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Resource-Based Planning and Management

by Charles V. Bohart and
Ralph C. Wilson

Land and water and the life systems they support are the basic resources upon which outdoor recreation environments are formed. Resource-based planning and management is simply the process of letting these resources play the lead role in determining the kinds and amount of recreation facilities and uses for an area, as well as the operation and maintenance requirements in connection therewith.

Demand studies and planning standards are important, but it is essential that their limitations be recognized. Planning based on demand frequently results in developments that function primarily to accommodate a specified number of users which are indicated by a demand study. Demand studies are rarely a true evaluation of actual demand, being in most cases a projection of past use and population expansion. Planning based solely on standards may result in a set number of facilities per acre, per park, or per so many people without regard for the inherent capability of the site to accept them.

In practice, sound planning procedure requires that consideration be given to demand, standards, and resources. We believe, however, that resources should serve as the primary guide to planning decisions. Missouri's outdoor recreation plan says it well. "No matter how vast the population, how great the need, how alarming the deficiencies, or how strong the desire for outdoor recreation, the land and water resources of the



USDA, Soil Conservation Service

Multiple purpose projects can capitalize on topographic features to meet such diverse, but compatible community needs as water supply, flood prevention and recreation.

out-of-doors are the crucial requirement."

There are two important objectives of resource-based planning and management. The first requires that land and water resources provide the greatest possible realization of user satisfaction. The second is development within the capability for sustaining a planned use within the limitations of operation and maintenance capabilities. Resource-based planning and management provides for melding landscape characteristics with recreation facilities to meet the objectives. The final result should be a recreation facility that is both visually and functionally beautiful.

If letting resources establish limitations for planning and management decisions is an acceptable concept, how then is this to be done? It is suggested that an evaluation of the soil is a logical starting place under the resource-base planning and management concept.

Soil Evaluation

For too many years, recreation planners and managers have all too often ignored the importance of soils information. Many operation and maintenance problems, incorrectly attributed to

"overuse," could perhaps have been prevented had soil suitability and limitations been adequately considered.

The major problem is *not* one of insufficient knowledge about the soils. It has been primarily a case of not bridging the gap between soil scientists and recreation planners and managers. The recreationists have not sought out the expertise of soil scientists, while the latter have been somewhat lax in explaining soils and their behavioral patterns in terms that the user can clearly understand. The opportunity for these two disciplines to work together and to understand each other has never been better, nor the need greater.

Soil surveys published by the Soil Conservation Service (SCS) of the U.S. Department of Agriculture contain comprehensive information on the capabilities and limitations of soils for various uses, including recreation.

Soils information will tell, for instance, whether a septic field can be used for sewage disposal, if there is danger of road or building foundation failure, whether grass, trees and shrubs can be established, whether the soil is suitable for impounding water to create lakes and ponds,

and a variety of other information that is basic to developing good, manageable recreation areas. A thorough review of soils information will help to avoid using areas that will be future maintenance problems and a source of both user and manager dissatisfaction and frustration. A soil survey can provide a guide for selecting a use for each area, based on the suitability of the soil. For example, soils that are susceptible to erosion can be planted to trees, shrubs, and grasses and used in a nonintensive way, such as for nature study. Loamy, well-drained soils can be used for play areas and other uses that require heavy foot traffic. A soil survey also provides information necessary for planning a conservation program to protect the area while in use against erosion and other kinds of site damage.

Topography

Another important consideration, in addition to soils, in resource-based planning and management, is topography. The effects of topography, which essentially means the way the land lies, varies for different uses. Slopes must be gentle enough (usually less than 8 percent) for picnic areas and campgrounds without requiring excessive cuts and fills. Slopes of 2 percent or less are most desirable for playgrounds, and slopes up to 15 percent have few topographic limitations for trails.

Natural topography will indicate water depths, location of potential swimming beaches and boat launch ramps and related facilities. More rugged topography will usually provide a varied shoreline and lake shape with numerous bays and coves. Rugged topography also provides the scenic quality that is generally desired on areas devoted to outdoor recreation use.

Consideration for topography in resource-based planning and



Taking advantage of natural topographic features, combined with soil surveys and good conservation practices, can be very helpful in planning and maintaining recreation facilities such as this golf course.

USDA, Soil Conservation Service

management means making use of topography in its present state rather than calling in heavy equipment in order to create a needed condition. More explicitly, if an area with desirable resources for a 50-unit picnic ground is available, it is generally better to plan a 50-unit development and maintain the natural site quality rather than to bulldoze room for an additional 50 units.

Another example of this same concept is to locate parking areas in order to use and to save existing shade trees rather than carving out a large bare area, giving it a hard surface, and then planting new trees. (When shaping and surfacing is planned in the vicinity of existing trees, it is assumed that appropriate consideration will be given to space, drainage, and other factors in order that the trees and their roots will not be damaged.)

Vegetation

Giving due consideration to soils and topography will meet many of the requirements for resource-based planning and management, but vegetation is another key resource to evaluate and use as a guide. As a general rule, park facilities should not be built in a grove of big trees. Research has shown that the best woodland for intensive use (campgrounds, play areas, picnic grounds) is young, vigorous hardwoods, particularly the deep-rooted species such as hickory. Thinning the overstory to a

shade factor of about 50 percent will solve many potential problems.

Vehicular impact, together with that caused by foot traffic, over unplanned or unreinforced areas, can change the ecology of a site. Roots will starve as the absorption, or percolation, rate of the soil is reduced from the original amount available.

Some of the primary tools used in resource-based planning and management are soils maps with interpretations, topographic maps, and vegetative maps. While these are essential, they must be supported by on-site familiarity with the area, its relationship to surrounding areas, and all of its many specific features and characteristics.

Resource-based planning and management is, in the final analysis, primarily a frame of mind, an attitude that says, "Let's make use of this area within its limitations and with a minimum of disturbance to its natural condition." The result will be a wiser and more lasting use of our basic recreation resources.

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Soil Survey as an Aid to Recreation Resource Management

by George D. Bailey

Soils are universally recognized as an important natural resource, whether they are used for producing food or fiber, for supporting engineering structures such as roads and buildings, or for campsites and other recreational use.

A detailed inventory of U.S. soils was begun about 1900, under the U.S. Department of Agriculture. Initially, the purpose of the inventory was to aid in agricultural production by mapping soils and interpreting their properties to show farmers which soils were best suited for crops or other agricultural land uses. As more was learned about soils through the years, interpretive data and ratings of soils for nonagricultural land uses were developed.

Today soil surveys published by the Soil Conservation Service (SCS) include ratings of soils for selected recreational uses, principally picnic areas, camp areas, playgrounds, and paths and trails. Some reports contain soil ratings for additional activities such as golf fairways and ski slopes. These ratings can aid the planning of recreational facilities by identifying soils with limitations for the intended use and stating the particular properties that inhibit recreational development. (See Soil Conservation Service, 1983, in *Who Can You Turn To?*)

Paths and Trails

The importance of soil survey information to recreation resource managers can be illustrated in the

case of soil ratings for paths and trails. These ratings apply to paths and trails used for hiking and horseback riding that lack a prepared surface, and that require little or no cutting and filling in construction. These ratings do not apply to specialized paths and trails, such as nature trails, bicycle trails, and barrier-free trails, although some soil survey data would be useful in the planning of such trails.

Soil Properties

Soils are rated for use as paths and trails by those properties that affect trafficability or erodibility. The properties of soils that are important for trafficability are: slope, texture (particle-size), stoniness and rockiness, wetness, and potential for flooding. Erodibility is determined by specific physical and chemical properties of a soil. Virtually all soils will erode on slopes, but some will erode faster than others.

Slope is the most widespread soil limitation to paths and trails. Ironically, steeply sloping areas attract these forms of recreation, since both hikers and trail riders enjoy the challenge of difficult topography. However, bridle paths require lower trail gradients than foot trails.

Soil textures (the relative proportion of sand, silt, and clay) affect the ease of movement of humans and horses: soils high in sand or small stones can cause slow and toilsome movement, and clayey soils cause difficulties



A bog bridge used to traverse a wet organic soil.

Roy Leonard, USFS

because they are slippery and sticky when wet. Rockiness can slow movement perceptibly, and in the extreme may inhibit the use of some areas for bridle paths.

Wet soils are of two types: perennially wet soils high in organic matter (organic soils of bogs, swamps, and marshes), which can support little traffic by humans or horses; and soils that are temporarily moist, wet, or ponded, because of a seasonally high water table. Soils that are moist or wet for extended periods will compact under traffic, especially under horse traffic, and this can lead to rapid deterioration of a path or trail by promoting erosion.

Floods can block paths and trails, not only with high water, but also with flood debris, and remote areas can be isolated for days by a stream and its tributaries. Dustiness is an additional limitation in arid and semiarid areas. Fragile soils, those which are likely to be damaged by traffic are also indicated in the soil survey reports. Use of these soils for paths and trails should be minimal.

Some soil limitations, such as wet organic soils, steepness, and rockiness, are easily recognized in the field without the aid of a soil survey map. However, most of the soil properties that adversely affect potential paths and trails are hidden beneath the surface most of the time but can emerge as problems after construction. One of the main values of using soil survey data in the planning of new paths and trails is that potentially troublesome soils can be avoided in route location, or, if such soils must be used, special design measures or intensive maintenance can be planned for.

Degree of Soil Limitations

SCS soil survey reports contain tables showing the degree and kind of soil limitations for paths and trails. Degree is expressed as *slight*, *moderate*, or *severe*. *Slight* means that the soil is generally favorable for this use, that any limitations present are minor and easily overcome, and that construction and maintenance costs will be minimal.

Moderate signifies that the soil limitations present can be overcome or alleviated by planning, design measures, or special maintenance, but the construction and maintenance costs will be high.

Severe means that the soil properties are unfavorable and that the limitations can be offset or alleviated only by costly soil reclamation, special design measures, intensive maintenance, limited use, or a combination of these measures. In some instances the costs of these measures may be prohibitive.

It should be emphasized that a severe rating does not necessarily imply that a soil should be explicitly avoided for a particular use. In many cases the recreation planner may have little choice; indeed, terrain that is most appealing for paths and trails often has soils rated severe because of

slope or other soil property that has aesthetic appeal.

Design Measures

Numerous design measures are available to overcome or minimize soil limitations for paths and trails. These measures range widely in cost and in the skills required to construct them, and many can be constructed with either milled lumber or native materials (trees, rocks, and soil). Some measures are quite simple to install, such as switchbacks for soils on steep slopes, stone mulch for soils high in clay, and waterbars for soils subject to erosion. If large stones are present, they can be used to construct steps or waterbars.

Sophisticated design measures such as bog bridges for wet organic soils and "turnpike" structures (an elevated trail tread with accompanying ditches) for soils with a seasonally high water table, will require skilled labor.

Some measures such as step-stones are suitable only for foot trails.

For some soils, such as those with a high proportion of sand or small stones, there are no feasible measures to overcome or minimize their limitations, and any control measure for flooding would be prohibitively expensive. Soils with these limitations should be avoided or used minimally for paths and trails.

Management practices may be an alternative to design measures for some limitations. For example, managers can restrict the number of users of a trail on erodible soils, or temporarily close a trail during flood season or period of high water tables. (See Hooper, 1983, and Proudman and Rajala, 1981, in *Who Can You Turn To?*)

Resource managers often discover that a new path or trail can be a financial nightmare. Typically, new routes are constructed by clearing vegetation,



Part of the soil map for Montgomery County, MD. The symbols indicate the different soils, and the solid lines show the extent of each. The soils indicated by the symbol IdB2 are rated Moderate for paths and trails because of wetness, and those indicated by the symbols GmA, GmB, WhA, and WoA are rated Severe because of wetness. The remaining soils are rated Slight.

with or without grubbing of the soil surface, and by placing signs or blazes to mark the route; switchbacks may or may not be included. The cost of these tasks for a given route can be reliably estimated. Most of the design measures to aid trafficability or reduce erosion are added as the need arises, but the amount of work is nearly impossible to estimate. Soil ratings, together with work records of adjacent paths or trails, can allow managers to make rough estimates of design measure work needed on new paths and trails. Detailed estimates are not practicable as the type and number of measures vary too much from place to place, even for the same soil limitation.

The major value of soil data to resource management is in the planning of new facilities, but the resource manager with a fully developed system of paths and trails can also benefit from soil survey information. Few paths or trails are trouble-free under active use, and soils information can aid in the diagnosis of problems that lead to deterioration. Once a soil problem is identified, the manager can choose between installation or redesign of a measure to overcome or minimize the problem, or relocation of the problem section of the route. The latter choice is essentially new trail construction. The use of soil survey information is recommended to lessen the chances that a relocated section will deteriorate in much the same way as the section it replaces.

Engineering Facilities

In SCS soil survey reports, recreation resource managers can find a broad range of valuable information that is useful for planning, not only for recreation, but for engineering facilities as well. These reports contain laboratory data on the physical and chemical properties of soils and suitability ratings for engineering uses of soils, such as sanitation facilities, roads, and small buildings. The maps on which areas of different soils are delineated usually have an aerial photo base, which show the location of trees, buildings, roads, streams, and other features.

Consultation

Although published soil surveys are available in many public libraries, a do-it-yourself approach in using soil information is not advised. Consultation with the local SCS office is recommended. Soil ratings are not static; as soil scientists learn more about soils and how they affect land use, the ratings may change from those published. Some soil surveys published prior to 1974 lack rating tables for recreational land uses, but the SCS can produce them for most mapped areas. Some parts of the country are not covered by published survey reports, but the local SCS office may have unpublished data useful for recreational land use planning.

Conclusion

Today's resource managers are faced with a growing demand for

recreation facilities together with increasing shortages of funds and personnel, and it is to their benefit to use any planning aid that can reduce construction and maintenance costs and contribute to the durability of these facilities. Soil survey interpretations prepared by the U.S. Department of Agriculture's Soil Conservation Service can contribute to the installation of lasting facilities and the moderation of their operating costs, and can help managers ensure that their land use decisions are environmentally sound.

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The Soil Conservation Service has prepared a slide presentation entitled "Soil Information for Paths and Trails." This presentation examines the soil limitations for paths and trails, the rating criteria utilized, and shows specific design measures which can be used to overcome or minimize the limitations. The SCS encourages all potential users of these soil interpretations to contact their local office of the Soil Conservation Service and arrange for a viewing.

Plant Materials for Conservation

by Robert S. MacLauchlan

Soil Conservation Service Centers in 24 Locations Develop Plant Materials to Combat Erosion, Sedimentation and Other Special Problems.

Plant Materials for Conservation

Finding plants for conservation is the primary job of plant materials centers (PMC). Most of these centers are operated by the United States Department of Agriculture, Soil Conservation Service (SCS). To date, more than 160 cultivars of plants released by the centers are being commercially produced by seed growers and nursery staff.

Conservation plants are needed mainly to help solve two big problems common to all parts of the United States: erosion and sedimentation. Erosion can occur wherever the soil is unprotected by vegetation or is subject to the erosive force of wind or water.

Fortunately, the right kind of plant cover and management can control most erosion and sedimentation. And many plants good for controlling erosion have other conservation benefits. They provide food and cover for wildlife, beautify the landscape, increase the forage production of range and pasture, or improve the quality of the environment in a variety of ways. But the same plant won't be equally effective in all geographical areas or for all purposes. Whether a particular plant is adapted depends on soil type, climate, land use, and other characteristics of the environment.



Test plot of 'Luna' pubescent wheatgrass, 'Rosana' western wheatgrass, and 'Manchar' smooth brome on processed oil shale.

USDA, Soil Conservation Service



'Cape' American beachgrass protects this beach from erosion by wind and coastal rainstorms.

USDA, Soil Conservation Service

There are 24 PMC's in the United States. The National Plant Materials Center in Beltsville, Maryland, is the central facility for distributing plant materials from foreign sources that may be useful in programs of the 23 field PMC's. The work at the 24 centers includes cooperation with other federal agencies, state experiment stations, state departments of natural resources, conservation and wildlife commercial businesses, and seed and nursery associations.

Each field PMC serves major land resource areas; these areas have common characteristics of climate, topography, and soil and water resources. The service area of most PMC's covers parts of two or more states.

The PMC's begin their testing procedure only after a specific conservation problem has been identified. The first step in testing is to gather the plants that seem to have potential for solving the problem. These may be native plants or plants introduced from foreign countries.

The plants are initially tested and compared in small plots.

Although the plant scientists are mainly concerned with erosion control, they also consider a plant's possible value for specific uses, such as livestock grazing or wildlife cover, and for multiple land uses, economic development, and environmental quality.

Plants determined to be superior in initial testing are selected for advanced testing. Selected plants must be superior to plants already available for solving the identified problem.

After evaluation, the superior plants are used to produce seed for final tests in large plantings under actual use conditions. Plants that demonstrate superior performance in use are then released for commercial production.

These new cultivars are given names and information is provided on how to plant, fertilize, harvest and prepare the seeds for use in plantings to meet the needs for which they were developed. Commercial seed growers and nursery staff then produce the seed or plants for sale.

Selecting Conservation Plants

Each PMC works on conservation problems common throughout the nation, such as roadbank erosion. It also works on problems limited largely to the area it serves. For example, the center in Cape May Court House, New Jersey, was established to find plants that could control shoreline erosion and stabilize sand dunes along the mid-Atlantic coast.

In the West, hundreds of thousands of acres are affected by salinity and alkalinity. Most saline-alkaline soils have a poor plant cover. They produce little forage and are highly erodible. But scientists at the center in Pullman, Washington, found that a tall wheatgrass introduced from Russia grew well on many of these soils. This plant, 'Alkar' tall wheatgrass, has controlled erosion and increased forage yields on many western ranches. 'Alkar' is also used as a wind barrier in cropped fields.

