC program promotes tree and shrub planting to assist communities in protecting their natural resources — and our Nation's youth are the planters. The Kansas City, Missouri-based "Plant A Tree - Help A Kid" Foundation will administer the program through a unique partnership with the USDA Forest Service, USDA Soil Conservation Service, USDA Extension Service, National Association of Conservation Districts, and Council of Western State Foresters. The Foundation and partners will work closely with local youth groups such as the Big Brothers/Big Sisters of America and Boys Clubs/Girls Clubs of America to establish "working trees" projects nationwide.

Jerry Bratton, Technology Transfer Program Manager at CSA says, "City-dwelling Americans have been concerned about the management of soil, water, and wildlife in rural America, while often neglecting their own natural resources in town. For decades we have used trees, with the ability to heal many of the problems associated with intensive farming and ranching, to protect soil, water, and people. If we can use trees to sustain agriculture, we should also be able to

(See WTTC on page 2)

Riparian Areas and Neotropical Migratory Birds

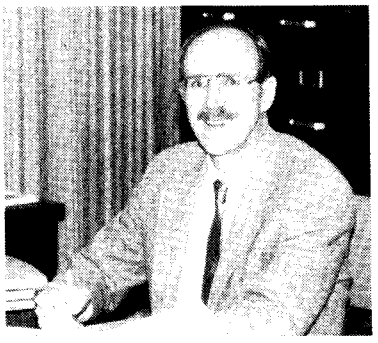
Of the more than two billion acres of land in the United States, almost three-fourths is controlled by private landowners. Quite literally, the future of migrant bird populations in the United States depends on the actions of private citizens.

Successful migration depends on whether birds can replenish energy reserves rapidly; locate suitable stopover sites and travel routes; avoid predation in unfamiliar habitats; and cross travel barriers quickly and safely. While few private landowners have large tracts of undistrubed forest, many have a riparian zone or at least a small grove of trees near a water source on their land. In light of the scarcity of large forest tracts, these small areas, especially riparian areas, have become increasingly significant to migratory bird survival.

It is estimated that wetlands and riparian areas comprise less than one percent of the total land area in the western United States, yet they support a tremendous number and diversity of aquatic and terrestrial wildlife. Over 60 percent of the species which *Partners in Flight* (an international effort that addresses the conservation of neotropical migrants) have identified as neotropical migratory birds, use riparian areas in the west as stopover areas during migration or for breeding habitat. Riparian zones have been shown to be extremely important for

(See Migratory on page 5)

Inside This Issue



Message From the Manager

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

Working Trees

About two years ago the Agroforestry Center invented the concept of "working trees" to help draw attention to the many ways that trees in agricultural systems work to increase productivity, protect soil and water resources, enhance the environment, and provide tree products and amenities for people. We developed, in cooperation with Forest Service Northeastern Area State and Private Forestry, a traveling display and companion leaflet entitled "Agroforestry: Working Trees for Agriculture," which has been in high demand. Now we are seeing the term "working trees" everywhere, which is very gratifying.

"We reasoned that communities, especially communities in regions that generally lack trees and the community/rural interface, can reap the same benefits from conservation trees as agricultural production systems."

This issue of *Inside Agroforestry* reports another success story: "Working Trees for Tomorrow's Communities." We reasoned that communities, especially communities in regions that generally lack trees and the community/rural interface, can reap the same benefits from conservation trees as in agricultural production systems. We conducted a pilot project to demonstrate our ideas and hosted a workshop to evaluate the concept. The strong support by our cooperators and the evolutionary process of refining the concept led to the development of the "Working Trees for Tomorrow's Communities" (WTTC) national program.

The key elements of the WTTC program are: 1) applying conservation forestry technologies in communities; 2) involving at-risk youth in establishing demonstration projects; 3) enhancing awareness of job and career opportunities in natural resources management; and 4) conservation education for youth.

The program will be implemented by the "Plant A Tree - Help A Kid" Foundation, who will network with youth organizations like Big Brothers/Big Sisters of America and Boys Clubs/Girls Clubs of America, and raise funds from private sources to support projects. A conservation partnership consisting of USDA Forest Service, USDA Soil Conservation Service, Extension Service, the National Association of Conservation Districts, and the Council of Western State Foresters has been created to cooperate with the Foundation and youth organizations in providing technology transfer and technical assistance. We are very proud of this emerging new program, and feel that it will be a win-win situation for all partners, agroforestry, and the environment.

