

SMALL SCALE SMALL FIELD CONSERVATION

Simple practices and concepts to help you solve natural resource problems with a small investment of time and money



United States Department of Agriculture



SOLVE YOUR CONSERVATION PROBLEMS

Small Scale/Small Field Conservation is intended to help you solve natural resource problems using simple conservation practices and concepts. Meant for small fields or to be used on a relatively small scale, the practices featured can be designed and installed with a small investment of time and money. This booklet should serve to give you the basics- additional technical help is available from your local Natural Resources Conservation Service office at your USDA Service Center.

The goal of many landowners is to take care of their land, so as to leave it better than they found it.

CONSERVATION MEASURES WORK BEST TOGETHER IN SYSTEMS

A single conservation practice may solve your problem, but conservation practices work best together. The benefits of conservation practices are generally additive- for instance, small gullies can usually be stopped with grassed waterways or small structures (see pages 6-7). But the chosen practice will last longer and be more effective if the drainage area above the gully is managed to absorb more rainfall and reduce runoff. Or, cropland protected by contouring is even better protected if crop residues, or mulches, are left on the soil surface or if rowcrops are rotated with small grain, grass or legumes. This kind of farming promotes better soil and water quality as well as wildlife habitat. The use of several practices planned and applied to solve multiple problems is called the "systems approach" to conservation. Ask your local conservationist for help in designing a complete conservation system for your land.



Technical help from the NRCS to plan and install conservation measures is free to small farm owners.



conservation improvement.

Improving pastures, cropland and woodland are among conservation improvements owners of small farms may consider for their land.



Roger Hill

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SLOWING SHEET & RILL EROSION

To slow sheet and rill erosion on cropland, you need to leave cover on the soil to prevent falling raindrops from splashing and dislodging the soil. You also need to help rainwater and runoff soak into the soil rather than run off a hillside, tearing more topsoil loose as it runs off the land. Basic soil-saving methods include some type of ground cover and cropping patterns that hold water on the soil to allow infiltration. Since sheet and rill erosion account for the majority of sediment in the Nation's waterways, practices that control sheet and rill erosion improve water quality. They also benefit fish, other aquatic life, and wildlife.

Protective ground cover of crop residues, grass, or trees is a basic conservation method to combat sheet and rill erosion.

CROP RESIDUE MANAGEMENT, also called conservation tillage, leaves last year's crop residue on the surface before and during planting operations. The residue is left on the surface by reducing tillage operations and turning the soil less. Advantages:

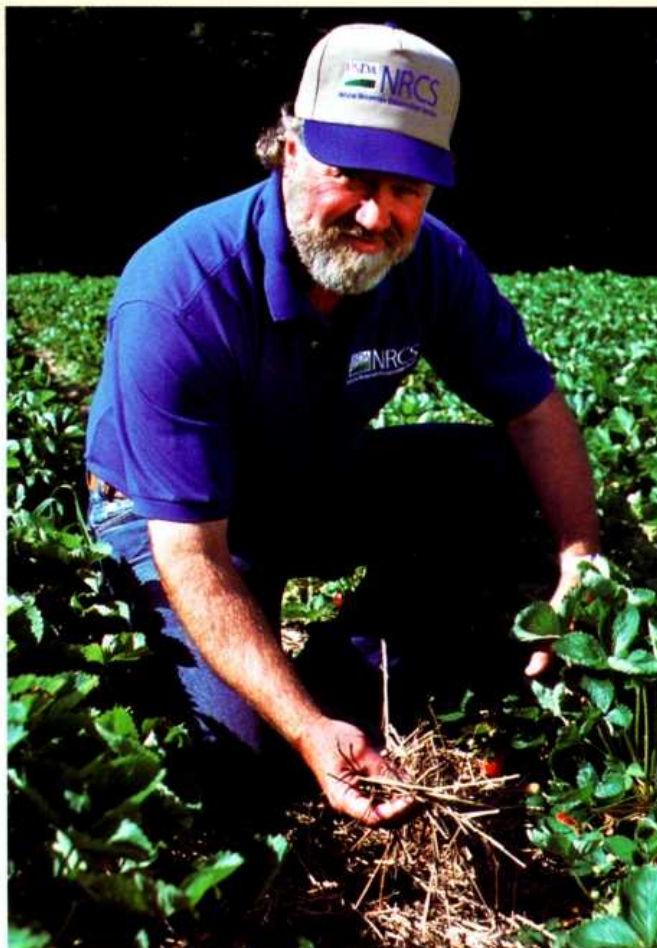
- Provides cover for the soil at a critical time of the year, preventing soil erosion, improving water quality, and helping wildlife and aquatic habitat.
- Residue improves soil tilth and adds organic matter for a healthy, living soil.
- Fewer trips and less tillage reduce soil compaction.
- Time, energy and labor savings are likely.