The centers don't limit testing for a specific problem to only one kind of plant. Scientists have found that a compatible combination of plants generally provides the best erosion control. These combinations or mixed plantings are also attractive and may provide other benefits. For example, flowering forbs and shrubs on a roadbank will protect the soil better than grass alone, and they will beautify the landscape much more. In a windbreak, a mixed planting of flowering and fruit-bearing shrubs and trees is attrac-

tive and provides food and cover for wildlife.

Range and Pasture

Rangeland may appear rugged from a distance, but a good plant cover is required to protect the soil. Saline-alkaline soils, steep slopes, arid climate, and overgrazing add up to a poor plant cover on many rangelands. The result is low forage production, excessive erosion, and stream sedimentation.

rangeland. It also responds more favorably to intensive management practices such as fertilization and irrigation. And, like rangeland, it needs a good plant cover to control erosion.

To protect and improve range and pasture, SCS plant materials centers have tested tens of thousands of plants from all over the world. One example is 'Lana' woollypod vetch. 'Lana' is a persistent, self-perpetuating annual legume that was introduced from



Final testing of 'Cave-In-Rock' switchgrass, a warmseason pasture grass, on a cooperators farm in Iowa.

USDA, Soil Conservation Service

Rangeland is one of the nation's most valuable resources. Through range plants and grazing animals, it provides food and fiber products. Rangeland also provides wildlife habitat and recreation opportunities.

Land suitable for pasture generally has a higher potential for forage production than

Turkey. It was tested and released by the center in Lockeford, California.

'Lana' is used to increase the amount and quality of range forage. It also helps protect valuable rangeland watersheds. Cattle, sheep, and deer relish the plant in both its green and dry stages. It retains 8 to 12 percent

protein in its leaves and stems after it matures, and it produces as much as 1,500 pounds per acre of seed. The seed is favored by quail, mourning dove, and pheasant.

The Pullman PMC released 'Latar' orchardgrass for use in pasture mixtures. 'Latar' is highly productive and reaches the hay-cutting stage about the same time as alfalfa. It contains less lignin and more digestible

Since then, they have released more than 60 varieties that are used for this purpose.

The center in Big Flats, New York, released 'Tioga' deer-tongue, 'Arnot' bristly locust, and 'Lathco' flatpea for the acid spoils of the eastern coal mining region. The center in Quicksand, Kentucky, released 'Appalow' sericea lespedeza for reclaiming surface-mined areas in Appalachia.

Recreation, Beautification, and Environmental Quality

Recreation areas that get heavy foot traffic—parks, ballfields, golf courses, and the like—require plants that are durable and easy to maintain. Areas used mainly for nature study have other requirements. SCS plant materials centers have released many plants for beautifying the environment and preserving its quality.

The centers have released several grasses for recreation areas subject to heavy foot traffic. Two examples are 'Durar' hard fescue (Pullman PMC) and 'Tufcote' bermudagrass (Beltsville National PMC). Both grasses are drought-tolerant and wear-resistant.

To beautify plantings for erosion control along highways in the Midwest and Great Plains, the Manhattan PMC is testing native wildflowers. It is also testing ways to plant, propagate, and harvest wildflowers. 'Kaneb' purple prairieclover and 'Nekan' purple pitcher sage are two Manhattan PMC releases. These plants can be planted in their natural prairie habitat to help restore the natural plant community. They also make attractive erosion control plants for utility corridors, parks, roadside rests, urban areas, and watershed structures.

Controlling erosion and reducing sedimentation are the two major ways that conservation plants benefit the environment. But other environmental benefits have become increasingly important in recent years.



USDA, Soil Conservation Service

'Tufcote' bermudagrass makes a durable grass cover for heavily used play areas.

nutrients than any other orchard-grasses that the center tested.

Mine Spoil Reclamation

SCS plant materials centers began testing plants for mine spoil reclamation in the 1940's.

For reclaiming western mine spoil, the Bridger PMC released 'Critana' thickspike wheatgrass, 'Rosana' western wheatgrass, 'Goshen' prairie sandreed, and 'Wytana' fourwing saltbush. The center in Tucson, Arizona, released 'Corto' Australian saltbush for reclamation in arid and semiarid parts of the Southwest.

For example, restrictions on herbicides are forcing utility companies to look for other ways to control trees and brush in rights-of-way. Mechanical or hand removal is costly. To help suppress woody invaders, scientists at the centers are testing both new varieties and those previously released for other purposes. Herbaceous plants that tend to dominate a site, such as 'Lathco' flatpea and 'Chemung' and 'Emerald' crownvetches, are showing promise.

Wildlife Habitat

As urban development and other intensive land uses expand, wildlife habitat is diminished in extent and quality. There is a corresponding decrease in the number and often the kinds of wildlife that the remaining habitat can support. Large single-crop farms replace natural habitat with a far less diverse plant community.

SCS has released several woody plants that have value for wildlife. These include 'Rem-Red' Amur honeysuckle, 'Midwest' Manchurian crabapple, 'Roselow' Sargent crabapple, 'Cardinal' autumn-olive, and 'Pink Lady' winterberry euonymus.

'Natob' bicolor lespedeza, 'VA-70' shrub lespedeza, and Thunberg lespedeza are preferred food and cover plants for quail in the Southeast. 'Natob' was released by the Beltsville National PMC. It can be planted along woodland borders or used as a wildlife hedge. 'VA-70' is a herbaceous plant that can be seeded

in erosion control mixtures along stream channels; this combination creates excellent habitat by supplying food, shelter, and water in the same area.

In the South there was need for a proso millet that could produce a heavy seed crop to attract game birds, particularly doves. 'Dove' proso millet, an introduction from India, was tested and released jointly by the center in Americus and the Georgia Agricultural Experiment Station.

Roadside Stabilization

SCS plant materials centers cooperate with state highway departments to find plants that will stabilize roadsides. The best plants are those that need little maintenance, grow a dense root system that can take hold on steep slopes, and tolerate droughty sites.

The centers have released many plants suitable for roadside stabilization. Some examples are 'Emerald' crownvetch, 'Zorro' annual fescue, 'Appalow' sericea lespedeza, and 'Kalo' dwarf English trefoil.

Several grasses for roadsides were tested cooperatively by the Manhattan PMC and the state of Nebraska. As a result, low-maintenance, short-growing native grasses are saving the state thousands of dollars each year on mowing highway roadsides.

The Lockeford PMC has worked with California's highway department to find fire-resistant grasses for roadsides and firebreaks. In many foothill and

mountain areas, brush fire is a severe hazard. The dense native brush ignites readily, and fire spreads rapidly and is extremely difficult to control.

Firebreaks are cut to halt the spread of fire and provide access for firefighting equipment in the rough terrain, but the brush soon reinvades. The Lockeford PMC found that 'Perla' koleagrass and 'Luna' pubescent wheatgrass could be seeded on cleared firebreaks to prevent erosion and slow the reinvasion of the brush.

Streambanks, Shorelines, Sand Dunes, and Watershed Structures

Where land and water meet, special care is needed to control erosion. When streambanks erode, valuable soil is washed away. Shoreline erosion can damage beaches and erode the banks of coastal sounds and tidal areas. Sand dunes in coastal areas are susceptible to wind erosion and to wave erosion from severe storms. Wave action can destroy inadequately protected watershed structures in inland areas.

A good plant cover can protect many of these critical areas. Plant materials centers have tested and released several plants for stabilizing shorelines and streambanks. For example, 'Halifax' maidencane was released by the Coffeerville PMC for use in the South. 'Halifax' is particularly effective where the water level fluctuates along the shores of ponds, lakes, and streams. It is transplanted to the waterline,



USDA, Soil Conservation Service

This earthen watershed structure is protected by 'Shoreline' common reed.

where it grows up the banks and into the water. This insures an adequate cover when the water level fluctuates.

The Big Flats PMC released 'Streamco' purpleosier willow for streambanks throughout the Northeast and in parts of the Midwest. 'Streamco' produces a dense cover that helps protect the banks even during flood flows caused by severe storms.

The Cape May PMC released 'Cape' American beachgrass and 'Emerald Sea' shore juniper. These plants can be used to stabilize and build sand dunes along the mid-Atlantic coast.

The Corvallis and Pullman PMC's developed ways to stabilize sand dunes in the Pacific Northwest. Initially the sand is stabilized with European beachgrass. Then, adapted perennial grasses and legumes or trees and shrubs are planted for permanent protection.

The Knox City and Manhattan PMC's are testing plants and techniques for stabilizing watershed structures and the shores of lakes and reservoirs. The Knox City PMC released 'Alamo' switchgrass and 'Shoreline' common reed for these purposes.

Windbreaks and Shelterbelts

High winds not only erode unprotected soil but also can destroy crops. If the soil is used to grow crops that produce only

small amounts of residue, it is especially susceptible to wind erosion.

The center in Bismarck, North Dakota, tested and released 'Midwest' Manchurian crabapple as a fruit-bearing shrub for windbreaks in the intensively cultivated areas of the upper Great Plains. 'Midwest' consistently produces fruit that helps sustain wildlife through the winter. 'Roseglow' Sargent crabapple, released by the center in East Lansing, Michigan, has uses similar to 'Midwest.' It is adapted to areas from the Midwest to western Oregon.

The Los Lunas PMC released 'King-Red' Russian-olive for shelterbelt and windbreak plantings in the Southwest. This tree also provides food and cover for wildlife.

Many conservation plants, mainly trees and shrubs, are useful as screens and noise barriers. 'Barranco' desertwillow, another Los Lunas release, is an attractive plant for screens and windbreaks. It is also a good general landscaping plant for roadsides, rest areas, homesites, and parks and other recreation areas. 'Flame' Amur maple, an Elsberry PMC release, has similar uses.

Robert S. MacLauchlan is a National Plant Materials Specialist with the Soil Conservation Service, U.S. Department of Agriculture.

SCS Help Available Locally

Plant scientists at the SCS centers will help with individual problems that have a potential for solution with plant materials. Locations of centers can be obtained by contacting the Soil Conservation Service.

In addition to plant specialists in the 24 centers, SCS maintains local staffs in offices throughout the country. These specialists are available to provide direct assistance as needed.

SCS addresses and telephone numbers are listed in telephone directories under *U.S. Government, Department of Agriculture, Soil Conservation Service.*

New Parks From Old Cemeteries

by Robert A. Abernathy

Pulaski, Tennessee, is a community of 7500 people, in a rural county with a population of 25,000 located in southern middle Tennessee. Pulaski is the county seat and was incorporated in 1820, eleven years after the county was organized. Soon after the first settlers came to the area a community was established on the banks of Richland Creek which was to grow and prosper, and later to be named Pulaski.

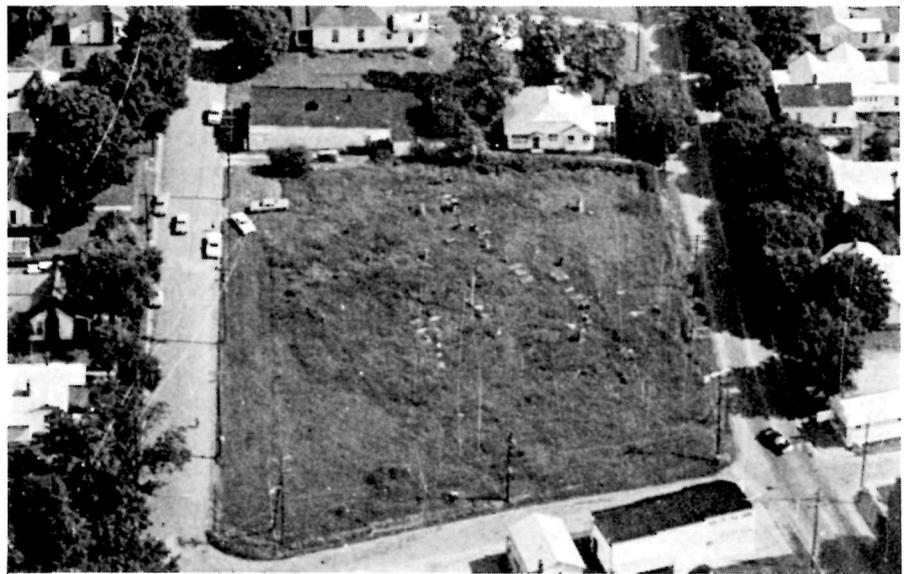
As early settlers came to this new community to live, work, and worship their God, homes, businesses, and churches were built on the high ground north of the creek. On the highest ground in the town, as was the custom, a graveyard was laid out for the burial of the dead. This graveyard, as cemeteries were called in those times, was approximately one acre in size.

It is not known how many people were buried in this graveyard since no record of burials exists, but 218 positive gravesites and names have been inventoried from stone markers. The first known burial was in 1817 with the last known burial being in 1883. In the mid 1850's, minutes of the Board of Mayor and Aldermen of the Town of Pulaski revealed that the "old graveyard" was about filled and that a suitable site at the edge of town should be acquired for a "new cemetery." This was done with the first burial in this new cemetery taking place about 1855.

As time passed and as the town, later to become a small progressive city, grew both in



John E. Roe



John E. Roe

Deteriorating graveyard in Pulaski, Tennessee, prior to 1966.

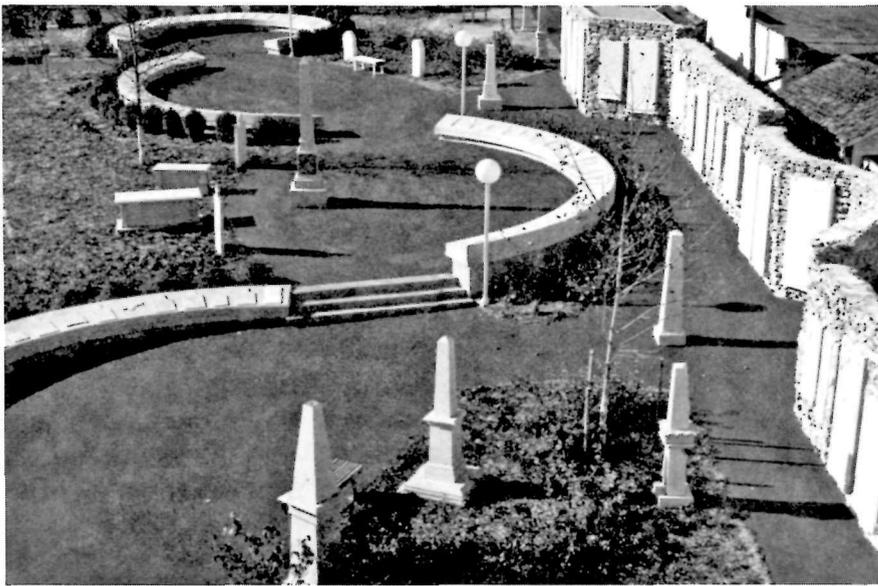
population and area, the old graveyard received less and less attention and maintenance. As generations passed on there were no close relatives to maintain the gravesites of their loved ones. The town did what it could to maintain the graveyard but by the 1940's and 1950's the only maintenance was the cutting of weeds and underbrush by jail inmates once or twice a year.

During this period of time vandalism crept in, resulting in the destruction of many limestone grave markers. The old section of the town where the graveyard is located began to deteriorate and in addition to the gravestones be-

ing broken, the site became a dumping ground for garbage.

Demonstration Grants

During the latter part of 1966 the City of Pulaski learned that the United States Department of Housing and Urban Development intended to fund several demonstration grants which would revive or maintain neighborhoods from further deterioration. One of these demonstration projects (90% federally funded) was designed to learn if old abandoned public cemeteries could be cleaned up and used for a worthwhile public



John E. Roe



John E. Roe

Old Graveyard Memorial Park in Pulaski, Tennessee.

purpose while maintaining the dignity of the hallowed ground. Sensing it had a perfect example of what HUD was looking for, Pulaski immediately filed an application which was approved in short order.

In addition to "turning around" a deteriorating city neighborhood, HUD also wanted to learn if new cemeteries could be used for dual purposes or if they could be established in otherwise unusable areas such as large highway interchanges or in the landing paths of planes near airports. Cemeteries today comprise well over two million acres of land in the United States.

With good developable land becoming more and more scarce, it behooves municipalities to make use of these abandoned and/or new cemeteries for other purposes, if possible. Laws in some states prohibit changes of any kind in a cemetery but Tennessee law does allow projects such as we undertook.

Maintenance-free Design

Knowing that the new park would be maintained by the city after its completion, every effort was made in the design and landscaping plans for it to be as maintenance-free as possible. Extensive use of Boston Ivy as a

ground cover is an example of keeping ground maintenance to a minimum. Only about fifty percent of the lawn is grass which requires weekly mowing during the summer months. Another example is the placing of all monuments on stone walls, set in concrete or on concrete bases. This eliminates all trimming which would be time-consuming. All trees and shrubs selected were those requiring practically no attention.

Over 6000 King Alfred jonquil bulbs are planted along the walkways. They are the first blooms to be seen each year and are followed by other flowering plants, trees and shrubs all through the summer and into the fall months. Fifty dogwoods, half white and half pink, are scattered throughout the park which turns the entire area into a blaze of color the latter part of April. Beds of Shasta daisy blooms follow along with oakleaf hydrangeas, tulip poplars and day lilies.

Each year since the park project was completed, the various religious bodies in the community have joined together in celebrating Easter Sunday sunrise services around the paved center monument area. This is an ideal setting for these services. Other groups such as the local high school and a junior college have used the park as a setting for some of their annual school pictures.