(WTTC from page 1)

use the same adapted technology to improve our cities and towns."

To help kick off the WTTC National Program, over 150 youth from the Big Brothers/Big Sisters of America and the Boys Clubs/Girls Clubs of America gathered at DIA to plant over 3,000 trees and shrubs along Pena Boulevard, the main entrance. In a few years the trees will be a "living snowfence," replacing traditional wooden snowfences, which will protect the entrance to the airport and save thousands of dollars in snow removal costs while at the same time beautifying the roadway and protecting the safety of motorists. The Colorado State Forest Service led the DIA project effort. They were assisted by many local organizations and agencies.

Once the National WTTC Program is in place, the "Plant A Tree - Help A Kid" Foundation will work with youth groups to establish WTTC projects nationwide, and locate private sources of funding for the program. The Agroforestry Center will provide technical materials, while other WTTC partners will provide technical assistance and help with implementation.

By applying what we have known for decades about the value of conservation trees, and at the same time educating our Nation's youth, communities can reap the benefits of cleaner, quieter, and healthier surroundings, while preparing the next generation to be more user-friendly to our natural resources.

More information is available by contacting Carol Green, "Plant A Tree - Help A Kid" Foundation, 816-753-1147.

New Hope for Chestnuts and Elms

A breakthrough discovery by scientists at the Roche Institute of Molecular Biology could result in restoring native chestnuts to the American landscape. Chestnuts have virtually disappeared since a fungal disease was accidentally introduced from Asia in 1904. The new discovery uses a genetically engineered virus that alters the genetic makeup of the chestnut-killing fungus, reducing its virulence. Because of the reproductive abilities of the blight-fighting virus, scientists hope that once introduced, it will spread naturally, enabling the return of American chestnuts. The method used for manipulating the genetic machinery of these microscopic organisms also shows promise for use as a natural control of Dutch elm disease and various agricultural disease problems. Permission for greenhouse and field trials has been sought from the USDA, with three to five years predicted for completion of the tests.

Source: Arbor Day, January/February, 1993

Agroforestry and Wildlife: Caveats and Opportunities

By Arthur W. Allen
Landscape and Habitat Analysis Section, National Biological Center, National Biological Survey, Fort Collins, Colorado

Whether for recreational or aesthetic reasons, American agriculturalists often consider wildlife an important environmental component. Consequently, the effects of farm management for game and nongame wildlife frequently plays a role, at least a minor role, for many producers in land use decisions. Agroforestry offers opportunities to enhance vegetative and structural complexity, while obtaining more diversified and sustainable production from agricultural ecosystems. The use of shelterbelts and windbreaks to address environmental issues and increase farmland wildlife habitat is well documented. Employment of agroforestry practices to provide financial benefits to farmers through production of wood fiber products and biofuels is receiving growing recognition as a potential future use of agricultural land as well.

The environmental and wildlife benefits of agroforestry are often greatest on sites where soil fertility is low or the potential for erosion is high. On such marginal lands, agroforestry may enhance land productivity, contribute to greater sustainability of agricultural ecosystems, and provide additional benefits to wildlife inhabiting agricultural landscapes.

The quality of wildlife habitat within agricultural landscapes is defined by conditions within individual fields and spatial relations between required habitat resources. Specific effects of agroforestry, as well as agriculture in general, on wildlife habitat are dependent on interspersion between resources and management activities. However, this fundamental question must be addressed before the influence of agroforestry on habitat quality can be defined: What are the specific wildlife species of concern? Practices that may be advantageous to one assortment of wildlife species may have negative effects on other species, due to conflicting habitat requirements. Therefore, the definition of how agroforestry may influence the quality and distribution of habitat is dependent not only on the land use and management practice, but on the habitat needs of the wildlife species.

White-tailed deer potentially do well in agricultural ecosystems and can be characterized as a habitat generalist.