CONTOUR FARMING - tilling and planting around the hill with nearly level rows - creates hundreds of small ridges on a hillside. These ridges slow water flow and increase infiltration to reduce erosion.

- Contouring can reduce soil erosion by as much as 50% from up and down hill farming.
- Contouring is cost-effective.
- Most landowners can contour with little guidance.

STRIPCROPPING AND CROP ROTATIONS ensure crops are changed year by year in a planned sequence. Crop rotation and stripcropping are common practices on sloping soils because of their potential for soil saving. Stripcropping saves soil because half the slope is in soil-conserving legumes or grasses most of the time.

- Rotation also reduces fertilizer needs, because alfalfa and other legumes replenish soil nitrogen that's been removed by grain crops.



Mulch protects soil in a strawberry field. The ground cover left by mulching or conservation tillage helps save soil and moisture and helps control weeds.

mulching and conservation tillage

Rotating row crops in alternating strips with legumes or other soil-saving plants slows erosion from both the wind and water.



reduce sheet & rill erosion

- Pesticide costs may be reduced by naturally breaking weed, insect and disease cycles.
- Meadow or small grains cut soil erosion and improve soil condition.
- Crop rotations add diversity to the land.

GRASS AND TREE PLANTINGS are among the best soil conservation practices because of the excellent ground cover the plants provide.

- Improving stands of grass or woodlands can increase profits.
- Healthy, well-managed woodlands and grass lands provide long-term wildlife habitat.
- Matching tree or grass species with soil types prevents soil erosion, increases income, and boosts productivity.

CONTOUR BUFFER STRIPS - strips of grass in a contoured field, help trap sediment and nutrients. Similar to stripcropping, but with narrow, permanent grass strips.

- Vegetation provides cover and habitat for small birds, mammals and beneficial insects.
- The strips reduce erosion by slowing water flow and increasing water infiltration.

COVER CROPS are close-growing crops that cover the land to protect the soil when crop residues are not adequate. Crops such as cereal rye, oats, winter wheat or legumes are planted to temporarily protect the ground from wind and water erosion during times when cropland isn't adequately protected against soil erosion. Cover crops

- keep ground protected.
- add organic matter to the soil.
- trap nutrients and reduce weed competition.



Grass strips placed in contoured rows help catch the soil to break up steep slopes and reduce sheet and rill erosion.

Consult your NRCS conservationist for technical and financial help in protecting your soils from erosion.

protection from erosive forces



Protective cover crops between row crops such as grapes can build the soil as well as protect it from erosive forces of water and wind.

stopping soil erosion



A ground cover of trees or grass is highly effective in stopping soil erosion.

crop rotation



STOPPING SMALL GULLIES

There are several types of soil erosion, but none is more visible on the landscape than gully erosion. Gullies often begin in slight depressions where concentrated runoff water from heavy storms tears at the soil. They may also form as rapidly melting snow or ice runs off the land. Sediment from gully erosion fills farm ponds, road ditches, streams and lakes, and causes other problems downstream.

A variety of grade stabilization structures can be built within gullies to control erosion. They reduce the grade, or slope of the gully channel, to slow the water and reduce its energy. Common structures include chute spillways, drop structures, pipe drop structures, and grassed waterways.

The size of the drainage area above a gully and land slope point to the type of structure best suited to control the gully.

CHUTE SPILLWAY

A chute spillway can be easy to install and last for several years. Chute spillways are used to control overfalls or headcuts within channels or constructed waterways. Chutes can also be used to safely move water from farm fields into the bottom of drainage ditches. Chute spillways can be constructed using various materials such as concrete, loose rock, geotextile, concrete blocks, or established sod. The type of material will dictate the amount of time and energy that will be needed to maintain the structure after each runoff event. The suitability of the chute spillway to the site conditions is important since a lot of time, effort, and materials will be used to install the practice. It is important to have the practice designed by a qualified person.

water flow through or over a designed opening, where the water drops to a nearly level apron or stilling basin and then passes into the downstream channel. Besides controlling gully erosion, drop structures:

- Serve as outlets for tile and surface water along drainage ditches.
- Protect the outlet end of grassed waterways and sod chutes.
- Control irrigation water.

Gully erosion along and across steep roads is a common problem for orchard owners. Water bars divert runoff water away from orchard roads (bottom).