During the warm summer evenings local citizens and descendents can be seen strolling through the park reading inscriptions from the monuments. Many

descendents of those buried in the graveyard live in the area and they were especially glad to see the project undertaken, primarily due to the long generation gap. If there had not been this generation gap, the project probably would not have been allowed by the courts since the relatives would not have wanted their loved ones' gravesites altered. On the other hand, without a long generation gap these relatives probably would have maintained the graves and the graveyard would not have deteriorated through neglect and the rehabilitation project would not have been necessary.

Brochures placed at a State of Tennessee Welcome Center nearby have been responsible for many tourists stopping by. This is evidenced by many letters received from these people on return to their homes. All of the comments have been complimentary.

Old Graveyard Memorial Park was placed under control of Pulaski's Parks and Recreation Department. This department has some 14 parks and playgrounds under its control with all but the old graveyard and the recreation center used for outdoor athletic and sporting events and playgrounds for children. A year-round crew of 5 people maintain all of our parks and recreation center facilities. Since the old graveyard was designed for a minimum of upkeep, no additional personnel were required when this park was added to the system.

The park has 18 lights along

the walkways which adequately light the area. No vandalism has occurred since the park was opened. The design was such as to discourage vandalism. Before the project, in addition to using the area as a dumping ground, vandals would take the flat tombstones and either destroy them for the fun of it or actually take them away. After the initial inventory of tombstones and markers was taken, one headstone was actually broken off at ground level and stolen.

Construction Stage

During the construction period all stones with any inscription whatsoever were removed to a nearby building for safekeeping. All broken stones were fitted together and glued with only 5 pieces that could not be placed. All gravesites were surveyed and identified before any stone was

removed but no grave was disturbed in any manner. All construction was done above ground with the exception of shallow concrete footings under rock walls and large monuments.

The gravestones, most of which were native limestone, were lightly sandblasted to clean them in order to make the inscription legible. After cleaning they were sealed with a liquid spray for preservation. The cleaning and sealing method has proven very satisfactory.

Three types of grave markers and monuments were found in the graveyard. One type was the ordinary headstone and footstone that was placed in the ground at the grave. These stones were removed from the ground and sawed off below any and all inscriptions. The top part was set in concrete in five concrete arcs. The bottom part, below the in-



scription, was broken into pieces and used as filler in the rock wall. No stone or rock was removed from the premises. All waste was used as filler in the rock walls. The tops of the vault-type monuments (large size were for adults and small for children) with the inscriptions were placed vertically on the rock wall along the entire north side of the area. The third type of monument was the obelisk which marked the family plot. These were relocated at the entrances and along the walkways.

In the center of the park a large concrete monument was built with the names of all those known to be buried in the graveyard listed on a bronze plaque attached to the monument. Each name was keyed to a site grid with the new walkways overlaid on a bronze plaque. Thus, the actual gravesite of any individual can be identified. No gravestone or marker was returned to the actual gravesite since all stones were incorporated in the renovation design.

After the project was completed the Tennessee Historical Society designated it as a site with historical significance since most of the founders and early leaders of Pulaski are buried there. Many of these people were born in European countries, migrating to Virginia and North Carolina before settling in Pulaski.

Conclusion

Seventeen years later the citizens

of Pulaski look with pride at "Old Graveyard Memorial Park." This project has reclaimed a one-acre graveyard, converting it to a beautiful, passive park used primarily by middle aged and older citizens. Almost immediately after construction was completed, homeowners in the area began to spruce up their property which was one objective both the city and federal government had hoped to achieve. Today this section of the city around the park is still a fine neighborhood, thanks primarily to the HUD project.

The total project cost was \$144,000 including, in addition to the \$83,000 construction cost, all legal research and the legal report, administrative costs and the complete HUD demonstration project reports. The City of Pulaski received force account credit for over 50% of its share of the project with only \$6000 in cash actually invested in this park.

Approximately 1500 copies of the project report "Cemeteries As Open Space Reservations" have been distributed throughout the United States and many foreign countries on request. The project site has been visited by many planners and other officials looking for ideas that may be applied to other abandoned cemeteries. Articles have appeared in several publications including The Wall Street Journal, The Huntsville (Alabama) Times, The Jackson (Tennessee) Sun and other newspapers.

Robert A. Abernathy is the City Recorder of the City of Pulaski, Tennessee and was the Project Coordinator of the cemetery project. He may be contacted at P.O. Box 633, Pulaski, Tennessee 38478 for further information.

Maximizing Land Resources

by William L. Hughes

Arlington County, Virginia, was originally part of the District of Columbia. Our first President, George Washington, laid out a ten-mile square area which was to be the Nation's Capital. In 1847, the Federal Government retroceded the Virginia side of the ten-mile-square back to the State of Virginia. The Virginia part of the District of Columbia remained a sleepy resort type of area and was principally a rural farming community until about 1940.

The pressure of World War II caused Arlington's character to change dramatically. World War II brought the Pentagon, National Airport, Navy Annex, Arlington Hall Reservation, and Henderson Hall, all Federal Government installations. Currently, the Federal Government owns about 18% of the land area in the County. The County consists of 25.5 square miles, one of the smallest counties in the United States and one of the more densely populated areas, with 152,599 residents in 1980.

After World War II there was a tremendous housing boom responding to the unmet needs because of the lack of construction during the War. Furthermore, during World War II a large volume of garden apartments were built, many of which have since been converted to condominiums. The land use planning that went on during the early period was unsophisticated and, to say the least, substantially ignored the standards for open space. The land use development reacted to the pressures of

World War II and the pressures of housing needs related to the expansion of the Federal Government after World War II.

In the analysis of open space in the County, there were many opinions about what the need was. For instance, many citizens felt that Arlington's proximity to the District of Columbia afforded it unique opportunities and, therefore, local parks were of little concern. Furthermore, the baby boom of the 1950's caused the community to react strongly to education needs and, therefore, the park and recreation system became subordinate to that. An early effort to develop a park and recreation program resulted in the Planning Commission deciding that recreation programs would share school facilities with parks adjacent to the schools. School buildings became the recreation centers. Hence, to some large degree, parks and recreation programs became a second cousin to the public school system.

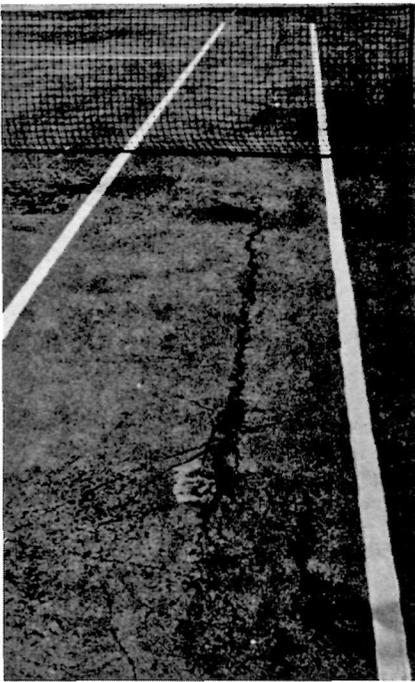
With that as background, it is understood that the County made little effort to meet standards for providing open space for park and recreation purposes. Later community interests increased in open space and recreation activities, and in the late 1960's through to the mid-1970's, a considerable amount of effort was placed on purchase of park land and providing recreation programs. Although substantial open space was purchased, it was at a very high price and often consisted of remnant pro-

perties which did not provide for optimum activity area. It was indeed challenging for the County staff to find unique ways of providing the park and recreation space that was now desired by the community.

For instance, the County built a large community center as a wing of a new junior high school, providing a central focal point for indoor and outdoor recreation activities. When other departments of County Government had capital projects, the park and recreation divisions would review those projects to determine if there was some opportunity to provide expanded park and recreation services for citizens. There are two instances described in this article where both public and private lands have been utilized in unique ways.

Minor Hill Tennis Courts

The Department of Public Works provides water distribution for the County. They purchase the water from the Corps of Engineers and pump the water to ground level storage reservoirs which then provide a gravity flow system for the County. A project was established to build a 12-million-gallon ground level enclosed water reservoir which, fortunately, had a flat deck on the top. The County Park Division negotiated with the Department of Public Works to have the top of the reservoir reinforced so that seven tennis courts could be built on the deck. The deck was designed with sleeves in the concrete for the fence, net posts, and light bases and conduit for wiring



Arlington County, VA

A detail of a tennis court scheduled for resurfacing.

to the lights was installed as part of the project.

There was such a small additional cost to the overall project that the Public Works project carried the cost of the sleeves, the extra reinforcing in the deck, and the conduit. The Park Division agreed to pay for the fencing, net posts, nets, light pole bases, lighting fixtures and wiring. The agreement provided that the Park Division would take over the deck and would install the infrastructure to make the tennis courts functional.

The problems that occurred resulted from a lack of experience. There are lessons for everyone. The first issue was whether or not the engineers had designed the deck so that the asphalt contractor could use a roller to level and compact the asphalt for the tennis courts. It was determined that a light weight roller had to be used instead of the roller normally used. After the asphalt was in place, the fence was erected, the lights were installed, and the courts were put in play.

For the first year the courts

were well used and in excellent condition. Like all new projects, however, the test of time reveals the real problems. No one realized how much expansion and contraction that size of deck would have. Each one of the expansion joints had so much movement that large cracks developed over the tennis court surface. Unfortunately the courts were laid out so that the expansion joints went down through the playing surfaces and not across the net lines.

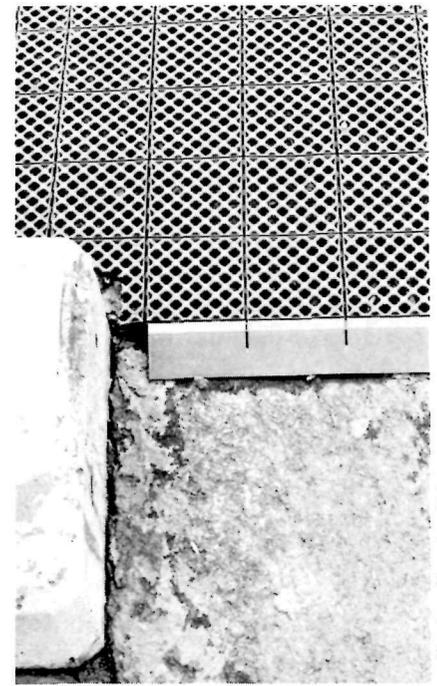
If this problem had been realized initially, no doubt the design of the expansion joints could have been altered so that the cracks would occur directly underneath the net. The courts soon became unplayable as a result of the inability to keep the cracks from recurring.

Further, the deck was designed flat, and is so large that water does not drain off very well. Therefore, the surface is wet a long time after a rain. During the winter, considerable freezing and thawing causes major damage to the asphalt surface.

And Now the Salvation

A new product called "Mate Flex" has been installed on three of the courts which gives it a mat-type surface which is unaffected by the expansion and contraction of the deck. The mat is pegged down at the edges and in a sense floats over the existing surface. With the successful experiment in using the mat surface, the County is now anticipating placing additional mats over the remaining four courts.

Today Minor Hill Tennis Courts represent an interesting experiment in the use of a Public Works project deck area for recreation use. In a dense urban area, where land costs are extremely high, it would be unlikely that these seven tennis courts would have been built. To buy land for seven tennis courts



Arlington County, VA

A detail of the new and old tennis court surface.

would have required the acquisition of developed property resulting in the loss of housing for citizens, which would not be acceptable.

On the other hand, the Department of Public Works projected the need for a reservoir, purchased this property long in advance, and land banked it for a number of years until the reservoir was funded. This joint-use example should be welcomed in most communities today. Certainly Department of Public Works projects can gain double support if their basic utility need is achieved and a broader community purpose realized. This is not to say that some citizens did not object. In fact many did because they feared the increased activity in the neighborhood as well as the possible problems with lights. Given time, however, all of the objection has subsided and as the courts are now being resurfaced they will serve the community very well.

Community Gardens

In a similar manner to the tennis courts, the Park Division and

the Extension Service office developed a program for community gardens on small parcels of under-utilized County property and private property. For instance, a large park was under development in central Arlington where the County was purchasing twenty older houses. Until the park was developed, certain portions of the land were cleared and made available to citizens for a community garden program. After the entire site was cleared, the gardens were replaced with an urban park. Citizens did enjoy nearly ten years of gardening on property that would have been otherwise unused.

The largest single opportunity for gardens occurred under Virginia Electric Power Company (VEPCO) high tension lines in South Arlington. Initially, VEPCO agreed to give the County a permit for the ground which provides 74 garden plots in a lineal 100-foot-wide swath running parallel to a stream bed park. Subsequently, the Northern Virginia Regional Park Authority purchased the property, and has permitted the County to continue the garden activity. There are additional garden sites on other County and private land.

The County, in administering this program through the Extension Service, provides the ground, initial plowing, a water tap and fencing. The gardens are turned over to a citizen's group, with overseeing by the Extension Service Horticulture Staff. A fee of ten dollars per plot is charged which covers the administrative costs. No attempt is made to recover all service costs.

To date there are not enough garden plots in the County to supply the demand. Gardening has turned out to be another form of recreation. The fact that half of the Arlington citizens live in garden apartments or condominiums gives the reader a sense of need. Many citizens simply do not have the privacy of their own yard. Furthermore,



A community garden on land formerly owned by VEPCO.

Arlington County, VA

early subdivision development provided for very small lots resulting in limited capacity by many home owners to provide a sizable garden.

In maximizing land resources, it's important for the agencies having the need to look at other agencies' resources and determine if joint use arrangements are feasible. This, of course, takes on another dimension—that of maximizing interagency cooperation. It would have been very easy for the Department of Public Works to say "no" on the use of the deck of a 12-million-gallon water reservoir. They could have come up with all kinds of reasons to say no. Because of the interagency cooperation that exists in Arlington, the project became feasible. The same principle goes for interagency cooperation with Schools, Fire, Police, etc.

Another example in Arlington is a community center where there are five users in the building. There is a fire station, a public library, a recreation center, a visitor's center and an instrument room for the State Air Pollution Control Board wherein they have their air sampling instruments. It is this type of interagency cooperation and appreciation for one another's area of responsibility that makes the Minor Hill Courts a success. The

same holds true with private enterprise. We are currently looking at "borrowing" land from developers for two softball diamonds. The County could use the land until such time that the land is scheduled for development.

William L. Hughes serves as a group manager for six operating divisions. He is in charge of Economic Development, Inspection Services and in charge of the Extension Service, the Park Division and the Recreation Division. The article above relates to the leisure service group and the relationship to other County departments.

Mr. Hughes is a 1954 graduate landscape architect from the Ohio State University. He has held several positions in the County Government starting as a Planner, then Director of Recreation and Parks, Director of Environmental Affairs and now Director of Community Affairs.

Recreation Resource Management: Science, Art, or Guessing Game?

(A Paradox in Land Stewardship)

by John T. Hultsman and

Richard L. Cottrell

Welcome. Welcome indeed to some of the most beautiful lands and waters in the United States: the resources the American public has entrusted to those of us who work in recreation management. Picture a clear, bubbling stream painted in pristine coolness by the soft pastels of lichens, moss, and ferns. And now—enter the planner; the designer; construction and maintenance crews; the administrator; and yes, even the “professor” and the consultants; all with the same motto: “WE NEVER MAKE MISTRAKES.”

More often than not, the parks they’ve “designed” turn out to be environmental disaster areas and dollar-gobbling maintenance monsters. Given all these good folk who can do no wrong, who’s to blame for all the problems—and problems there are aplenty—existing in our parks and recreation areas? Generally, the scenario runs something like this:

Time: Late September—after Labor Day

Place: A Virginia Campground

Cast: The “Ranger” and maintenance crews

Plot: The annual job of rehabilitating Possum Hollow Campground begins

“Boy, I’m glad the season’s over! Seems like this poor ole campground had 20 percent more of those city-born, city-raised critters called campers than ever before!”

(The song is the same in Virginia, Indiana, Colorado, or in North Carolina.) Campers seemed even more determined than in past years to drive over and use any area they wanted. They even cut what few barrier posts we had left to get their trailers onto our tent pads and nearer the picnic tables. The soil is hard as concrete—dusty in dry times, with mud aplenty when it rains. The grass we planted around the camp units last September has long since died—a victim of the pad, pad, padding of feet, feet, feet! It’s a real shame, since the green grass sure looked good this spring before the campers arrived.”

“You know, Possum Hollow sure doesn’t look like it did when we first built the campground. Remember the big trees—oaks, maple, white pine, hemlock? The Laurel, rhododendron, azalea, and other low shrubs were sure thick and pretty. Now look around, shrubs and small trees are mighty scarce; and the big, beautiful trees have all got some kind of disease and are dying. I’ve sprayed them with all kinds of chemicals and spent a fortune having dead tops and limbs cut out; but nothing seems to work. We’ve got a sad area from all this over-use! Well, boys, let’s finish our lunch and get to work spreading grass seed and fertilizer around these tables!”

This sort of dialogue or talk among maintenance folks echoes from the mountains to the sea across and up and down our great land. It happens in all the Federal land-managing agencies including the National Park Ser-

vice, the Corps of Engineers, the Forest Service, and in TVA. State park, county park, and city park folks, and private owners of “parks” all face the same maintenance challenges. And, most of these good folks make the same “MISTRAKES.”

“Over-use” is a word we over use. Park lands the nation over suffer from what is mistakenly called “over-use.” This means we blame the visitor for our problems and for our maintenance woes. Yes, he causes us a bit of trouble; but not as much as some folks would have you believe.