Wildlife Habitat Requirements

Assuming that basic food and cover requirements are provided in sufficient quality and quantity, many species of wildlife are adapted to the inherent spatial and temporal patchiness of highly-developed, intensively-managed agricultural landscapes. Wildlife species that potentially do well in agricultural ecosystems can be characterized as habitat generalists and are represented by species such as the ring-necked pheasant, eastern cottontail rabbit, and white-tailed deer. These species generally profit from a high degree of interspersion between vegetation associations such as the inclusion of shelterbelts and other woody vegetation in intensively farmed regions.

In contrast to those species that have adapted to agriculture, wildlife endemic to perennial grassland ecosystems have experienced long-term declines in numbers and distribution across much of North America. Avifauna endemic to grassland ecosystems have suffered more severe and geographically widespread declines than any other guild of North American species, including forest-dependent neotropical migrant birds. The lark bunting, grasshopper sparrow, mountain plover, and dickcissel exemplify such species. The continued loss and fragmentation of grassland ecosystems have contributed to these declines, as has deliberate and unintentional introduction of woody vegetation in ecosystems historically dominated by grassland.

The establishment of extensive riparian forests along major rivers in the Great Plains, due to changes in hydrologic regimes and elimination of fire in grassland ecosystems, has contributed to westward emigration of wildlife species more characteristic of eastern forests. These species have displaced grassland species and have contributed to higher rates of predation and nest parasitism on species endemic to grassland habitats. Conservation of grassland avifauna is contingent on reducing practices that expand the distribution of woody vegetation into remaining tracts of contiguous grasslands.

Habitat requirements of these two generalized groups of wildlife often conflict. For example, establishment of shelterbelts or windbreaks, practices widely perceived to benefit most wildlife species affiliated with agricultural ecosystems, may negatively impact grassland-dependent species through habitat fragmentation with resultant increased rates of predation and nest parasitism.

Potential Benefits of Agroforestry to Wildlife Habitat

Agroforestry offers opportunities to mitigate the effects of fragmentation and isolation of woodland habitat in areas of intensive row and grain crop production. Woody crops could be sited to buffer existing woodlands or fill gaps between remaining forest fragments, increasing the availability of interior forest habitat. In intensively farmed regions, generally devoid of wooded cover, deer are restricted in winter to small remnant woodlots or flood-prone bottomland forests. These sites frequently provide insufficient winter shelter and support poor survival rates. Agroforestry plantations situated in association to small woodlots could increase the effective area of these stands, thereby improving their potential as habitat. Agroforestry plantations could be situated to provide corridors for wildlife dispersal between existing forest stands or other key habitat elements, such as wetlands.

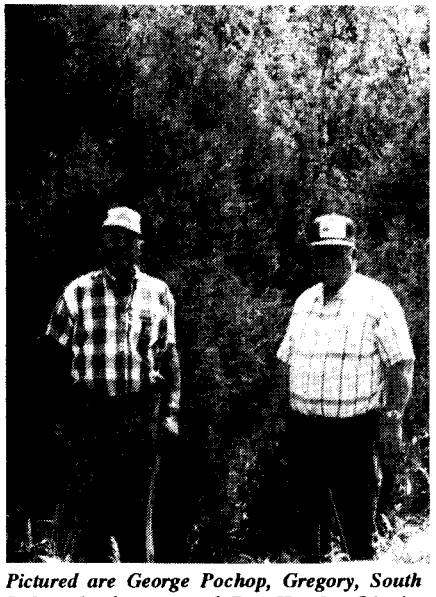
Recent investigations in California have documented agroforestry benefits

(See Wildlife on page 5)

Successful Wildlife Planting is Home for Many Pheasants

George Pochop's wildlife habitat planting, a mix of many species including plum, buffaloberry, cedar, Russian olive, green ash, honey locust, caragana, and hackberry, attracts mostly pheasants and houses about 20-25 deer as well.

In 1982, George Pochop of Gregory, South Dakota, a man with a sincere interest in wildlife, renovated 5.6 acres of an old, rundown tree belt. This area was reestablished as a wildlife tree and shrub planting. The mix of many species including plum, buffaloberry, cedar, Russian olive, green ash, honey locust, caragana, and hackberry attracts mostly pheasants — actually, lots of pheasants — that Pochop enjoys and his friends love to hunt.