DROP STRUCTURE (small dam)

The straight drop spillway is a dam that directs



divert runoff water



Grassed waterways are used where runoff water concentrates - they may require shaping and maintenance because natural forces tend to drop sediment in them or cut small gullies.

slowing gully erosion

DROP STRUCTURE ADVANTAGES:

- Very stable, can withstand large flows without being damaged.
- Does not easily clog with floating debris.
- Lower maintenance costs than most other structures.
- Relatively easy to build.

The drop structure may be built with concrete, rock masonry, concrete blocks, metal sheet piling, or treated lumber. Select construction material based on the life span needed for the structure, costs including maintenance, and construction difficulty. In most cases, structures built using concrete block, masonry, or treated lumber can be constructed with farm labor; reinforced concrete or steel sheet piles require a more experienced work force. While a drop spillway may be easy to construct, a significant amount of material may be needed. To ensure a quality job, the drop spillway should be designed only by qualified persons.

PIPE DROP STRUCTURE

A pipe drop structure is commonly an earthen dam built across a gully with a pipe that carries water from above the dam to an area below, without erosion. While pipe drop structures are often used to control gully erosion, they also are used to form farm ponds, and serve as outlets for settling basins and flood control structures.

PIPE DROP STRUCTURE ADVANTAGES:

- Adaptability for high drops.
- Uses less material than chutes or full-flow drop structures
- Lowers the peak flows downstream-but the pipe inlet clogs easily with debris.

GRASSED WATERWAY

A grassed waterway is a natural or shaped channel, usually seeded to perennial grass. The waterway is designed to be wide and deep enough to safely carry storm runoff water down the channel on the grass rather than across bare soil. Grassed waterways are used where water concentrates and gully erosion is a problem. Grassed waterways can also be used to carry water downstream from diversions, terrace systems, road ditches or culverts.

GRASSED WATERWAY ADVANTAGES:

- Can be built with farm equipment.
- Reduces soil erosion, improves water quality.
- Increases wildlife habitat.
- Grass may be harvested from the waterway, but avoid disturbance during bird nesting season. Don't over graze or use the waterway as a road.

NOTE: Establishing and keeping a thick stand of grass in the waterway is critical to its success. Waterways with constant or prolonged water flows may need special treatments such as stone centers or subsurface drains to carry a portion of the flow, or grade stabilizing structures at the outlet end.



Wood is one of the material choices for relatively inexpensive drop structures that help solve small gully erosion problems.

While pipe drop structures are often used to control gully erosion, they also are used to form farm ponds, and serve as outlets for retention or settling basins and flood control structures.

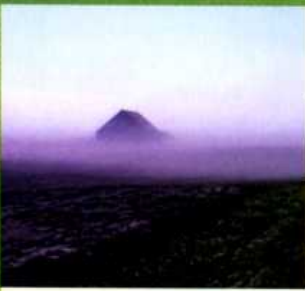


Concrete blocks can be placed by the owner to form a chute structure. This can be an inexpensive option to help stabilize an eroding gully.

stabilize an eroding gully

In very small streams or waterways, anchored rocks help stabilize the stream.





REDUCING IMPACTS OF THE WIND

Unprotected soil caught by the wind results in loss of topsoil, crop damage and sediment in road ditches and dust in the air. Erosion by wind can be cut dramatically if the soil is covered or partially covered by vegetation. These cost-effective practices use that principle to combat wind erosion.

Key principles in reducing wind erosion are barriers to slow the wind and vegetative cover for the soil.

CROP RESIDUE

The non-harvested plant material left on the soil after crop harvest should be left undisturbed as long as possible. Called crop residue management or conservation tillage, this practice is a widely accepted farming practice helping reduce erosion from both wind and water throughout the Nation.

COVER CROPS

Cover crops are planted to cover the soil between cropping cycles to protect against both wind and water erosion. They are not harvested, but instead are turned under or left on the surface to decompose once their protective function is complete. Other benefits: they may cut fertilizer costs, reduce the need for pesticides, and increase crop yields by improving soil health. Cover crops planted to control wind erosion must be adapted to the site and grow fast to protect the soil quickly.

WINDBREAKS/SHELTERBELTS

Windbreaks, sometimes called shelterbelts, reduce wind erosion by disrupting the wind flow and slowing the wind down. One or more

rows of trees and/or shrubs planted perpendicular to the prevailing wind direction can protect crops and livestock, offer habitat for wildlife, improve air quality, and manage snow. Choice of trees and shrubs, number of rows, planting direction, spacing within and between rows, and distance from the area to be protected all work to determine how effective your windbreak will be.