(Don’t forget, either, Mr. Visitor is the fellow who is responsible for our livelihood, or our daily bread.) If not “over-use” then what’s the problem? This may shock you and make your planners, designers and bosses less than happy, but more often than not, poor planning, inadequate design, and lax administration combine to give the “over-use” appearance. A thorough knowledge of planning and design techniques, use of the research data now available, and good common sense can minimize user impact and trim maintenance costs drastically.

Over the years, we’ve learned a good bit about resource stewardship. We know, for example, how to handle water movement on agrarian lands through the use of ditches and berms; we know how to analyze soils and use the results to prescribe treatments for mineral deficiencies and imbalances to maximize agricultural production; we

understand the carrying capacity of our resources to maintain domestic livestock and game species; and we know how to manage forest lands for timber production.

BUT, when it comes to applying these same areas of expertise to managing resources for people which is, after all, the goal of recreation resource management—we have either failed to use the information available to us, or (and this is more likely), simply haven't realized that information from a host of other disciplines, from forestry to soil science, has application for recreation. Consider the situation we described at Possum Hollow campground. The resources were in sad shape. What sort of "picture" did you get from the description? What were the real problems and what caused them? We see many things including:

1. Heavily impacted and compacted soils caused by foot traffic and vehicular traffic over the entire area.
2. Accelerated run-off and erosion—soil only 1/20 to 1/120 the absorption rate, percolation rate, of water it once had.
3. Once beautiful, old-growth trees now dead or dying from an inability of their root systems to gain enough moisture through compacted soils.
4. Young, seemingly vigorous trees throughout the campground breaking out with curious, "cat-face" wounds six to eight feet



Dead trees resulting from vehicular impact.

Richard L. Cottrell

above the ground, making them susceptible to insect infestation and other disease vectors.

5. A continuing tendency to fight effects rather than causes by practices such as planting grass on areas of known impact such as campsites.
6. Perhaps the most serious error has been one of omission rather than commission—a failure to consider the needs of users in our design.

It is easy to blame the users for most of these problems; after all, the area looked fine before it was opened for use. Let's consider, however, others in the cast of characters: the planner, designer, administrator, and professor—and see how they may have contributed to these problems.

Planner

The first real error was the planner's, when he or she picked the grove of big trees as the site for the campground. You can't build park facilities in such groves (particularly some species) without killing your attrac-

tion—those big trees. Research has shown the best woodland for intensive use (campgrounds, play areas, picnic grounds) is young vigorous hardwoods, particularly the deep-rooted species like hickory. Research tells us some species can withstand little or no use—scarlet oak, white pine, sweet gum, hemlock. Trying to save such species will gobble dollars with mini-results.

Generally, those of us who are planners have been treated well by our superiors—given our choice of lands for development and having few constraints placed on us in terms of design parameters. Given this freedom, have we investigated alternative sites for suitability? Once a site has been tentatively selected, have we tested soils for composition and percolation rate? Chances are, we haven't.

Designer/Landscape Architect

What about the designer (perhaps including the landscape architect)? Can these good folks be at fault as well? Often, designers have a tendency to subscribe to a philosophy of "if I like it, it must be right." This can lead to a failure to provide administrative and support personnel with alternative designs from which the best elements of each may be synthesized into a final product. Most of the soil compaction described at Possum Hollow was a result of pedestrian and vehicular traffic—but not the fault of the users. The design of Possum Hollow, like those of many of our campgrounds and

Filter strip along edge of parking lot to contain run-off of water and pollutants.



Richard L. Cottrell

other recreation areas, did not recognize and reinforce areas of known impact. Allowing users to drive over unreinforced areas changed the site environment. Areas intended to handle vehicular traffic (roads, parking lots, turnouts) need to be reinforced.

More importantly, areas not intended for vehicular traffic, such as the space between campsites, need to be protected from it. While this is in part a management challenge or responsibility, the designer can help as well by using techniques of design psychology.

For example, when a campground is being built, understory vegetation should be removed only where campsites and support facilities will be located. This discourages users from parking and driving where you don't want them. This technique of "carving" camp units out of the understory has an added benefit: by leaving a dense screen of vegetation between units, it's possible (when this is a design goal) to increase the density of camp units per acre and still provide the user with a sense of being secluded.

Unit Design

Unit design is also a key factor. Since we were told visitors to Possum Hollow cut barrier posts to get to tent pads and tables, we have actually forced the user to cause problems. One good remedy is the back-in spur with living space attached to the right side (as you face the road).

Visitors come with all types of camping equipment. This spur and living space can accommodate anything conceivable. The spur must be well-defined (at least 50 feet long) and reinforced with gravel as is the living space (though the living or camping space gravel should be of a finer gradation). You have provided a convenient, comfortable camp unit and have recognized and reinforced an area of known impact with gravel.

Grass doesn't belong where much foot traffic is involved. One of the most common mistakes in unit "design" is placing facilities at different elevations or contours. This is a real **NO-NO**. The camping pad, fireplace, and table must be located near each other and at as near the same elevation as possible. Certainly steep ground poses problems; here a level contour "slice" is in order.

Other areas of known impact requiring surfacing are: hydrants, fountains, garbage cans, interpretive signs, bulletin boards, etc. Soils experts tell us gravel (particularly creek gravel) is one of the best materials for covering impact areas. The gravel allows water to filter through the gravel bed, thus minimizing overland water movement, erosion potential, and maintaining the inflow to tree and other plant roots.

Location

Location of service facilities can cause maintenance headaches or make your job easier. For instance, a toilet located in the center of a 50-unit camp loop may find itself visited from 50

different directions. The proper location of the toilet on the side of a carefully designed camp loop road may mean the campers would walk to the facility on an already existing reinforced surface (spur, road, or trail).

Water

As you can see, we are looking at causes of soil compaction rather than effects. Let's now consider one of the major causes of erosion: water. Water is a real friend to us—indeed, we couldn't have parks without it. We also know our "friend" can cause all sorts of costly problems. These problems cost maintenance dollars and are generally caused by poor design.

One of the most mysterious phenomena involving water is: **IT RUNS DOWNHILL!** It does so all over the U.S. An example comes to mind involving a Parish park in Louisiana. Each year, the maintenance folks spread several tons of sand onto their beach to replace that which surface water has carried off into the lake. **WATER RUNS DOWNHILL.** How simple it would have been to have installed a sod ditch above the beach to carry downhill surface runoff around the beach and into a sump or into the lake! Chances are, you could think of an example of this problem closer to home.

Erosion caused by water movement is a function of both volume and velocity. Thus, our challenge is to slow the water and move it off of fragile surfaces

Result of inattention to soil composition - garbage cans buried in highly absorptive pocket of clay. With a heavy rain, the clay swells and the garbage cans pop up out of the ground.



Richard L. Cottrell

as soon as possible. Other water challenges are—

- Surfacing on trails - outslope where possible about 3 percent and don't place loose surfacing on trails with over 9 percent grade.
- Define streams and water courses where possible by clearing out gravel bars, trash accumulation, etc. This may occasionally require some channel straightening inside parks.
- Roofs of buildings act as small watersheds - make certain the areas where water runs off have the proper reinforcement.
- Make certain you have drains at hand-pumps, hydrants, and fountains and make sure these drains aren't clogged. Considerable erosion can be caused at these sources.
- Provide adequate drainage from parking lots perhaps including a filter strip and berm combination. This will minimize water movement and contain pollutants such as gases, oils, and waxes.
- Stay away (if possible) from wet areas and flood plains.

Administrators

We feel most of the blame for the physical problems existing in our parks and recreation areas lies with the planners and designers. However, administrators can be at fault as well. At times, they have charged their planning staffs with building areas which are fated to

mismanagement. One Corps of Engineers reservoir manager-friend of ours has to make a round trip circuit of over 350 miles to visit the campgrounds he's charged with managing. The "campgrounds" are actually small, lake-access areas averaging from seven to thirty campsites each (what the management plan called for). The areas are too small to justify on-site management, and as a result, have become hangouts for vandals and rowdies. In addition, carrying out the management plan spread the area exposed to impact around the entire reservoir.

The solution? Think big, plan big, and build big. Use facilities such as campgrounds and picnic areas should be large and centrally located. This practice makes it possible to minimize the number of areas receiving impact, provides the opportunity for on-site management and user protection, and allows the provision of a host of recreation programs (more on this shortly). Experience and some research conducted by the Corps of Engineers has shown us the "break-even" point in terms of offsetting campground operations and maintenance costs with user fees is about 200 units.

Consider the simple example of garbage collection alone: compare the cost of collecting trash—probably with union employees at \$10-\$15 per hour—on two reservoir-based recreation areas. Each reservoir has 300 camp units and 200 miles of shoreline. The first has 20 campgrounds, averaging 15 units

each. The second has two campgrounds, one with 280 units and the other, located nearby, 20 units for those users who desire a "back-country" experience. Which do you think would be more cost-efficient to administer?

Administrators at times may also make changes in plans and designs without adequate thought or justification (in all fairness, some changes may have to be made for a host of reasons—political, budgetary, etc). Also, a campground or park can be well planned and designed and still fall apart if the manager allows users to abuse the area, or has inadequate regulations (or doesn't enforce the ones in effect), or fails to recognize the causes of problems and take action accordingly.

An example of this last situation is the occurrence of those curious "cat-face" scars on trees we mentioned earlier. The cause of these scars is simple: lantern burn damage. The user is unaware of the problem because lantern burn damage may not manifest itself until two to three years after a lantern is hung on a tree. The problem is caused by the direct transfer of heat from the lantern to the tree. The heat kills the cambium layer (the "circulatory system" of the tree, located just beneath the outer bark) and after a few months, the locally affected area completely dies and the dead tissue falls away, opening the wound. The damage itself won't kill the tree but it's an unsightly addition to an area and it does

make the tree more susceptible to both insects and disease.

Perhaps the biggest failure of administrators has been allowing the work of planners and designers to become an end in itself. Planning is—or should be—a service function catering to the needs of managers, programmers, users, and maintenance staff. In reality, what has often happened is for planners to design areas and then challenge those who work and recreate in them to bend their needs to fit their less-than-excellent design.

A good axiom for recreation professionals who depend on planning types to provide designs is: LEARN TO ASK WHY. Make sure your planner can justify **WHY** the area or facility “fits together” the way it does. Before you accept a product from a planner, walk yourself through the design with respect to your particular role—if you have to manage the area, are facilities that support conflicting uses zoned well away from each other? Are expensive support facilities which are subject to vandalism, such as toilets, well-lighted and in open areas easy to patrol? If you are a programmer, is the tot lot located where children can reach it safely without supervision? Is the lighted play court screened and separated from the camp unit areas so teens can use it late at night, or is it next to the high density camping areas to invite complaints from those who retire early in the evening? If you are a maintenance foreman, are gar-

bage cans clustered at convenient, logical points, or spread out at every picnic table? Are pathways reinforced, or will you have to try to rehabilitate them constantly?

Ideally, administrators should require planners and designers to develop a minimum of three alternative plans for major new use areas. The alternatives should be based on input from all the folks mentioned above who also should have the opportunity to review and critique the various plans. Obviously, everyone has to compromise, but a sharing of ideas, needs, and concerns can contribute immensely to the success of any design. Curiously, the planning and design functions in most federal agencies and far too many state agencies have poor or non-existent lines of communications with managers.

Professor

Consider the professor for a moment. Most universities encourage research—many require it. Research is being generated, but the bulk of it has little utility to the field-level professional. Basic research is needed, but managers, planners, designers, and programmers need applied studies addressing the problems they encounter daily. The solution to this dilemma would seem to be an increased dialogue among practitioners, academicians, and the leisure products community. (The extent of the

lantern burn problem described above was determined in a cooperative effort by the Forestry School at Southern Illinois University, TVA, and the Coleman Company. It culminated in recommendations for methods of educating the public about the problem and in the development of a lantern hanging device which Coleman now markets.)

Since recreation managers rarely clamor for research; since the academic community has shown little enthusiasm for finding helpful, applied answers; since old-line researchers in the agencies look with disdain on applied research conducted by practicing students or even persons pursuing graduate degrees; and since the Bureau of Outdoor Recreation—which in the early years promised to be the cradle of research—is no longer with us: the outlook for an outpouring of applied research is poor indeed.

Up to this point, we’ve been addressing problems concerning resource stewardship. Perhaps the biggest failure in our nation’s wildland parks has been a lack of realization that recreation professionals have a dual responsibility: resource stewardship AND providing a meaningful, enjoyable experience for all segments of the public. Too often, our facility designs and management plans have failed to consider the needs of certain segments of the population, particularly the handicapped, the elderly, teenagers, and special interest users.

During the late 1960's and early 70's, environmentalism came to be equated with—rather than a complement to—outdoor recreation. Wilderness recreation was heralded, as was environmental education and historical interpretation. Some of the large federal recreation agencies which had begun to make advances in providing facilities and programs for a spectrum of users backed quickly away from substantive development. They moved instead with vigor into the realms of wilderness and interpretation for the physically fit, wealthy, and well-educated, leaving most real park users in limbo. Later, the Washington administration compounded the lack of attention given to mainstream recreators when the moral fiber of park users was questioned if they consumed fuel in their recreation pursuits. Certainly our profession should be responsive to wilderness and environmental interests, but not at the expense of “mainstream” forms of recreation.

Are we providing fun programs and activities for teenagers? Barrier-free facilities and programs for the chair-bound fisherman? Utility hook-ups for the elderly camper who needs refrigerated medication for a heart condition? Opportunities for the off-road enthusiast to do his or her thing? If not, we essentially say to retirees, teens, and others—“we don't want you!” The public/private sector controversy combined with the resource manager's natural reluctance to provide programming for users



“Drive anywhere” campground design.

Richard L. Cottrell

gives the manager a dandy excuse to back further away from the real world of recreation.

Hopefully, our comments have gotten your attention. Perhaps we've even made a few of you mad (if so—good). We hope we've made you think. Ours is a complex and challenging field, but a little common sense, attention to detail, and openness to trying new (and old) ideas, a willingness to be creative and cooperative, and a commitment to providing enjoyment to a broad spectrum of users can help us meet the challenges we face.

John T. Hultsman is Assistant Instructor, Department of Recreation and Park Administration, Indiana University, where he is a doctoral student. He holds the B.G.S. degree in Physical Sciences from Kansas University and the M.S. degree in Outdoor Recreation from the University of Missouri-Columbia.

He has served as a research consultant to the Tennessee Valley Authority, specializing in visitation sampling, and as Recreation Staff Officer at Land Between The Lakes, the nation's only federal demonstration area for outdoor recreation. There his responsibilities involved planning, research, and experiential learning programs.

Richard L. Cottrell is former Chief, Outdoor Recreation Design-Administration-Southern Region, USDA Forest Service and former Chief, Outdoor Recreation-TVA-Land Between The Lakes (retired). Mr. Cottrell, who holds a B.S. in Forestry from Purdue University, is currently a part-time outdoor recreation consultant and co-owner of a wholesale tree nursery in Savannah, TN.

He has served as a facilities design consultant to the U.S. Army Recreation Service, planning campgrounds and other use areas on military bases throughout Europe. He was recently asked to provide assistance to the Japanese government in designing their first major reservoir-based recreation areas. Mr. Cottrell has lectured on numerous college campuses and in maintenance-management workshops from coast to coast.

Mining To Motorcycling

by Steven M. Eklund

The Withlacoochee State Forest is located in West Central Florida, 40 miles north of Tampa.

The forest consists of 113,000 acres and has something for everyone. The land was acquired by the federal government in the 1930's as a Depression days recovery measure. Later, in 1957, the land was sold to the State of Florida on a 25-year purchase agreement. The final payment was made October 1983, and Agriculture Commissioner Doyle Conner received the deed in January 1984.

The forest consists of four separate tracts of land in the counties of Citrus, Hernando, Sumter and Pasco. Multiple use is the main theme throughout the forest. Recreational activities include camping, hiking, hunting, fishing, picnicking, swimming, canoeing, horseback riding and motorcycle riding, just to name a few.

Croom Motorcycle Area

The Croom Motorcycle Area is of special interest with a history dating back before the federal government acquired the property. The land was originally owned in the late 1800's by John Hale and Stuart Cook. Mr. J. Buttgenbach leased the property prior to 1900 from Hale and Cook for the sole purpose of mining phosphate. Phosphate is of primary importance in the manufacturing of high grade fertilizers. It is also used in match heads, dental cements and the ingredient that whitens sugar. Phosphate helps to make table salt flow freely, luminous paints and detergents.

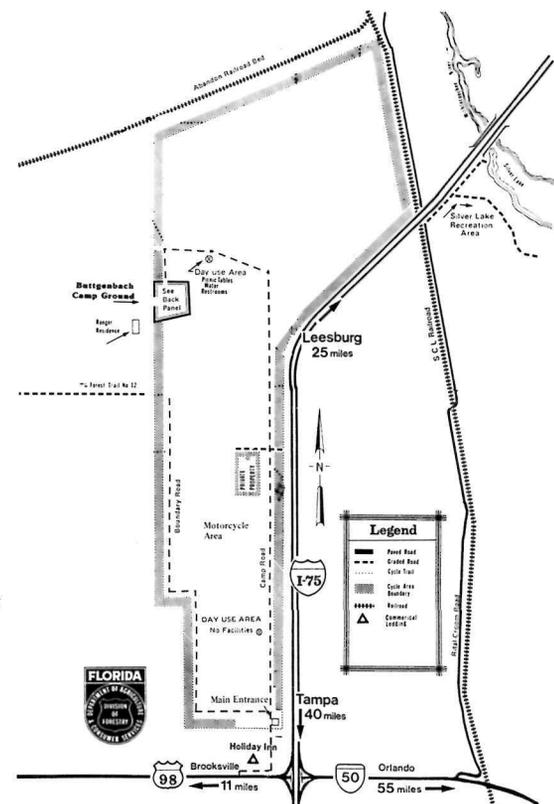
Mr. Buttgenbach never actually lived in the Brooksville area, just west of the mine. Instead, he chose to operate his company from Brussels, Belgium, and may have only visited the mining area once or twice. His distance didn't stop him from operating one of the largest phosphate mining operations in the United States, which included other plants in Florida. The mine was worked with a convict labor force, but only for a few years. (Much of the labor force in the early years were convicts from Georgia and Alabama.) Although the phosphate was mined in the United States, it was exported to Germany and Belgium. During World War I the mine was closed. Shortly after the war the mine was reopened and in operation until 1924. The owner then sold his interest to C. L. Camp and D. B. Kibler. These two men operated the mine into the 1940's as the Kibler-Camp Phosphate Enterprises. When the mine finally closed, the long, slow process of regeneration began.