Pictured are George Pochop, Gregory, South Dakota landowner, and Roy Hasche, District Manager for the Gregory County Conservation District in Burke.

When Pochop himself was asked why he did this, he answered, "Oh, I don't know, maybe just for my friends and others to enjoy and because I enjoy it so much myself. After all, isn't that what it's all about?"

The wildlife planting was a success from its beginning in 1982, with only three rows of jack pine failing. In 1983 the three rows were replanted with cedar, and since that time there has been no replanting or thinning. The only maintenance involves cultivating in between rows, which Pochop himself prefers to take care of.

According to Roy Hasche, District Manager for the Gregory County Conservation District in Burke, "George Pochop is just plain interested in wildlife. He does a good job keeping the planting up all himself and after almost ten years, it still looks super!"

Cropland is on one side of the planting with a pasture on the other. It's visible from the highway so many people have the opportunity to see it — and the pheasants that it houses — as well as 20-25 deer who also take advantage of this prime habitat.

Pochop's wildlife planting is 14 rows wide, which provides a good, wide area of cover and, according to Hasche, is the secret for attracting pheasants — especially in the winter. Two rows of plum and two rows of buffaloberry are on the east (leeward) side of the planting, while caragana and one row of cedar is planted on the west (windward) side, with three rows of cedar in the middle.

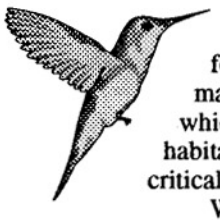
Pochop's dedication to wildlife is evident. Sometimes South Dakota gets hit with a very hard winter and, even with 5.6 acres of land devoted to wildlife, little food is available. When this happens, Pochop can be seen feeding his pheasants a little extra cracked corn. For this reason, among many others, Pochop was presented with the first place Izaak Walton League Wildlife Habitat Award for the state of South Dakota in 1979.

Improving habitat for upland game, like Pochop has done, is one of the most gratifying and worthwhile enterprises landowners can undertake. Most upland game species respond quickly and positively to even the smallest habitat improvement and are readily attracted to edges of farmyards where they are easy to observe.

Not everyone has "extra" acres, or is willing to make "extra" acres for wildlife habitat. However, habitat can be improved in many ways, with little effort by the landowner. Some examples are: 1) leaving fence rows and ditches unmowed; 2) fencing land around farm ponds, leaving just a small area for watering livestock; 3) leaving grain unharvested near cover; 4) preserving marsh or wetland areas; and 5) proper harvesting of forests.

Pochop is very proud of his wildlife planting and quite often takes people through it. Hasche believes that this has probably motivated other people to plant wildlife habitat because Pochop's planting looks so good, and is so successful. He would certainly like to see more in the future.

(Migratory from page 1)



migratory species by providing cover, food, and water in many areas of the west which are surrounded by habitats deficient in these critical elements.

Western riparian areas contain up to 10 times the number of migrants per hectare than adjacent non-riparian habitats. At least twice as many breeding individuals and species have been found in riparian zones versus non-riparian zones. This disparity has been attributed to three factors: the presence of water attracts large numbers of predators and prey alike; plant growth and vegetative biomass are very high, which leads to multi-storied vegetation and greater food production; and vegetation is deciduous in these habitats, so plants do not invest in chemical compounds to protect leaves from insect herbivores as do coniferous trees, thereby allowing abundant insect prey for avian consumption.

Due to the value and productivity of western riparian areas, human activities have also been concentrated in these habitats. As a result, riparian areas are among the most modified habitat types in the west. Habitat alterations include river flow management and diversions (dams, reservoirs, canals, rip-rapping, channelization, and dredging), agricultural clearing, firewood collecting, sand and gravel extraction, urbanization and development, recreation, grazing, groundwater pumping, pollution and effluent discharge, fire, flooding, erosion and soil deposition, and exotic plant invasion.