VEGETATIVE WIND BARRIERS

Vegetative wind barriers - narrow strips of tall grass or other herbaceous vegetation growing perpendicular to the wind - function like small windbreaks. They're most often used to protect young crops from the wind. Like windbreaks, the way they function depends on their height, density and spacing. For optimum protection, these barriers should be spaced not more than 10-12 times their height apart. If annual plants are used, the barriers must be replanted each year.

trees, shrubs form windbreaks



Rows of trees form windbreaks to protect tender flowers and other high value crops from damaging winds and windblown soil.



Gary Kramer

A vegetative wind barrier several feet wide will stop soil from blowing along the ground surface to protect vulnerable vegetable crops on irrigated land.



Temporary, narrow rows of ryegrass form a vegetative wind barrier in a vegetable field.



MANAGING GRAZING LAND

DEVELOP A COMPLETE SYSTEM

Grazing management is more than just moving livestock from one pasture to another. It begins with balancing livestock demand with forage supply, and includes proper water, mineral and nutrient distribution, and much more.

Consider the entire grazing system as you plan to protect the soil and develop an efficient grazing program.

BALANCE LIVESTOCK WITH FORAGE

The first and most important step in managing grazing lands is to balance livestock numbers with forage supply. To do this, you need an inventory of both livestock and forage. These inventories will help identify the times of year when forage may be in short supply and times when extra forage is available.

FORAGE

Plan to supply the quality and quantity of forages that meet the nutritional needs of livestock throughout the year. There are numerous grazing systems designs from high management intensive grazing systems to those with minimal time and resource inputs. Keep your goals and resources in mind. A grazing system with multiple pastures and a diversity of forages offers the most flexibility.

WATER SUPPLY

The challenge is to keep an adequate supply of good water available all the time. There are several low cost options.

FENCES

Fences help control your livestock's grazing time in a particular pasture. There are many types of permanent and temporary fences.

SOIL FERTILITY

Soil fertility management varies according to soil, climate, and type of forage. Native grasses in arid and semi-arid areas do not respond well to fertilizer. Most forage plants grown under irrigation or in higher rainfall areas do respond to fertilizer. Consult local experts for advice on fertilizing your pastures.

WEED MANAGEMENT

Take good care of your grazing land and you probably won't have to worry about weeds, because healthy forage plants will usually crowd weeds out. On the other hand, many so-called weeds are actually high quality forage plants. Learn to identify the plants growing out there so you can manage them to your benefit.

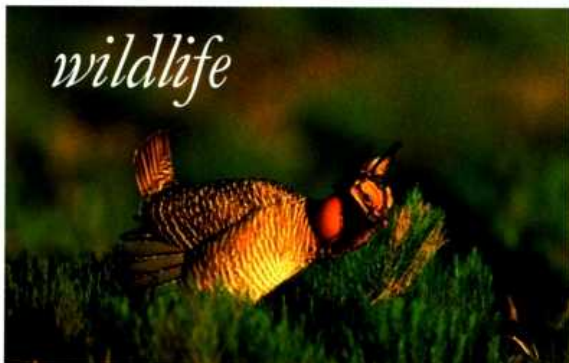
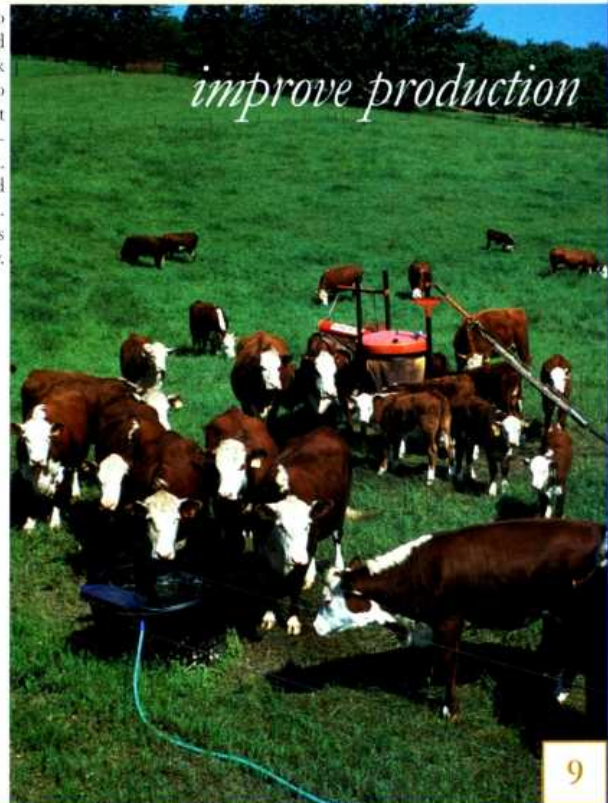
grazing efficiency



Portable fencing offers flexibility to maximize grazing efficiency in a rotation system. It allows more forage production on fewer acres.