Throughout the years the 113,000-acre forest was a magnet to off-road motorcycle riders. Forestry staff in 1965 did all it could to prevent motorcycle riding in the forest. The fragile soil on the Citrus tract, where the horse trails are now located, was unable to withstand motorcycle traffic which created ecological problems; but the riders didn't give up and neither did the Division of Forestry. Realizing that there would be a definite need for this type of recreation in the future, plans were formulated to

accommodate motorcycles.

Planning began, but it wasn't until 1971 that a public hearing was held so the general public could express their views and offer suggestions. There was an overwhelming response which brought out many valid points and suggestions. The forest was also the only public land large enough, within a 100-mile radius, where riders could ride without the fear of being prosecuted. The Division of Forestry acknowledged the definite need for such an area that motorbike riders could utilize. Cooperatively the Division of Forestry agreed to provide a motorcycle area if motorcycle usage would be curtailed in more fragile, environmentally sensitive areas. Motorcycle enthusiasts as well as the American Motorcycle Association and Florida Trail Riders Association agreed to this concept.

The Withlacoochee Forest personnel proceeded to construct the Croom Motorcycle Recreational Area with funds provided by the Florida Legislature. The area set aside consisted of 2,600 acres of land which included the old



Buttgenbach Mine. This seemed to be the most logical area. After all, the land had already been disturbed by the mining operations. Gullies, hills and wash piles left behind had created the perfect terrain for motorbike riding.

Day-Use Area and Campground

The Croom Motorcycle Area has two day-use areas and one campground. The day-use areas both provide parking, but the northern day-use area also has picnic tables, water outlets and restrooms. The Buttgenbach Campground consists of approximately 40 acres that is fenced and separated from the rest of the motorcycle area. The campground has 50 campsites, picnic tables, water outlets, electrical hookups, a bathhouse with hot showers and a central trash refuse station.

There is no charge for the day-use areas, but camp sites are \$6.00 per night plus \$2.00 for electricity if needed. Permits for each bike are required, but the cost is very minimal. There is a yearly permit available for \$13.00 or a \$4.00 permit for six consecutive days. Permits can be purchased at the entrance gate on Saturday, Sunday and holidays or from the Park Ranger. Once purchased permits must be displayed on the right front fork of the motorcycle. Permits cannot be obtained by mail.

Rules

There are other regulations to prevent accidents or destruction to the facilities provided. Rules and regulations are fairly basic for camping, but there are other

rules which are specific to riding in the motorcycle area. The camp rules entail: parking in designated areas only; campsites limited to five people with tents or one trailer or RV unit; do not cut, scar or mutilate trees; all trash must be taken to the centrally located trash bin. Fires are permitted only at designated sites, pets are not permitted in the campgrounds, and check out time is 2:00 P.M.

The rules pertaining to motorcycles and riding them require that cycles must have mufflers in accordance with the Florida Highway Patrol Handbook, motorcycle operation is restricted to daylight hours only, all riders must wear protective headgear, speed limits must be obeyed where posted, cycles may be ridden to and from camping sites but no faster than walking speed, only inexperienced riders should use the designated practice area, and all vehicles are prohibited within the boundary of the day-use campsite bathhouse areas.

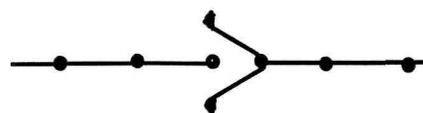
The permit area does not require that motorbikes be street-legal or that riders possess a license. Therefore, anyone who can ride a motorbike regardless of age is allowed to ride in the permit area.

Croom Motorcycle Area, like any other recreation area, has administrative problems. Vandalism and theft are always possible. Overuse has created greater amounts of soil compaction which adversely affected the natural regeneration process. One problem in particular was the constant motorbike traffic around the bathhouses and across the medians between the different sections within the

campgrounds.

This problem was remedied by stringing a steel cable approximately two feet high through cement posts. Passage through the cabled area to the bathhouse was designed to allow people through without their motorbikes. The passage points were constructed by splitting the cable into a V around the other end of the fence.

Fence Passage Points



The camp area and cycle boundary fence, near the campground, has been planted with over 1,000 sand pine seedlings for future help in controlling the noise to adjoining property outside the cycle area. The trees will also provide future vegetative cover.

Response from the public that utilizes the Croom Motorcycle Area has been very favorable. One woman's comment was that this sport is the only medium she has to communicate with her son. Cycling is a family sport which the Withlacoochee State Forest is proud to offer, concurrently with the other recreational activities found throughout its 113,000 acres.

Steven M. Eklund is employed by the State of Florida, Division of Forestry and currently holds the position of Forester for the Short Term Offenders Program administered by the Florida Department of Health and Rehabilitative Services.

Reservoir Timber Clearing and Fish Attractors

by Al Payne and Jim Robbins

The pattern of removing timber during the construction of large reservoirs has come full circle in the last four decades. The great dam building boom of the early 40's, sparked by the sudden need for electric power to fuel America's manufacturing might during World War II, has given way to water resource projects which now boast recreation as a justification for their need and existence.

In the early days when impoundments such as Dale Hollow and Center Hill in Tennessee, Lake Cumberland in Kentucky, Norfolk and Bull Shoals in Arkansas were conceived, all the timber was removed for reasons of mosquito control, water quality, navigation or to prevent clogging of control works and outlets.

The principal objective of mosquito control was to clear the basin so that the surface and shoreline are clean. An abundance of the pests seemed to be directly related to the number of structures intersecting the air-water interface.

Researchers examining the effects of soils and vegetation on water quality also advocated complete clearing, removal of herbaceous plants and even stripping of soils to prevent degradation.

Later studies by qualified scientists reversed this flow of thought when scientists found that the beneficial effects of soil stripping were relatively short-lived. After 35 days, water quality over stripped and unstripped samples were virtually indistinguishable.



A wintertime angler tries out a fish attractor on Lake Barkley.

US Army Corps of Eng.

Potentially serious problems affecting water quality could be predicted and solved by pre-impoundment testing of soils and vegetation.

By 1958, most biologists agreed that timber left standing in deeper portions of man-made lakes was not harmful and would attract sport fish. The retention of large, uncleared areas decreased the costs of clearing, reduced wave action and shoreline erosion, and increased surface area for attachment of organisms helpful in the production of fish. Standing timber provides shade and shelter for bluegill, crappie, bass, and other species. It also provides habitat for a wide variety of wildlife such as woodpeckers, ospreys, wood ducks, and bald eagles.

Opinion began to emerge that the most productive patterns for optimum aquatic conditions were those in which timber was either retained in selected areas of deep lakes with boat paths provided for access or those in which dispersed blocks of timber were left in shallow impoundments.

How much clearing is enough?

In Missouri's Table Rock Lake, where 90-95% of the timber had

been left standing, the upper ends of some coves are extremely difficult to reach by boat. Access to these areas could have been improved by cutting a boat lane in the middle of each cove, a practice used extensively on Lake Millwood in Arkansas and Toledo Bend on the Texas-Louisiana border.

A proposal for clearing Narrows Reservoir in Colorado recommended retention of timber near but not within sight of timber recreation areas, thus providing ready access to anglers without aesthetic degradation.

The nearness to large urban centers can be a basis for determining how much open water is necessary for recreational boating versus fishing. Fishermen like substantial proportions of flooded standing timber because: they have a place to tie their boats; can relax in one spot; have less problems with wind; and interference from water skiers is reduced to a minimum. Plus, they catch more fish and a higher percentage of anglers are successful. Pleasure boaters, however, for obvious reasons, prefer wide open spaces to enjoy their sport.

Percy Priest Lake

Percy Priest Lake is a 14,200-acre impoundment within the metropolitan limits of Nashville, Tennessee, which has a population of nearly half a million. This was one of the first projects in U.S. Army Corps of Engineers history where the potential for outdoor recreation demanded that it be included as a project purpose. Anticipated heavy utilization for recreational purposes suggested total reservoir clearing. The accepted plan called for complete clearing between elevations 492.0 (two feet above summer pool) and 475.0 (five feet below minimum pool). Only in the lower four miles of the reservoir along the main river channel did the tops of a majority of trees remain below elevation 475.0.

Like all new lakes, Percy Priest experienced a boom in fish populations and biological production, followed by a gradual decline. The cycle of production in new reservoirs such as Priest is fueled initially by a microbiological explosion that releases nutrients from submerged organic matter. This upsurge in production begins a food chain reaction that leads to a rapid rise in fish populations. Duration of the "biological boom" varies among reservoirs but usually lasts two to ten years.

The abundance and harvest of sport fishes in Lake Oahe in North and South Dakota, Red Rock Lake in Iowa, and West Point Lake in Alabama soon began a steady decline after the initial years of impoundment.

Creel surveys on Rough River Reservoir in Kentucky, before and after impoundment, showed that sport fishing success was greater in the new reservoir than in the river but that harvest decreased each year after impoundment. A comprehensive analysis of data from 121 U.S. impoundments found that sport fish harvest was inversely related to reservoir age.

Was there a way to reverse this trend?

The National Reservoir Research Program estimated that reservoirs currently receive 200 million angler-days annually—about one-third of the total fresh water fishing in America. On this basis, annual fishing pressure is expected to increase from 20.3 to 36.4 angler-days per acre over the next 20 years and reservoir area will fall 4.5 million acres short of projected needs.

Can fish production be increased sufficiently to meet angler demands expected to exceed 400 million angler-days by the year 2000?

Since we can't depend on the addition of new water resource projects, (with occasional exceptions) managers must actively manage existing waters to improve habitat and fisherman success. The placement of fish attractors seems to be an alternative worth considering . . . perhaps the only one for existing impoundments which cannot be drained and refilled as many

Florida lakes have been re-juvenated.

The idea is not original to the 1980's. In 1931, C.L. Hubbs and L. Hubbs recognized that underwater structures concentrated freshwater fish by providing essential shelter. Since then, other researchers have compared the population dynamics of sport fishes in relation to the presence of artificially placed structures and the density of species composition.

Bass, bream, crappie, and catfish are the most abundant sport fishes associated with man-made reefs. In more northern areas, the walleye, bluegill, and green sunfish are predominant around reefs while the yellow perch prefers open-water stations.

However, artificial reefs are not the panacea for increased harvest and angler success in all situations. The placement of cover in cold-water reservoirs does not appear to benefit species such as salmon and trout. In others, the degree of fluctuation may expose reef structures during winter drawdown causing navigation hazards or be too deep over them in the spring and summer. The drastic changes in water level also make it harder to keep structures in place which require constant replenishment of material and maintenance of marking devices.

Marking Devices

A marking device is necessary for the average fisherman to locate the attractor and to fish it effectively. Very few anglers are successful in locating the target area by using maps, triangulation

or even with electronic gear. A highly visible buoy, although often requiring replacement, is the best choice.

Permits

Before the installation of any artificial structure in the navigable waters of the United States, a permit must be obtained from the U.S. Army Corps of Engineers. The application should include a complete plan showing exact size, location and clearance over the top of the reef at low water levels. In no instance will the Corps permit a facility which might pose a hazard to navigation. A permit may also be required by the state.

After determining the need to improve fish habitat and securing the proper approval, several questions remain. What materials are the reefs to be made of? How many and what size reefs should be built? Where in the lake should they be placed for maximum use?

Brushpiles

Veteran panfish enthusiasts have long known that a sunken brushpile is a surefire way to concentrate springtime fish. The brush is put out clandestinely to avoid detection by authorities or other fishermen. Normally the brush is good for about 3 years and then has to be replaced.

Fish Attractor Materials

Paradoxically, we have also come full circle in regards to the best material for fish attractors. Construction materials such as tires, rocks, concrete blocks,



A Bass'n Gal Club in Nashville, Tennessee, worked hard to place tire attractors in Percy Priest Lake.

U.S. Army Corps of Engineers

drain tiles and stake beds have come into wide-spread use. All have been successful to a degree. The most popular medium has been the use of tires because of their availability at little or no cost, they don't affect water quality and may even improve it by removing mercury wastes, and they are fairly easy to work with. Tires have an additional benefit in that they can be used as a floating attractor in deep water reservoirs where more traditional forms of bottom placed structure are ineffective due to extreme fluctuation of water levels.

Combinations of these materials are often used with great success. At Killdeer Reservoir in Ohio, biologists randomly piled tires over a wide area and covered them with limestone riprap to a height of 3 feet. On Percy Priest Lake, fishery personnel used small trees anchored with concrete blocks and placed in an upright position which favored their use by crappies.

Evaluation

In 1978, a rotenone study on Lake Barkley in Kentucky, conducted by the Southern Division of the American Fisheries Society, afforded an excellent opportunity to evaluate fish attractors.

Brush attractors consisted of 43 units (50% hardwood, 50% cedar) wedged in concrete blocks and strapped in a bundle on top. Ninety-two triangle-shaped tire units were used for comparison. Tires were split in half, holes punched in the sidewall (very important) and strapped together. Weighted buoys, with fish attractor decals, were placed at the four corners of each site.

It became immediately evident that brush and tire attractors effectively concentrated four game fish species: channel catfish, bluegill, largemouth bass and white crappie. Both types were particularly effective in the concentration of harvestable-sized fish. Each acre of brush was found to hold an average weight of 1354 pounds as compared to an average of 103 pounds in open-water areas.

In comparing the two attractor materials, brush exceeded tires substantially . . . holding three times more channel catfish, four times more bluegill, two times more largemouth bass, and three times more white crappie. Tires offset this difference in the long term by requiring less maintenance because of their durability.

Underwater observations by biologists in Bull Shoals Reservoir revealed that smallmouth bass,

spotted bass, and largemouth bass usually built their nests near protective cover in shallow water and the amount of cover available seemed to be directly related to the survival of the young. Brush shelters installed on spawning grounds received preferential treatment by both spotted bass and largemouth bass for nesting sites while the smallmouth showed less inclination for the sheltered habitat.

Chances of survival of the fry were further increased by high water levels which inundated shoreline brush and provided sanctuary in the postspawn period. This premise is supported by an effort on Kentucky and Barkley Lakes in Tennessee and Kentucky where lake levels are left in shoreline cover for an additional two to three critical weeks, which is resulting in a greater proportion of bass fry eluding predators to eventually provide better angling opportunities. Thus, the timely manipulations of lake levels into natural cover by managers can improve fish production. Conversely, the drawdown of water at the wrong time can wipe out an entire spawn and leave a severe gap in the year class.

Bald Cypress Trees

To supplement their efforts on the placement of underwater structures, many state and federal agencies in the southeast are attempting to establish bald cypress trees which will provide shade and shelter and serve

literally as permanent fish attractors in shallow water areas around reservoirs. Twenty-five thousand cypress trees planted by the Corps of Engineers around Bay Springs Lake in Mississippi have had outstanding initial survival success.

The advantages of fish attractors are easily understood but their greatest asset lies in their relatively low costs. Managers faced with a spartan budget and a lack of manpower can increase the potential of their lake to a considerable degree by using materials and labor from the private sector. Fishing clubs and associations of concerned citizens can provide all labor necessary to construct, place and mark the attractor. The resource manager needs only to conduct a planning session and perhaps provide miscellaneous supplies or a work barge.

Location

Deciding where to locate fish attractors in a multi-thousand acre lake can be a perplexing problem. They should ideally be both in deep and shallow water to accommodate a year-round fishery. In extremely deep reservoirs with a low winter drawdown, floating tire attractors may be the answer. On midland lakes, tire and brush attractors running parallel to the shoreline in shallow water with a cross section extending into deeper water making a T shape is effective in any season. On lowland lakes, such as Old Hickory in Tennessee, combina-

tion tire and brush attractors are sunk on the edges of old creek channels where there is a sharp dropoff.

The possibilities of fish attractors are unlimited but what about the ideal situation - a brand new water resource project where the habitat can be manipulated to the best advantage of the visiting public? The consensus among fishing scientists is to leave approximately 10 to 15 percent of the total water surface in standing timber. This percentage effectively concentrates fish where they are more susceptible to harvest. The Corps of Engineers used this guideline in the creation of 6700-acre Bay Springs Lake where 700 acres of timber were left in coves and tributaries. A proposal for 12,600-acre Columbia Dam in Tennessee by the Wildlife Resources Agency suggested retention of 1600 acres of standing timber in the lake site.

Of course, even projects such as these will require the addition of artificial reefs at some future date when the timber rots and falls.

In future planning, the importance of fish attractors cannot be underestimated by resource managers who should make every effort to keep up with anticipated demands in the 80's and 90's.

Al Payne is Resource Manager and Jim Robbins is a Ranger at the U.S. Army Corps of Engineers' Old Hickory Lake in Hendersonville, Tennessee.