The most threatened forest habitat of the 106 identified types in North America is western cottonwood/willow riparian. Cottonwood/willow riparian habitat once existed as extensive stands throughout the west but now exist only as cleared agricultural fields, dry riverine habitat, and urban development. For example, California has lost approximately 98.5 percent of its historic riparian habitat and Arizona has lost 90 percent of its historic gallery cottonwood/willow forests. The Colorado River from Fort Mohave to Fort Yuma had 400,000 to 450,000 acres of riparian habitat at the turn of the century, but as of 1986, only 768 acres of pure cottonwood/willow riparian habitat remained. In many western states figures may not be as dramatic, but the trend is similar.

Impacts of riparian habitat loss on riparian obligates, many of which are neotropical migratory birds, have been severe. The western race of the yellow-billed cuckoo was once common in all riparian systems throughout the west. It's population is now estimated at only 475-675 pairs primarily due to habitat loss or modification. The southwest willow flycatcher, Least Bell's vireo, and yellow warbler have experienced population and range declines in western states as well.

In the arid southwest, of the 166 species of nesting birds, 127 (77 percent) were dependent on water-associated habitats and 51 percent were completely dependent upon riparian habitat. Researchers predict that if water-dependent habitats were completely destroyed in the southwest, 47 percent of the lowland nesting birds would be extirpated. And, with continued riparian habitat loss, avian numbers will continue to decline. Once a species population deteriorates to the point where it becomes federally listed as threatened or endangered, a great deal of effort and money are required for protection and recovery. In 1989, the cost for attempted recovery of five avian species averaged more than $700,000 each. Preventing population declines of avian species will save significant funds which can better be used for funding recovery programs for other seriously threatened species or for implementing habitat conservation or improvement efforts.

As you can see, western riparian ecosystems are among the most productive habitats in North America, and among the rarest and most altered. Federal agencies, many non-federal management agencies, and private landowners, attempt to balance consumptive and non-consumptive land use practices in riparian areas and the watersheds on which they depend. This results in sacrificing one resource for another. To properly administer riparian ecosystems, managers need to be aware of interrelationships between hydrological processes, vegetative communities, and wildlife populations. If riparian values are to be conserved for future generations, managers must excercise practices considered in terms of cumulative effects on biological and physical systems.

Source: adapted from "Effects of Land Use Practices on Western Riparian Ecosystems" by David J. Krueper; from Status and Management of Neotropical Migratory Birds, USDA-Forest Service General Technical Report GTR RM-229.

(Wildlife from page 3)

to avian species. Established to reduce the volume of potentially toxic runoff from agricultural land, eucalyptus plantations provided an element of habitat diversity in an otherwise intensively farmed landscape. The trees furnished nesting habitat for resident species as well as shelter and foraging sites for migratory species. As might be expected, both the number and diversity of birds using these plantations increased as the plantations increased in age.

The spatial configuration of plantations established for biofuel or fiber production can be modified to enhance their value as wildlife habitat. Stands composed of multiple species will be of greater benefit than monocultures. Varied spacing of individual trees and rows, irregularly shaped rows or stands, planting in bands or strips, alternating bands of trees with herbaceous vegetation, and leaving areas maintained in herbaceous cover interspersed within or adjacent to plantations will enhance the vegetation diversity and habitat quality. Plantations adjacent or near wetlands, draws, or other sharp breaks in topographic contour may be of greater wildlife value than stands more distant from such features.

Mitigating Negative Effects of Agroforestry on Wildlife

Diminished availability and quality of grassland nesting cover, higher predator-prey ratios, and the tendency for predators to concentrate foraging around vegetation edges have contributed to lower nest success of both game and non-game birds in agricultural landscapes. To moderate the negative effects on grassland avifauna, preference should be given to locating agroforestry plantations adjacent to existing farmsteads or interspersed with rowcrops, small grains, and existing woody vegetation rather than pastures, old fields, hay fields, or other uncultivated cover types. Establishment of agroforestry plantations within or adjacent to extensive tracts of existing grassland should be avoided.

The specific consequences of incorporating forestry into agricultural ecosystems will vary based on the extent of the forestry practice and in response to local and regional wildlife issues. Biologists from state fish and wildlife agencies can provide more specific, regional guidance on alternatives to optimize integration of wildlife and agroforestry objectives.