Dividing a pasture into small paddocks of land and rotating livestock often from paddock to paddock is an excellent way to improve production and protect the soil. A portable or well-placed water supply is essential. Balance livestock numbers with forage supply.

improve production



wildlife

Properly managed rangelands and pastures, large or small, support wildlife as well as livestock.

Gary Kramer



MANAGING NUTRIENTS AND PESTS

It's easy to go wrong when you apply nutrients and pesticides to your land. Excess nitrate in ground water causes health problems, and excess phosphorus can cause algae blooms in lakes and streams, suffocating fish and reducing recreational and aesthetic values. Pesticides applied in the wrong place or wrong time can be toxic to wildlife, livestock, and people. You're wise to adopt a common sense strategy to manage the amounts, placement, timing, and handling of nutrients and pesticides that helps you apply only what your crops need.

Careful, continued monitoring of crops is key to economical nutrient and pest management.



Dot Paul

THE BASICS OF NUTRIENT MANAGEMENT:

- Know what you have - Sample and test your soils regularly.
- Know what you are applying - Have your manure, compost, or other material analyzed for nutrient content. Know and understand the nutrient content of chemical fertilizer.
- Know how much you're applying- Calibrate your fertilizer spreader.
- Use the recommended amounts for the crop you want to grow - Follow soil test recommendations.
- Minimize erosion and runoff - nutrients may leave in solution or attached to sediment.
- Maintain buffer areas - their purpose is to filter nutrients and sediment from runoff.

BASICS OF PEST MANAGEMENT:

- Grow healthy, well adapted crops - they are less easily affected by pests.
- Maintain healthy soils - they are alive with beneficial organisms.
- Encourage diversity of plants and animals - be in tune with nature.

- Monitor insect, disease, and weed populations - apply timely control techniques.
- Learn the common pests and control techniques.
- Consider organic crop production techniques, with no synthetic fertilizers or pesticides.
- If you use pesticides, read and follow label instructions carefully, try spot applications, and always calibrate your sprayer.

PEST MANAGEMENT PRACTICES YOU CAN USE AND WHY

- Conservation crop rotations break pest cycles.
- Cover crops and mulches smother weeds by shading.
- Scouting keeps you informed about the presence and population of pests.
- Proper timing of tillage operations is essential for effective mechanical weed control.
- Narrow plant spacing can out-compete weeds.
- Careful timing of planting dates can confound some pests.
- Buffers and cover crops harbor beneficial insects.
- Install bat houses.



Testing soil for nutrient content is a basic step in nutrient management.

Monitoring pest populations allows farmers to fine tune their pest management program.



the help of specialists



IMPROVING SOIL QUALITY

Take good care of your soil and it will reward you. Abuse or neglect it and your crops and the environment will suffer.

Eroded, compacted soils cannot produce the bumper crops possible with healthy soils.

HEALTHY SOILS:

- Supply enough water and air for plant growth.
- Hold and release plant nutrients steadily.
- Increase with infiltration.
- Host a large and diverse population of soil organisms.
- Have a loose consistency so that roots, water, and equipment can pass easily.

WHAT CAN YOU DO TO IMPROVE OR MAINTAIN HEALTHY SOILS ON YOUR FARM?

- **Manage organic matter.** Healthy soil contains an abundance of organic matter and living organisms. Soils low in organic matter cannot perform. Practices that increase organic matter include leaving crop residues on the surface; planting or under-seeding with cover crops; choosing crop rotations that include high residue plants; applying manure or compost; using residue management practices, especially no till; and mulching.

- **Maintain chemical balances.** Don't overload your soil with nutrients. Practice nutrient management and maintain or achieve a desirable pH.
- **Avoid compaction.** Excessive traffic or tillage, working soils when wet, or leaving bare soil exposed to heavy rains all cause soil compaction or crusting.
- **Conserve topsoil.** Use conservation measures to control erosion and runoff.



conserving topsoil

Healthy soil is porous and high in organic matter.



healthy soil



WETLANDS, WOODLANDS & WILDLIFE

Croplands are in many cases the heart of a farm, for economic reasons. The soul of a farm more often comes from its woodlands, its wetlands, its wildlife, and its open spaces.

The many values of wetlands, swamps, bogs, sloughs, potholes and marshes are only recently being fully understood and appreciated. The key is to recognize wetlands as valuable rather than wasteland.