An Expanded Resource Base — With Master Volunteers

by Stu Sutherland

Some of your resource-based management problems could be eased a bit by the impact of adding the equivalent of eight more full-time staffers.

For us in the Cooperative Extension Service system that equivalent added impact comes from an average of 133 volunteers who are supervised by each of our county Extension professionals. In fact, volunteers can be said to have started the Extension Service, since volunteers were carrying out many of our programs of today before our system was launched by the Smith-Lever Act of 1914.

The Cooperative Extension Service system is a unique 3-way partnership among federal, state, and local governments—and we proudly include our volunteers and private sector support as our 4th partners. There are Extension agents in virtually every county of the nation. At the state level there are Extension specialists in various program areas and administrative offices located at the nation's land-grant universities, and in area offices within some states.

At the federal level, we are the Extension Service of the U.S. Department of Agriculture (ES-USDA), with a mission "to provide national leadership and represent USDA within the Cooperative Extension Service system." The basic mission of Cooperative Extension is "to improve American agriculture and strengthen American families and communities through the dissemination and application of



Master Gardeners usually work on a community approach to gardening problems. In Arlington County, Virginia, Extension horticulture specialist Francis Lay instructs volunteers.

US Dept of Agriculture

research-generated knowledge and leadership techniques."

Collectively, we are known as the "educational arm" of the USDA—systemwide, the largest informal educational system for adults in the world and the largest and only Extension education program for youth.

This total nationwide program is presently supported with a resource base bonus of about 1½ million volunteers. In terms of the time they give, Extension volunteers donate a combined total of 183 million hours a year. If we value their time at \$8 an hour, they are giving \$1.5 billion a year to Extension programs — and that total would go much higher if we added the miles they freely travel and the materials they often donate.

The Master Volunteer Idea Starts

A dozen or so years ago the Extension horticulture staff members in the counties as well as at Washington State University needed some help during gardening season—when gardeners and would-be gardeners literally swamped them with questions.

The "master" idea, in a nutshell, is to provide intense, in-depth training in a certain program activity to people with

some prior experience—and in return, ask them to give a specific amount of time helping others in their area of enhanced expertise. The original Master Gardener idea in Washington State has since been adapted to other areas of Extension activity. The number of hours of training and of sharing by the new Master Volunteers have varied by state and type of Masters.

Washington State's Masters

Bernie G. Wesenberg, Extension horticulturist, has been associated with the "senior" Master Volunteer program at Washington State almost since its inception. He is pleased that upwards of 40 states have used Washington's program as a model for similar educational efforts. Over 900 Master Gardeners operate in Washington counties now, in parts of the state with about 70 percent of the population.

Washington's metropolitan King County contains some 200 Master Gardeners who are likely to make over 50,600 public contacts on gardening subjects a year during their roughly 3,100 hours of volunteer service. Typical activities for King County Master Gardeners from April through September include 4-hour sessions at neighborhood plant

clinics held at 17 different locations in the county. They also work in the Extension county office handling phone calls on garden subjects. Some of the Master Gardeners make speaking engagements while others go on radio talk shows. After their volunteer experience, a few have established home consultation businesses or gone into classroom teaching.

Master Gardening in New York

An extensive Master Gardener program in the State of New York receives training materials and support from Cornell University. Each county involved develops a program to fit local needs and the best use of volunteer talent. Statewide, over 900 Master Gardeners have been trained.

Suffolk County—the eastern three-fourths of Long Island — contains about 75 active Master Gardeners. They reach gardening consumers at public library sites, community gardens, and other locations such as senior citizen centers. They also occasionally work in a diagnostic laboratory at the county office.

These volunteers also staff a speaker's bureau that has 28 gardening topics for civic and service clubs; they give 100 to 150 talks each year. The volunteers also assist with the weekly newsletter for gardeners that has been published since 1977.

In Rockland County, New York, some of the 56 Master Gardeners help provide "hor-

ticultural therapy" programs at various institutions. At one mental health clinic volunteers have worked with the patients to root cuttings and transplant them. Master Gardeners also started an outdoor garden and worked twice a week with about 30 patients.

In the northern part of the same county at a large state institution for mental patients, gardening therapy activities have involved: a vegetable garden at a church site with 30 patients; a combination flower and vegetable garden at a men's dormitory with about 100 patients; and a garden at a school site for severely retarded patients who can handle little more than weeding and watering.

Small Park Setting of a Garden

Some of the over 100 Master Gardeners in the District of Columbia developed a demonstration garden on Independence Avenue, just off the Mall across from the National Air and Space Museum. In a triangular park-like setting, the garden was sponsored with grants to, among other things, test lead levels in vegetables grown directly adjacent to a heavily traveled street. That garden makes an interesting and restful area for tourists to visit.

California Garden Programs

About 80 Master Gardeners work in the double-county (San Bernadino and Riverside) area near the University of California-

Riverside campus. A group of 25 of them staff a speaker's bureau for 60 to 70 talks a year. A group of 35 conduct clinics at local area shopping centers and libraries — contacting as many as a thousand or more persons per clinic. A Master Gardener's weekly column runs in 7 local daily newspapers, with an estimated circulation of about 250,000 readers.

As part of a 16-city Urban Gardening program, Los Angeles had a component involving the preservation of garden produce. In 1981 in Los Angeles, 1,600 local gardeners used drying to keep part of their harvests for later use. Three of that program's four food drying centers serve as training locations for the area's two-stage Master Food Preserver and Expert Urban Gardener programs. Volunteers, by the way, help staff the drying centers.

Why Do They Do It?

Why do the Master Volunteers donate hours of their time for in-depth training—sometimes paying a fee to cover some of the cost of training materials? Why would they cover personal travel expenses and other out-of-pocket costs doing something for which they do not get paid?

James I. Grieshop reports his findings on this subject in *California Agriculture* (July 1982). The Extension Specialist in Community Education Development at the University of California-Davis, says the first 2 years of the California Master Gardener Pro-



US Dept of Agriculture

Francis Lay personally examines development of pole bean and other crops, following up on the work of the Master Gardeners.

gram (1980-81) were monitored closely and studies were designed to find out why people join and stay in this particular volunteer program.

Data from questionnaires completed by volunteer trainees in those two years showed the main incentive was that volunteers could increase their knowledge about gardening. The second and third reasons were to receive training and to gain new skills. Other reasons (in order) were wanting to share their knowledge, gain personal satisfaction, and provide a service to their community.

Grieshop says the information is important in the design and implementation of future programs similar to the Master Gardener program. To work to everyone's satisfaction, the program must deliver good, high-quality training that increases each volunteer's knowledge.

"It also has to meet the expectations of volunteers," he says, "by giving them opportunities to show off their knowledge—to ex-

tend it into their communities — and to socialize. In exchange for these opportunities, (Master) volunteers will give incredible amounts of time and energy."

How Much In-Depth is Enough?

Most often state training for Master Gardeners is on a ratio close to "we'll give you one hour of training, and you give us back one hour of service." For an example the Volunteer Master Gardeners in Washington State are presented with 50 to 60 hours of training by Extension staff. Then, during the gardening season each Master Gardener gives 60 volunteer hours serving the gardening public.

The Extension professionals who work in the Washington Master Gardener program *know* this program produces education and understanding. Reports, observations, and especially the enthusiasm and dedication of the Master Gardeners are effective results to the Extension workers. The multiplier effort of these volunteers is also exhilarating when contrasted to the overburdened, frustrated horticulture person who attempts to serve any size public with one-to-one answers or diagnoses.

As noted above, upwards of 40 states agree that it works and are in one stage or another of developing and benefitting from Master Volunteer effort. Canada also seems to agree and is expanding Master Gardener programs in their provinces. And

the basic idea is being used in a variety of other program areas.

Other "Masters" in Washington State

The Master Food Preserver program has been helping Washington Extension's family living agents respond to requests for information about home canning, freezing, drying, picking, and related subjects since 1976. These Master Volunteers receive extensive training in their subject area. Like the Master Gardeners, the Master Food Preservers help county agents handle phone calls, numbering in the tens of thousands, and also provide information to home food preservers contacted at farmer's markets and shopping malls, as well as at fairs and other locations.

The Master Food Shoppers' program was started in response to public interest in obtaining objective shopping information at the point of purchase—the grocery store. These volunteers receive 30 hours of specialized training in exchange for devoting 50 hours providing information to shoppers. Agents working alone would not have the time to do this countywide.

Energy Master Conservers

There are Master Volunteers in Oregon's Energy Master Conservers program who are expected to give back 40 hours of service for their 40 hours of training. Among other things, they have built storm windows and installed them in senior citizen's

homes, have held workshops teaching others energy conservation, and have made other speaking engagements with civic and other groups.

Who Does All The Training?

As the early Master Gardener programs were established in pilot counties, to try out the idea, there was the question of who should train them. The pattern that developed in this and later program adaptations was for the selected volunteers to assemble in one location with primary teaching being done by State specialists. In the case of the Master Gardener programs this would be the Extension Horticulturist.

With a few years of development and refinement, and reduced funding for travel expenses, training materials were adapted for training in the field using publications, slide sets and/or other visuals, with the specialist presenting the training (in part) from his campus office via teleconference. In some urban counties with an agent for horticulture on the local staff, the training may be done by that person.

Various Skills Are Represented in Extension

Though we have concentrated on the Master Volunteer idea, and presented some examples which might relate in some way to the management of your park or recreation facility, there are many talents to be found in other



A Master Gardener, originally trained by Extension, holds a plant clinic in a library in Montgomery County, Maryland, and has plenty of published information from Extension for clients.

US Dept of Agriculture

aspects of Extension.

For just one example, within the 4-H program for young people, there is a project area for Fish and Wildlife activities. Late in each year, in Chicago, a small and special group of 4-H'ers from this project area are selected as the best of the best and presented with scholarships and other recognition. One of the young people thus honored in 1983 had done some remarkable work in establishing nature trails and related programs for a park near his home.

Extension is Probably Nearer Than You Think

With Extension offices in virtually every county in the nation, your location shouldn't be more than a short drive, or a phone call, away from a source of information—or a reference to the right source.

If you should wish more detailed information on Master Volunteer training and length of service, or suggestions on how a program like this could be adapted to meet the needs at your location and strengthen your own volunteer activities—get in touch. Since each state's

program has developed a bit differently, the amount of time Extension professional managers are saving by the multiplier efforts of volunteers will also differ. Your state's Extension Horticulturist will know if your state already has a Master Gardener program in it, and your county Extension agent will know who that person is, and how quick contact can be made.

The 4-H program has been mentioned, and a growing activity within it are volunteers who are handling middle management activities. In many cases, they are acting as managers of other volunteers, thus relieving the professionals from worry over many minor details.

If The Shoe Fits . . .

Our "first name" is cooperative in the Cooperative Extension Service system. We feel that the use of some specialized training that upgrades selected volunteers' skills in certain activity areas is more than balanced by a reduction in staff time in those activities—which can better be used by professionals as increased time for better program management.

With an exception here and

there, as is found in any organization, we like to think of ourselves as pretty friendly folks. We are also enthusiastic about what we do and how we do it. Sometimes the only ones who are more enthusiastic than we get are our 4th partners—the marvelous Master Volunteers, the million-plus other volunteers, and our private sector resources.

The chances are fairly good that you personally know some of our 4th partners. They are undoubtedly among those who visit your location, they may be nearby farmers or ranchers and their wives, and there are others who likely live in your nearby communities. There is also a chance that some of our volunteers are also your volunteers—as it's a very interesting thing to do once you put your toe in the water and decide you can always find a little more time to do something good for somebody else.

So, if the idea fits . . . let us know if we can help you make it work for you.

Stu Sutherland is a Public Affairs Specialist with ES-USDA's Information and Communications Staff who worked closely with Dr. Ricardo Gomez, Staff Leader, Plant and Pest Management Sciences, ES-USDA on this material.



Abandoned farmstead, showing disastrous effects of wind erosion.

Mr. McLean, SCS

The Association Role In Resource-Based Management

by Walter N. Peechatka

With the celebration of soil conservation's golden anniversary just around the corner, in 1985, there is reason to reflect on the origin of soil conservation programs and the role of associations, such as the Soil Conservation Society of America (SCSA), in the development and implementation of these programs. But as we look to the past, so, too, must we anticipate the challenges in the years immediately ahead.

Early Conservation Initiatives

In 1933, the Congress authorized the establishment of the Soil Erosion Service within the U.S. Department of the Interior. This new agency was to conduct a nationwide demonstration program of soil erosion control. Dr. Hugh Hammond Bennett was named to head that program.

As a soil surveyor with the U.S. Department of Agriculture's Bureau of Soils prior to his

appointment, Bennett had become aware, through his work, of the serious nature of soil erosion. He expressed alarm at this insidious problem, which prior to the Dust Bowl had not received much public notice.

In 1935, the Soil Erosion Service became the Soil Conservation Service, a permanent agency within USDA, and Dr. Bennett went back to USDA to head that agency.

Throughout the 1930s and early 1940s, the U.S. Congress took considerable interest in soil and water conservation. A number of pieces of important legislation were enacted, including appropriations to deal with this national menace.

President Roosevelt strongly supported this effort. Model legislation for state legislatures was developed that resulted in the creation of state soil and water conservation agencies and local conservation districts in every state.

Legislative and executive branch support was forthcoming for many years to come, and staffing within USDA to do this important work reached its peak. Cost share funding also increased through this period, resulting in the installation of numerous soil and water conservation practices around the country.

The decades of the 1960s and 1970s produced high-water marks from the standpoint of personnel and funding for conservation programs. Inflation and other factors have since cut deeply into appropriations.

Current Status

Of late, our nation has experienced several difficult years in the agricultural sector. Landowners have not had sufficient funds to install conservation practices without governmental assistance. Conservation organizations are required each year to fight to maintain funding for soil and water conservation programs at previous levels. No new initiatives have been possible in this economic climate.

Yet, soil losses remain staggering in many areas, as data from the soon-to-be-released 1982 Natural Resource Inventory will show. Progress has been made in soil conservation, of course, but much energy has been devoted to implementing conservation programs on farms where soil losses are at, or slightly above, tolerable limits. Meanwhile, areas remain untreated where soil losses exceed the tolerable limits manyfold.

Targeting of federal assistance to highly erosive areas has been undertaken in the last two years. Results from this effort are promising. Using natural resource inventories, USDA has been able to channel increased financial and technical assistance to those areas where soil losses are the greatest.

Working Together

Throughout the first five decades of the soil and water movement in this country, many interests and academic disciplines have been involved. Professional conservationists, including agronomists, engineers, soil scientists, and others, as well as farmers, ranchers, and conservation district officials have played important roles.

Conservation professionals and lay persons alike have shared a concern for the land. They have worked together to combat soil erosion.

Agencies of government at all levels—federal, state, and local—have joined hands to develop workable conservation programs. Individuals and organizations in the private sector have worked cooperatively with public employees to develop and improve conservation programs.

The Soil Conservation Society of America is Created

Early in the 50-year period, there was recognition that some type of organization was needed where conservationists, both professional and laymen, could come together to discuss problems and solutions. An organization was needed that could provide a forum for the intermixing of talents of both the professionals and laymen and where experiences could be shared with one another.

To fill this void, a number of concerned soil conservationists organized the Soil Conservation

Society of America in 1945. Hugh Bennett was a principal supporter of this effort and is today recognized as the founder of SCSA. SCSA was incorporated as a scientific and educational organization to advance the science and art of good land use.

As an organization, SCSA has several major thrusts. First, it serves members' needs through education. Second, it represents members' interests where it counts. Third, it provides intellectual leadership in its fields of interests. And fourth, it strives



to educate the youth of this country.

SCSA members have a number of opportunities to keep current on timely policy issues as well as applied research. SCSA publishes the *Journal of Soil and Water Conservation* bimonthly. This publication is noted for its authoritative coverage of conservation issues.

Also, a newsletter, the "Conser-vogram," attempts to keep members up-to-date on items related to SCSA and its members.

Over the years, SCSA has published a variety of books and other resource materials on a variety of conservation subjects. Publications on remote sensing, water resources, soil conservation policies, economics, ethics and ecology; a glossary of terms, etc., have been published and are available for sale and distribution to members and nonmembers alike.

SCSA conducts an annual meeting each year, which allows members and others to interact on a timely topic. Special conferences, workshops, and symposia are conducted from time to time by SCSA as a way to keep resource professionals and laymen alike informed and up-to-date on pertinent subjects.

Conservation Education

Because SCSA recognized that the future of this country rests with its youth, it began a series of educational cartoon booklets nearly 30 years ago to provide useful information on conservation to young people in the upper elementary grades. Over 20 million of these booklets have been distributed to students, educators, 4-H clubs and other youth groups. These booklets are accompanied by a teacher's guide, which provides suggestions and guidance to the teacher to use in discussing the material with the students.

Recognizing that students



Gerald R. Tussing

Outdoor education- "The Wonderful World of Mud."

entering college to study natural resources also require assistance, SCSA developed a scholarship program to provide assistance to students studying soil and water conservation at the college level. Scholarships are provided for students working on their bachelor's degree as well as on graduate degrees.

Information Decision-makers

To keep decision-makers at all levels of government and industry informed, SCSA has developed a series of position statements on a variety of subjects. These position statements are revised and updated from time to time in order that they include specific information that can be used. SCSA also reviews and analyzes pending conservation legislation at the federal level and works with sister organizations and members of the U.S. Congress in ensuring that conservation legislation is designed to advance the science and art of good land use.