ALL OF AMERICA'S ducks and geese

depend on wetlands for breeding, nesting, and feeding habitat. More than 5,000 plant species, 190 species of amphibians, and one-third of all native bird species are supported by wetlands.

- The ecological diversity of wetlands can offer one of the most beautiful and aesthetically pleasing features of a farm.
- Wetlands can provide natural pollution control. They remove nutrients, pesticides and bacteria from surface waters. Created wetlands have been used as efficient, low cost waste treatment practices.
- Wetlands filter and collect sediment from runoff water.
- Because wetlands store runoff water, they reduce both streambank erosion and flooding downstream.
- Many wetlands release water slowly into the ground which recharges groundwater supplies.
- Goose nests, wood duck boxes, and other protection for waterfowl and habitat for adjoining uplands may be added to enhance the wildlife and recreational value of a wetland.

WOODLANDS may be managed for timber production or for wildlife, or both. Optimum tree populations are determined by the kinds of trees planted and their adaptability to your soils. Existing trees or newly planted trees are thinned, pruned and harvested to maintain desired production. Twigs, limbs and other debris are left on the surface to help maintain ground cover, reduce soil erosion and provide wildlife habitat. As trees mature and are harvested, establish new plantings. As you plan ahead for well-managed woodlands that add beauty and income to the farm, consider:

- Know your timber markets.
- Plant trees that are suitable to your soils.
- Cut undesirable trees and shrubs that are competing with desired species for sunlight and moisture.
- Thin stands to maintain growth and vigor.
- Maintain diversity. Do not cut vines unless absolutely necessary—vines provide valuable food and cover for wildlife.

Roger Hill

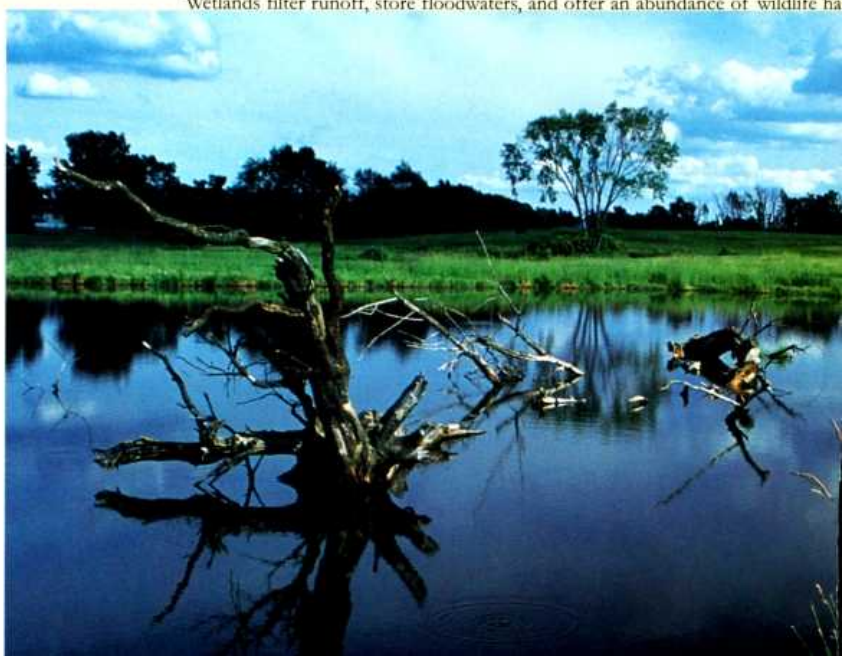


Wetlands filter runoff, store floodwaters, and offer an abundance of wildlife ha

wetlands



Poul



WHAT DOES WILDLIFE NEED?

From mammals to birds and reptiles to amphibians and fish, wildlife benefit from the same economical practices used on small farms and ranches to improve soil and water. As a matter of fact, the presence of wildlife is an indicator of healthy land and water. All wildlife species need habitat, along with adequate space, to survive.

Food - Most species have specific plant or animal food preferences, while others consume a wide variety of food items.

Cover - Physical structure, provided mostly by vegetation, provides the necessary places for wildlife to feed, rest, breed, nest, rear young, avoid predators, and regulate body temperature.

Water - Access to water in some form is necessary to sustain life. Many wildlife species need free water access throughout all seasons of the year, while fish and other aquatic species need water of sufficient quality and quantity.

WHERE DOES WILDLIFE FIT?