Early in 1983, SCSA undertook a new initiative when it established a part-time office in Washington, D.C., in order to better represent members' interests in that setting where policy formulation and legislative development take place.

SCSA, as one of many conservation organizations, works with sister organizations on a variety of conservation programs and subjects. SCSA participates as a member of the Natural Resources Council of America. The National Endowment for Soil and Water Conservation's awards program, developed and implemented in 1983, received the support of SCSA and its local chapters. This effort is extremely important in giving positive publicity to those persons identified as being outstanding conservation farmers.

Local Chapters

As with most organizations, the key to success has been the establishment and development of local chapters in each state, Canadian provinces, and Puerto Rico. Through local chapters, SCSA members have an opportunity to organize committees to deal with issues that are of interest to them within that region or state. Members also have an opportunity to develop leadership skills through chapter organizations.

Chapters attempt to develop educational programs with local communities, plan Arbor Day ceremonies, and work with policymakers at the state level to ensure that conservation policy is considered in all legislative and executive branch decision-making.

In recent months SCSA chapters have found the subject of conservation tillage as one that generates substantial interest. Chapters have held a large number of workshops on this subject. Conservation tillage is a subject that will be receiving increased attention and exposure in the months and years ahead. It is one way that farmers can reduce soil losses without the expenditure of large sums of money.

Progressing Toward the 21st Century

SCSA has been an acknowledged leader in the natural resource field for the past 40 years. With its origin going back almost to the beginning of the soil conser-

vation movement in this country, it has been in touch with the initial thinking, program development, and expansion that occurred as soil conservation programs grew over the years.

As an organization, it has monitored activities at the federal, state, and local levels and promoted changes in existing institutions to improve program administration and delivery. SCSA has also been a critic, when appropriate, of existing programs that were adversely affecting this nation's natural resources.

As we celebrate the golden anniversary of soil conservation and reflect on what has happened over the past 50 years, we also must anticipate and plan for the challenges ahead in the next 50 years. SCSA is conservation's melting pot in that it represents soil and water conservation professionals and lay persons alike who have a strong desire to protect our God-given resources. The multidisciplinary membership of SCSA is indeed the organization's strength, and this strength will serve its members and this country well in the years ahead. SCSA's educational programs will be expanded to better equip members and nonmembers alike to deal with issues. SCSA will be more vocal on legislation and policy formulation. With its broad-based membership, SCSA's primary concern will be to ensure that the important natural resources of this country are protected so that generations yet to come can also use and enjoy them.

At SCSA, conservation is our bag and natural resource conservation our goal. In the next 50 years, SCSA will strive to be more effective in its efforts to advance the science and art of good land use.

Walter N. Peechatka is Executive Vice-President of the Soil Conservation Society of America, Ankeny, Iowa.

Living With The Gypsy Moth

by Thomas H. Hofacker and
Susan M. Tucker

They splatter underfoot. They swarm over benches and up walls and plummet into plates and glasses on picnic tables. They shower down from the trees. And as they feed, the gypsy moth caterpillars drop excrement and half-eaten leaves.

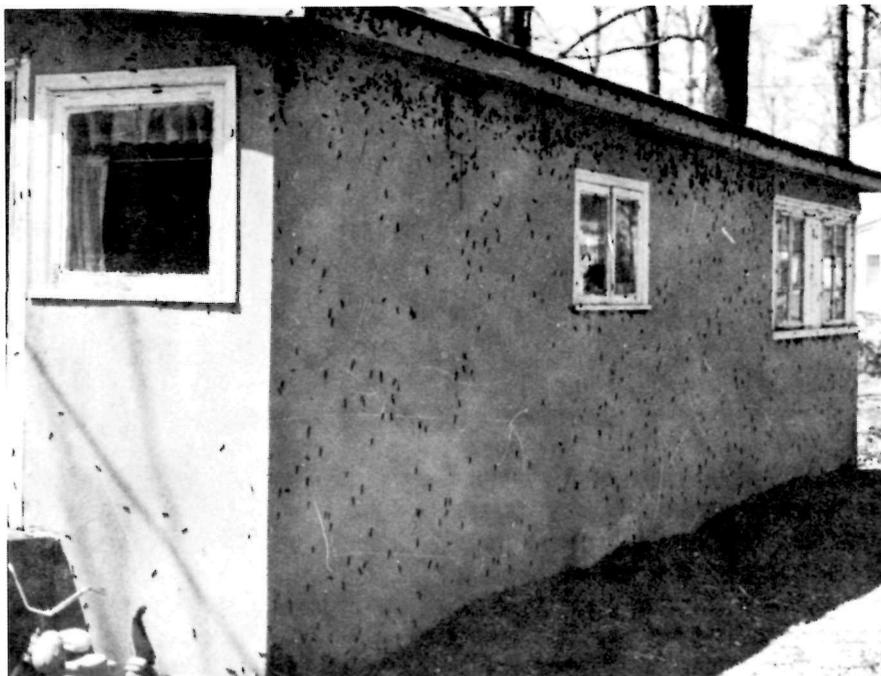
Efforts to halt the spread of the gypsy moth have failed. Since a few caterpillars escaped from a Massachusetts laboratory in 1869, the gypsy moth has spread north to eastern Canada and south to West Virginia. Surveys have found spot infestations as far west as California, Oregon, and Washington. Its spread can be slowed. But eventually the gypsy moth will, undoubtedly, infest large areas of the United States from coast to coast.

The larvae feed on a variety of hardwoods and on some conifers. During outbreaks, as many as 30,000 caterpillars can infest a single tree; trees over millions of acres can be stripped of their leaves.

Some trees—vigorous hardwoods growing on a good site—usually withstand one complete defoliation and put out new leaves later the same year. A second defoliation, however, seriously weakens even a healthy tree, leaving it vulnerable to attacks by other organisms. Death may result. Conifers often die after only one complete defoliation.

Life Stages

In July, the female moth lays eggs in buff-colored, hairy clusters of up to 1,000 eggs. The clusters are deposited on tree



Gypsy moth larvae on building in Browns Mill, New Jersey.

J. Kegg, New Jersey Dept of Agric.

trunks and branches, stone walls, houses, picnic tables, and even cars and campers.

The eggs hatch the following May. The young, black larvae begin climbing trees or other objects in response to overhead light. As they climb, they trail silken threads. When the larvae reach to top branches, they drop these threads. Then, the wind catches the larvae and disperses them for distances of up to 20 miles per year. This stage lasts 7 to 10 days while the larvae are still less than one-half inch long.

Once the dispersal period is over, the larvae begin feeding. During the day, they alternate feeding and resting. When this stage ends in about 10 to 13 days, the larvae are about 1 inch long.

The older larvae now display the characteristic five pairs of blue spots and six pairs of red spots on their upper side. Their behavior changes. They feed at night and descend the tree at dawn looking for protected places to rest. (When populations are high, the larvae feed both day and night.) This stage lasts about 20 days and is the most

destructive. A fully grown larvae, which is about 2 inches long, can eat five to ten small leaves a day. The larvae pupate in late June or early July.

Mahogany-colored pupal cases rest attached at the base of branches, in crotches, and in bark crevices. During the pupal stage, the larvae change into adults; after about 10 days, the adult moths emerge.

The brown, male moths are strong fliers. The larger, white female moths do not fly but release a sex attractant to lure male moths. Soon after mating, the female deposits her eggs in a single cluster, then dies.

When the egg masses are hidden in places like the hollow legs of aluminum outdoor furniture, people can move the clusters long distances, so the eggs hatch the following spring in previously uninfested areas.

Survey Traps

Every summer a large number of gypsy moth traps are set out all over the country. These traps contain a pheromone (disparlure), which attracts male

moths. The traps are so sensitive that they catch moths even when populations are sparse. Spot infestations in Oregon, California, and other states have been detected using these traps.

But where the gypsy moth has become established and conditions are such that the population explodes, we can do little to control the overall outbreak. Consequently, we restrict our efforts to areas where—by reducing the caterpillar hordes—we lessen their effect on people or prevent defoliation of valuable trees. Our techniques fall into three categories: mechanical, chemical, and biological.

Mechanical Control

Mechanical controls are generally more therapeutic for the tree owner than practical. These techniques often involve destroying the gypsy moth in its life stages: the egg clusters, the larvae, the pupae, or the adult moths.

Egg clusters, for example, can be scraped off trees, wood piles, and other places. Then the clusters should be buried under 6 inches of hard-packed soil, flushed down the toilet, or dunked in soapy water or kerosene. Egg clusters merely scraped onto the ground will hatch.

To catch the larvae, a hiding band can be wrapped around the tree trunk. Some of the larvae, descending the tree at daybreak in search of shady resting places, will stop under the hiding band. Hiding bands can be made from 12-inch-wide strips of burlap. The



U.S. Forest Service

Mechanical control - burlap hiding band around tree trunk.

cloth should be fastened to the trunk with wire or string tied 6 inches below the top of the cloth. The top 6 inches of the cloth should be allowed to droop down to form a flap. Every afternoon, the larvae that “hide” under the flap should be killed, or they will climb the tree at dusk to feed.

Although time consuming, these and other mechanical controls may, nevertheless, protect individual trees from the feeding of moderate numbers of larvae.

Chemical Control

Many chemical insecticides are available for use against the gypsy moth. The most commonly used insecticides contain acephate, carbaryl, diflubenzuron, or trichlorfon as their active ingredient.

These chemical ingredients provide valuable control options. Some have been formulated into liquids that can be applied to tree foliage over a wide area, either from the air or the ground. Acephate has also been formulated into capsules, which can

be inserted into individual trees to provide systemic action. Although acephate, carbaryl, and trichlorfon may kill bees foraging in the sprayed area, precautions can be taken to prevent adverse effects.

All these chemical insecticides have proven their effectiveness. When properly applied, they reduce gypsy moth populations, alleviate nuisance problems, and prevent excessive damage to tree foliage.

Biological Control

Biological sprays can also be used against the gypsy moth. These sprays contain *Bacillus thuringiensis* (Bt) as the active ingredient. Bt is a bacterium that kills certain moth and butterfly larvae. Improved formulations, higher dosage rates, and lower prices have recently made Bt sprays competitive with chemical insecticides.

One of the safest insecticides available, Bt can be sprayed near streams and lakes and is harmless to other forms of life. But timing is more critical than with the chemical insecticides. Bt must be applied when the gypsy moth caterpillars are less than 1 inch long.

Properly timed applications of Bt protect tree foliage from gypsy moth feeding. Where the populations are building rapidly and egg mass counts are high, however, chemical insecticides are needed to effectively reduce populations.

Frequently Used Insecticides For Gypsy Moth Control

Active ingredient	Representative trade names*
Acephate	Orthene, Acecap, Medicap
Carbaryl	Sevin, Sevin 4-Oil, Sevimol
Diflubenzuron	Dimilin
Trichlorfon	Dylox
<i>Bacillus thuringiensis</i>	Dipel, Thuricide

* The use of trade names is provided for the convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product.

Natural Controls

Control efforts over the last 100 years have included importing many parasites from Europe and Asia. During the years between outbreaks, natural predators and parasites help maintain populations at tolerable levels.

But for several reasons, the gypsy moth often stays one step ahead of its natural enemies. The parasitic flies established in Pennsylvania, for example, attack only the gypsy moth, so when gypsy moth outbreaks collapse, fly populations also collapse. When the gypsy moth population begins building, the parasite population lags behind.

A naturally occurring virus causes a disease that kills the larvae. The disease is known as wilt disease. Virus-infected larvae hang limply, and their skin emits a foul-smelling liquid. The disease becomes prevalent when caterpillars are crowded and stressed from lack of food. Rather than preventing outbreaks, wilt disease collapses outbreak populations.

Although predators and parasites help lengthen the time between outbreaks, managing predators and parasites to prevent outbreaks has remained an elusive goal.

Cooperative Efforts

The first large-scale effort to control the gypsy moth took place in 1890, about 20 years after the gypsy moth was introduced. Then, the arsenical insecticide Paris green was used in an at-

tempt to eradicate the gypsy moth.

Today, people are learning to live with the gypsy moth. Large-scale suppression projects, either with chemical or biological insecticides, usually treat an average of less than 10 percent of an outbreak area. These projects—no longer aimed at eliminating the gypsy moth—protect high-use recreation areas, forested residential communities, and valuable forests or watersheds.

The U.S. Department of Agriculture, Forest Service is responsible for protecting the Nation's forest resources from damage by forest insects and diseases in accordance with the Cooperative Forestry Assistance Act of 1978 (Public Law 95-313). On Federal lands other than National Forests, the Forest Service cooperates with other Federal agencies to protect the resource from pest-caused damages.

In 1983, for example, the Forest Service joined with the U.S. Department of the Interior to control gypsy moth populations at Catoctin Mountain Park in Maryland. At the request of the Park Service, the Forest Service surveyed Catoctin to determine gypsy moth population levels and their damage-causing potential. The survey of the egg masses showed large gypsy moth populations in areas adjacent to the park. During the dispersal period, caterpillars from nearby areas could blow into the park. The potential for defoliation was there. After reviewing this information, the Park Service

requested Forest Service financial and technical assistance to suppress the gypsy moth populations.

In the spring of 1983, Bt was sprayed over 5,769 acres at Catoctin. Another cooperator, the Maryland Department of Agriculture, also assisted the Park Service in the treatment. No defoliation occurred. And that fall, Forest Service surveys showed that the treatment had reduced gypsy moth population an average of 88 percent.

Note: Federal agencies can arrange for gypsy moth surveys — or for other insects and disease surveys or technical assistance — by contacting the nearest Forest Service, Forest Pest Management office. Requests for Forest Service



Gypsy moth caterpillar killed by the oak wilt disease.

U.S. Forest Service

financial assistance for gypsy moth suppression should be made to your Regional pest management coordinator. The "Who Can You Turn To?" section lists addresses of Forest Pest Management offices.

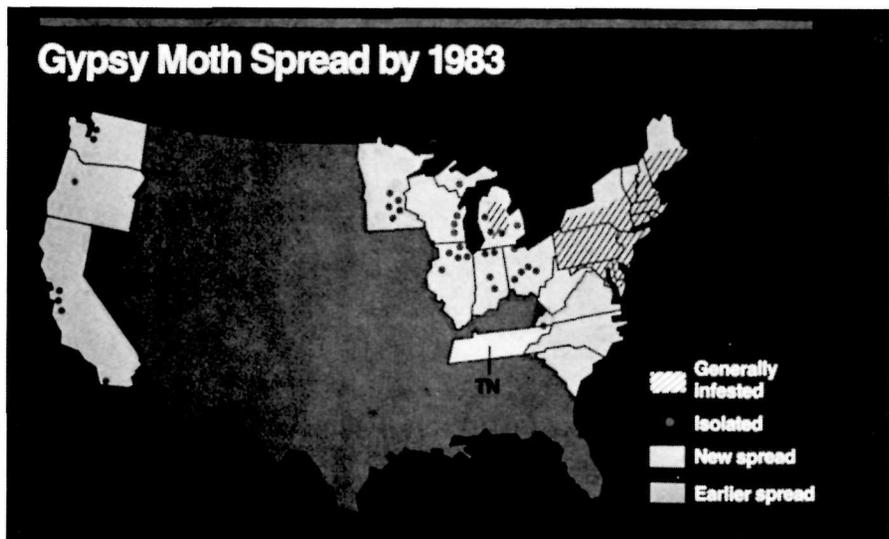
The Best Defense

In the midst of an attack, chemical and biological controls provide immediate solutions. But the gypsy moth is here to stay. Consequently, going on the offensive between outbreaks is the best defense.

When the larvae eat about 60 percent of the leaves on a hardwood tree, the tree will usually send out a second batch of leaves that same year. But refoilation exhausts the tree's energy reserves. It can take as long as 10 years for a tree to completely recover from a severe defoliation. A second defoliation will seriously weaken the tree and make it susceptible to attack by other insects and diseases. Even many healthy trees will die after 2 consecutive years of severe defoliation. Supplying trees with enough of the basic essentials—sunlight, water, and nutrients—will help keep them healthy, vigorous, and better able to withstand defoliation.

Silvicultural Management

- Thin overly dense groups of trees to reduce competition for sunlight, water, and nutrients.
- Water valuable trees during periods of drought. Watering increases their chances of surviving defoliation. Thorough, heavy



Source: Animal and Plant Health Inspection Services (APHIS).

waterings are better than frequent, light waterings. Mulch around trees to prevent excessive water loss.

- Avoid construction projects that disturb or compact soil near trees. These projects may adversely affect soil moisture relationships and hinder tree growth and health. Mulching under the drip line of trees has the added benefit of reducing soil compaction because it discourages people from walking under the tree.

- Fertilize valuable trees with slow-release, complete fertilizers. Even established trees on well-fertilized turf may need additional attention because grass competes severely for moisture and nutrients. Proper fertilization techniques are varied and rather complicated. Your local County Extension Service can provide specific information for your situation.

- Remove objects that provide protection from parasites and predators and shelter the larvae and pupae. On the ground, these include natural debris such as dead branches and tree stumps, and artificial debris, such as tires and cans.

- Diversify tree and plant species or encourage species that are less favored by the gypsy moth. The eastern hardwood forest, for example, is extremely

susceptible to gypsy moth because it contains vast amounts of oaks—the gypsy moth's preferred food. (Oaks, however, were not always such a significant component of this forest. Chestnut blight, fire control, logging practices, and other factors helped produce the abundance of oak we find today.) On the other hand, yellow poplar, maple, hickory, dogwood, and many pine are less susceptible to attack by the gypsy moth. Pest management personnel can provide advice on less susceptible tree species that are compatible with your climate, soil, and site situation.