There is room for wildlife on every farm and ranch. How you manage land directly affects what wildlife uses it and the quality of the habitat it provides. Keeping wildlife food, cover and water needs in mind, heavily cropped land can be managed and conserved in a way to maximize wildlife habitat. At the same time, some areas provide exceptional opportunities to improve wildlife habitat on your farm or ranch.

TIPS FOR MORE WILDLIFE

On Grassed Areas:

- Plant and manage for a diversity of native plants that produce fruits and seeds.
- Increase the variety of vegetation on your property-it supports wildlife diversity.
- Make conservation buffers as wide as practical.
- Use native plants adapted to the local climate.
- Use buffers to provide travel lanes that connect patches of forest or other habitats.
- Mimic natural disturbance patterns with practices such as periodic light disking, mowing, grazing, or burning where compatible.

On Woodlands

- Maximize the number of vertical "layers" by encouraging a diversity of low-growing plants, shrubs, young trees, and mature trees throughout the forest.
- Leave standing dead trees to provide nesting and feeding sites for woodpeckers and other wildlife.
- Encourage trees that produce fruits and nuts such as oak and cherry trees to provide wildlife food.
- Build brush piles for wildlife cover.

In Wetlands

- Restore natural wetland plants and water conditions to the extent possible.
- Establish wide vegetated buffers between wetlands and cropped areas for waterfowl nesting habitat. Do the same for farm ponds.
- Erect houses for wood ducks, bluebirds, bats, and other wildlife.

Roger Hill



"There's room on every farm, large or small, for nature's creatures"

Roger Hill



farm owners can get help from NRCS to improve wildlife habitat at no charge.



help from NRCS

nature's creatures

Robert Price



STABILIZING STREAMBANKS



Streambank erosion begins or increases when protective vegetation is lost, water flow in the stream channel increases, or the land use adjacent to the channel changes. A common problem is overuse by livestock along streambanks that brings trampling, trailing, and extensive physical disturbances to vegetation on the streambank.

Eroding streambanks are ugly! And, they send sediment downstream to clog lakes and destroy habitat for fish and other aquatic life.

MANAGE LIVESTOCK ACCESS to streams and streambanks to allow vegetation to reestablish and reduce streambank erosion. Other bonuses: better water in the stream for fish and humans, more habitat for wildlife, and better water for livestock to drink.

PROVIDE OFF-STREAM WATERING for livestock to offer better quality drinking water and improve their health. If the stream is the only source of livestock drinking water, establish a fenced water access ramp that protects the streambank.

INSTALL A WATER CROSSING for farm equipment or livestock. Water crossings can be designed as ford stream crossings, culvert crossings, or bridges. Used with fencing, water crossings at fixed locations minimize the impact of livestock on a stream .

PLACE ROCK RIPRAP on the streambank where long term durability is needed. Riprap is stone of various sizes, placed compactly or irregularly to prevent erosion, scour, or sloughing of the streambanks. Stone used for riprap should be dense and hard enough to withstand exposure to air, water and freezing temperatures.



Rock riprap can help stabilize streambanks. Placing logs in the channel of a small stream is an inexpensive, natural way to help stabilize an eroding stream and improve it as fish habitat.



Strategically placed rocks in this stream direct water away from eroding streambanks.

Cooperating neighbor landowners can improve the entire length of stream water quality and fish life.

protect streambanks

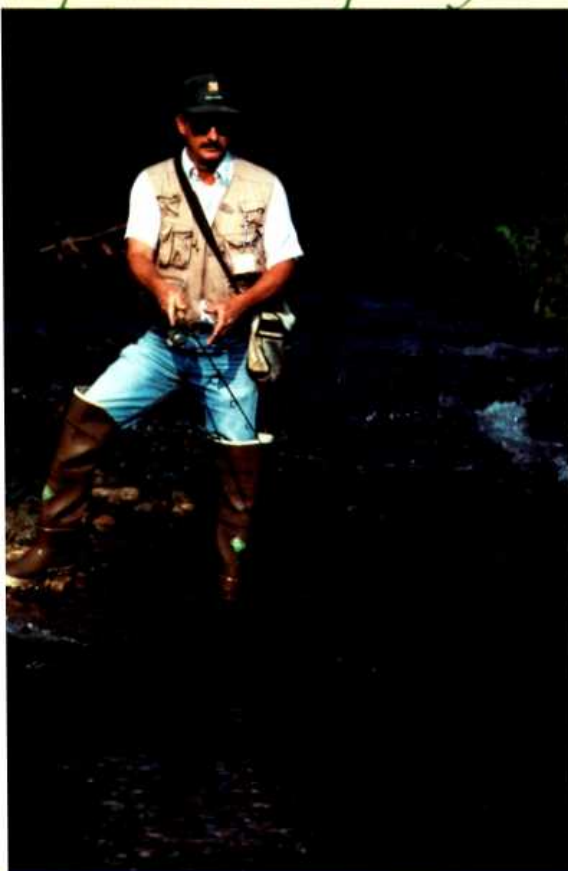
PLANT GRASS FILTER STRIPS or riparian forested buffers along streambanks to remove sediment, fertilizers, pesticides, and other potential contaminants from runoff. Filter strips and other buffers slow water runoff, and their root systems help hold the soil particles together to help stabilize the streambank and streamside areas. They also provide cover for wildlife and can also enhance fish habitat.