Outbreaks generally last 2 to 3 years in any particular location. While mechanical, chemical, and biological controls work during outbreaks, the best "control" takes place between outbreaks. Between these outbreaks, remember the gypsy moth. Encourage future stands of more diverse species composition and maintain healthy trees capable of withstanding attack.

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Bringing Resource Utilization Down To Earth

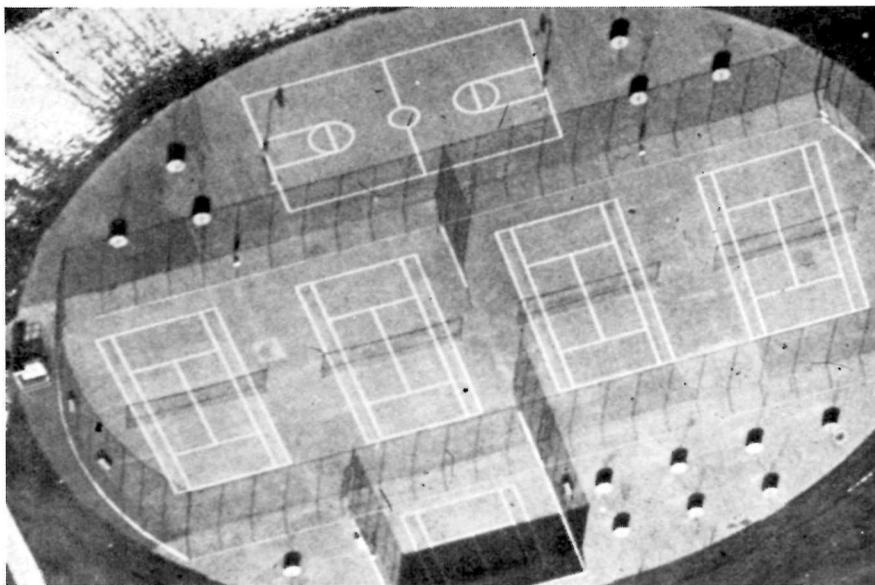
by James F. Fisher
and Vicki Sudmeier

Although Webster may not agree, innovation may be defined as "constructing tennis courts atop a City of Arvada-owned water storage tank." This variation to the English language is the compliments of the North Jeffco Metropolitan Recreation and Park District in Colorado.

North Jeffco is located between Denver and Boulder, and serves a population of approximately 95,000. Several years ago, as participation in tennis was reaching its peak, North Jeffco joined with the City of Arvada to develop an outdoor, multi-purpose court facility.

The desire to expand recreational facilities in the most economical manner had been of paramount importance for many years prior to beginning this search for the ideal project. At this same time, the need for expanded water storage in the growing community of Arvada was emerging. The City of Arvada and the North Jeffco District have enjoyed a very positive cooperative effort which, once again, provided a tremendous benefit for the taxpayer. The result of two entities working together met the dual challenge of providing citizens with leisure opportunities and water storage at a time when recreational demands were growing and finding available court time was becoming increasingly more difficult.

Ron Culbertson, city engineer director, is credited with originating the concept of constructing the tank and facility on one site. The concept was



Aerial view of Alice Sweet Thomas Park.

North Jeffco Rec/Park District

expanded upon with thirteen months elapsing between conception and actual construction. Because the proposed site was adjacent to a single family residential subdivision, a series of neighborhood meetings was conducted to alleviate misunderstandings and investigate the potential of any adverse impact which had not surfaced in previous studies. The work was completed on November 13, 1974, for a total cost of \$860,000. Costs for the park and recreational portions of this project amounted to \$60,000.

The water tank itself was recessed into the ground and measured 275 feet in diameter and 24 feet in depth, with a capacity of ten million gallons. In planning this complex, steps were taken to ensure that the facility was multi-faceted to better serve the growing recreational needs in the area. Four tennis courts, a practice backboard, and basketball/volleyball courts occupy the top of the tank. A sprinkler system and landscaping complements the four-acre site which further expanded the function of the area to picnickers, as well as a green visual relief to passing motorists.

Awards

The design of this project received regional recognition with the Grand Award from the Consulting Engineers Council of Colorado, the Ecological Award from the Rocky Mountain Chapter of the American Concrete Institute, and the Horizons on Display Award from the Department of Housing and Urban Development. North Jeffco and the City of Arvada were credited for "spending the extra money for environmental concern considerations" when installing a water reservoir. With the Boulder flatirons in the background, the setting for this unusual facility is only magnified.

The Arvada City Council named the facility in memory of Alice Sweet Thomas, a person who unselfishly gave of her time for projects which resulted in the betterment of the community.

An agreement was reached with an adjoining church for use of their existing parking lot which allows tennis players access to adequate parking without the cost to the taxpayers of duplicating an existing facility on this site.

Thundercloud Park

After completion, the facility was so favorably received by the public that this development was duplicated on an existing water storage facility in another part of the city. Thundercloud Park resulted and was funded as part of a city bond issue that provided for the development of thirty-five neighborhood parks in a three-year period.

Partnerships

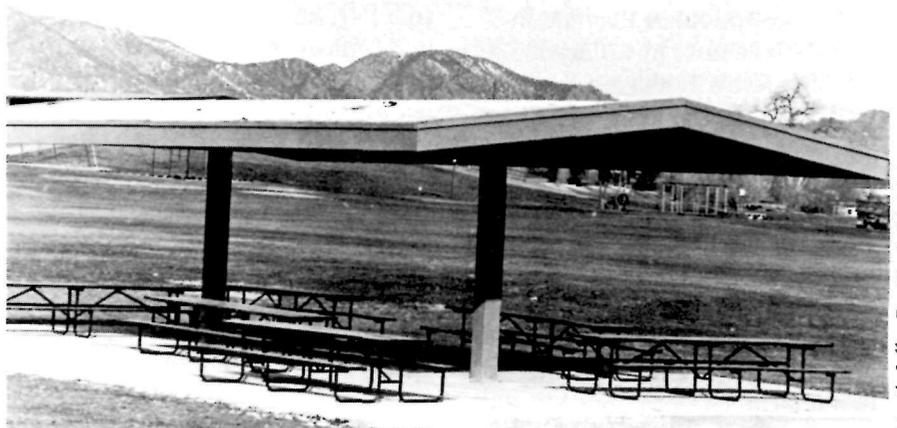
Creativity must be exercised when seeking methods to obtain new facilities or expand in the programming area. With finances representing a constant concern, staff is faced with the task of researching all available resources. The North Jeffco Foundation became involved in the acquisition of a building and property through the generosity of the Standard Oil Company, a division of Amoco Oil Company.

The North Jeffco Park is a large community park on which is housed the district administration/recreation center, ice arena, swimming pool, tennis courts and a picnic pavilion. A service station, which had not been utilized for several months, occupied the southwest corner of the park.

Gail "Doc" Gilbert, president of the District Board of Directors, joined with the executive director of the district in approaching Standard Oil to request the donation of this vacant building and land. The negotiations were very successful and served to ex-



Relocation of gas station canopy.



New picnic shelter installed at Oak Park.

emplify the importance of public/private partnerships. Value of the total contribution was \$60,000, which is the largest contribution to the foundation to date.

Through the ingenuity of staff and full support of the North Jeffco Board of Directors, the building was remodeled into a recreational arts and crafts workshop. All of the work was completed in-house during the winter months with actual renovation costs being kept to a minimum.

To ensure optimal use of this gift, the service station canopy was relocated to nearby Oak Park. The canopy serves the North Jeffco residents as a picnic pavilion. A 30 x 60 foot concrete slab was poured at Oak Park with total project costs amount-

ing to approximately \$4,200. The pavilion also serves the district as a source of revenue through a reservation system which is administered by the Parks Department.

Because this donation was utilized to the fullest extent and publicized throughout the community, it is feasible that Standard Oil may again contribute to the North Jeffco Foundation. A booklet was compiled for presentation to Standard Oil executives which included photographs and news releases as part of the donor recognition process.

Cooperative Agreements

Another avenue available for supplementing facilities and revenues is through cooperation with various government agen-

cies. A cooperative agreement, which established a joint park fund with the City of Arvada, was first created in 1974 and continues to provide improved facilities and maintenance to community park lands. In addition to the joint park fund, the city and district also cooperate for the exchange of equipment, facilities, shop areas, staff expertise as well as data processing services.

In 1980 the City of Arvada allocated dollars from its community development block grant fund for the remodeling of North Jeffco facilities for accessibility by special populations. The city and district have supported bond issues which have resulted in expanded park and recreational opportunities for our residents.

Another active cooperative agreement exists with the Jefferson County R-1 School District. This agreement provides for North Jeffco's utilization of school buildings for recreational activities at no cost to North Jeffco. In return, North Jeffco cooperates in the school district's use of swimming pools, the Indian Tree Golf Course, the ice arena and other recreational facilities. North Jeffco and the R-1 School District enjoy cooperation involving school park sites with both development and maintenance of these areas being shared between the two entities.

Open Space Master Plan

The North Jeffco Board promotes mutual cooperation with the Jefferson County Open Space Department to acquire open

space land within the district. Preparation of a joint park and recreation open space master plan, in conjunction with both the City of Arvada and Jefferson County, has been completed. This master plan provides a joint recreational philosophy shared by the elected officials of the agencies involved. The North Jeffco Board was one of the few elected bodies to actively support the open space program prior to approval by a vote of the people.

A number of cooperative programs are provided to the public through the efforts of the Colorado State Parks and Outdoor Recreation Department as well as the Colorado Division of Wildlife. North Jeffco conducts outdoor-related activities in nearby state parks while the Division of Wildlife stocks lakes and assists with fishing derbies and the instruction of hunter safety classes for North Jeffco participants. The cooperation enjoyed between the county, city, state agencies and North Jeffco has resulted in an extensive recreational trail system. These entities continue to illustrate their concern for the conservation of energy by providing recreational outlets close to the homes of our residents which are easily accessible with the connecting trail system.

The North Jeffco Board has joined with the City of Lakewood and Wheat Ridge, the Foothills Recreation and Park District, the Jefferson County R-1 School District and the Jefferson County Association for the Retarded Citizens in an effort to provide a more comprehensive recreation

program for special populations in the area.

Several years ago, the North Jeffco Mountain Park was acquired from the Bureau of Land Management through the Recreation and Public Purposes Act. The park has a Braille trail which was originally constructed by a local Girl Scout troop as a result of a Reader's Digest Foundation grant. The Braille trail has been maintained by the Arvada-Jefferson Kiwanis Club which illustrates the advantages of utilizing volunteerism to benefit park and recreation services in our community. The positive results of the cooperative efforts between public and private groups and agencies have exemplified cost effectiveness and the North Jeffco District will continue its efforts in these tax saving endeavors.

Public/private relationships offer another alternative for pursuit by parks and recreation professionals. The North Jeffco Foundation has raised over \$315,000 in cash and materials. Gifts have ranged from property to trees, from labor to bridges, from cash to bequests. The community participation that evolves from programs of this nature serves to benefit the image of the entity.

With tax dollars being limited and the public's demands growing, today's challenge is to aggressively plan for the provision of services in the next decade.

James F. Fisher is Executive Director and Vicki Sudmeier is Administrative Assistant of the North Jeffco Metropolitan Recreation and Park District in Arvada, Colorado.

Who Can You Turn To?

Cemeteries

"Cemeteries As Open Space Reservations" report, Robert A. Abernathy, P.O. Box 633, Pulaski, TN 38478

"Commemorative Parks from Abandoned Public Cemeteries, A Legal Report" 1971. 0-382-663 Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.

Gypsy Moth

Forest Pest Management offices are located at the following addresses:

Region 1

USDA Forest Service
Federal Building
Missoula, MT 59807
FTS: 585-3290
COMMERCIAL: 406 329-3290

Region 2

USDA Forest Service
PO Box 25127
Lakewood, CO 80225
FTS: 234-7280
COMMERCIAL: 303 234-7280

Region 3

USDA Forest Service
Federal Building
517 Gold Avenue, S.W.
Albuquerque, NM 87102
FTS: 474-2440
COMMERCIAL: 505 766-2440

Region 4

USDA Forest Service
Federal Building
324 25th Street
Ogden, UT 84401
FTS: 586-5257
COMMERCIAL: 801 626-5257

Region 4 Field Office

USDA Forest Service
Boise Field Office
1750 Front Street
Room 202
Boise, ID 83702
FTS: 554-9025
COMMERCIAL: 208 334-9025

Region 5

USDA Forest Service
630 Sansome Street
San Francisco, CA 94111
FTS: 556-4265
COMMERCIAL: 415 556-4265

Region 6

USDA Forest Service
PO Box 3623
Portland, OR 97208
FTS: 423-2727
COMMERCIAL: 503 221-2727

Region 8

USDA Forest Service
1720 Peachtree Rd., N.W.
Atlanta, GA 30367
FTS: 257-2961
COMMERCIAL: 404 881-2961

Region 8 Field Offices

USDA Forest Service
Asheville Field Office
PO Box 5895
Asheville, NC 28813
FTS: 672-0625
COMMERCIAL: 704 259-0625

USDA Forest Service
Alexandria Field Office
2500 Shreveport Highway
Pineville, LA 71360
FTS: 497-7284
COMMERCIAL: 318 473-7284

Region 10

USDA Forest Service
2221 E. Northern Lights Blvd.
Suite 104
Anchorage, AK 99504
COMMERCIAL: 907 276-0939

Northeastern Area
USDA Forest Service
370 Reed Road
Broomall, PA 19008
FTS: 489-3153
COMMERCIAL: 215 461-3153

Northeastern Area Field Offices
USDA Forest Service
St. Paul Field Office
1992 Folwell Avenue
St. Paul, MN 55108
FTS: 784-0324
COMMERCIAL: 612 784-0324

USDA Forest Service
Forestry Sciences
180 Canfield Street
Morgantown, WV 26505
FTS: 923-4133
COMMERCIAL: 304 291-4133

USDA Forest Service
Louis C. Wyman Forestry
Sciences Laboratory
P.O. Box 640
Durham, NH 03824
FTS: 834-0765
COMMERCIAL: 603 868-5719

Motorcycling

James J. Lewis
State Forest Manager
Withlacoochee State Forest
15023 Broad Street
Brooksville, FL 33512

Planning and Management

Assistance Available from the Soil Conservation Service, Agriculture Information Bulletin 345, Soil Conservation Service, U.S. Department of Agriculture, 1981.

Recreation Area Planners. . . Soil Surveys Can Help You, Program Aid No. 1053, Soil Conservation Service, U.S. Department of Agriculture, 1975.

Reservoir Timber Clearing and Fish Attractors

U.S. Army Corps of Engineers
P.O. Box 1070
Nashville, TN 37202

Tennessee Wildlife Resources Agency
Ellington Agricultural Center
P.O. Box 40747
Nashville, TN 37204

Technical Report E-81-11
Factors Affecting Fish Production and
Fishing Quality in New Reservoirs, With
Guidance on Timber Clearing, Basin
Preparation, and Filling

Available From:

U.S. Army Engineer Waterways Experi-
ment Station Environmental Laboratory
P.O. Box 631
Vicksburg, MS 39180

How to Build A Freshwater Artificial
Reef-Prince, Maughan, Brouha
From: Virginia Cooperative Fishery
Research Unit
Virginia Polytechnic Institute and
State University
Blacksburg, VA 24061

Effects of Standing Timber of Fish Popula-
tions and Fisherman Success in Bussey
Lake, Louisiana - Davis & Hughes
From: Louisiana Wildlife and Fisheries
Commission
Monroe, LA

Crooked Creek Study - Barkley Lake Ken-
tucky Department of Fish and Wildlife
Resources
Frankfort, KY 40601

Use of Brush Shelters as Cover by
Spawning Black Basses in Bull Shoals
Reservoir - Voegelé and Rainwater
From: U.S. Fish and Wildlife Service
Fayetteville, AR 72701

Soil Conservation Society of America

For information on the following, please
contact:

Soil Conservation Society of America
7515 N.E. Ankeny Road
Ankeny, IA 50021-9764
(515) 289-2331

1. Publications catalog
2. Discover a unique approach to conser-
vation and education brochure.
3. Membership brochure and SCSA
FACTS.
4. "The Golden Anniversary of Soil
Conservation" - 1984 Annual Meeting
Information.

Soil Surveys

Hooper, Lennon. *National Park Service
Trails Management Handbook*. National Park
Service, 1983.

Proudman, R.D., and R. Rajala. *AMC
Field Guide to Trail Planning and
Maintenance*. (Second Edition).
Appalachian Mountain Club, Boston,
MA., 1981.

Soil Conservation Service. *National Soils
Handbook*, part 603.03-5(d). U.S. Depart-
ment of Agriculture, 1983.

Upcoming TRENDS Issues

Following is a tentative schedule of future TRENDS issues. If you wish to contribute an article for possible inclusion in any of these issues, please submit your typed, double-spaced manuscript (not to exceed 3,000 words) by the due date to: Managing Editor, Park Practice Program, National Park Service, Department of the Interior, Washington, DC 20240, telephone: (202) 343-7067.

Photographs should accompany your article. Black and white glossy photographs reproduce best. Illustrations or line drawings are also welcome. All photographs and illustrations should be properly identified and credited, and they will be returned to contributor after printing.

All submissions will be reviewed, but publication cannot be guaranteed. Park Practice cannot pay for articles or photographs submitted or published, but full credit is given to authors and photographers whose material is used.

Issue	Theme	Date due
Summer 1984	Law-Related Issues for Park & Recreation Managers	(production already underway)
Fall 1984	User Fees and Charges	June 1, 1984
Winter 1985	Transportation	September 1, 1984