USE SOIL BIOENGINEERING METHODS to plant living, woody plant materials such as willows to stabilize a streambank. Used with other materials, soil bioengineering systems offer more permanent protection and a natural appearance. Advantages include a diverse riparian habitat, shade, organic additions to the stream, and cover for fish. The plantings can often be installed by the landowner.



Free-roaming cattle damage streambanks as well as pollute streams. Manage livestock to prevent streambank damage.

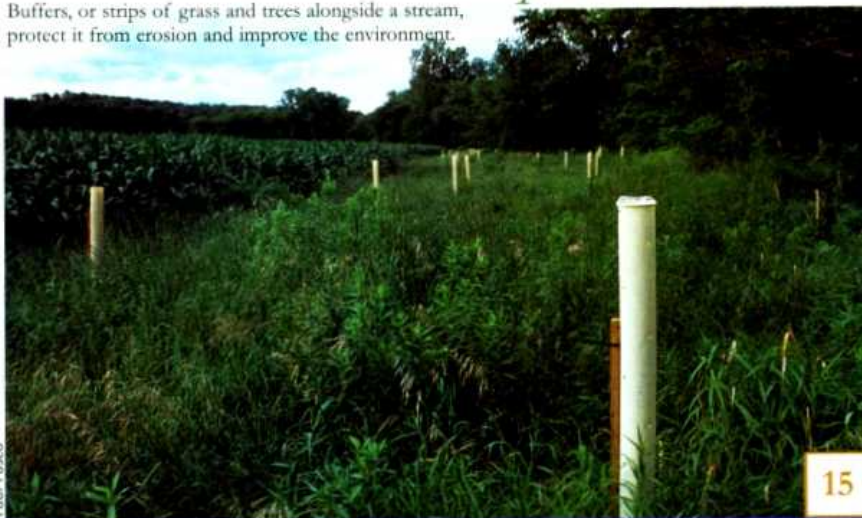
improve water quality



Cattle crossings limit access to a stream to protect streambanks.

protection

Buffers, or strips of grass and trees alongside a stream, protect it from erosion and improve the environment.





FARMSTEAD ISSUES

Farmsteads have more pollution potential per acre than any other part of the farm. The closer these potential pollution sources are to wells and the farm home, the more concerned you should be.

Manure, chemicals and fuels are all potential threats to the farmstead water supply.

STORE PESTICIDES AND FUELS SAFELY away from wells, the farm home, workshops and equipment storage buildings. Use backflow prevention devices on all pipes that are used to fill pesticide sprayers. See state and federal regulations governing pesticide and fuel storage.

MAKE FARMSTEAD MANURE AN ASSET with a good plan to store and apply it to the land. A good system manages manure to reduce commercial fertilizer costs without polluting ground or surface water on the farmstead. Manure storage structures, generally built above the water table, store manure so it can be applied when the crop needs it, under appropriate soil conditions, with a minimum of nutrient loss.

USE STACKING FACILITIES made of concrete, wood, clay, or a combination to handle manure as a solid material. A storage pond or grass filter area to handle runoff from the stacking facility and outdoor lots may be required by state and federal regulations.

STORAGE PONDS may be lined with clay, bentonite, concrete, PVC, polyethylene, or rubber liner materials. Where access to the pond bottom is necessary, a concrete ramp and concrete pond bottom are normally required.

MANURE STORAGE STRUCTURES are built of glass or epoxy coated steel, cast-in-place reinforced concrete, or pre-cast concrete panels or blocks with a poured concrete floor. The manure falls into the tank through slats, or through a hole in the tank top, or is pumped from a reception pit. A roof or solid top over the tank eliminates the expense of handling rainwater.

COMPOST animal carcasses to turn a problem into an asset. Carcasses and manure can be transformed into organic matter that increases water holding capacity and fertility of the soil. Properly managed composting reduces odors as well.

grassed diversion



An attractive grassed diversion moves field runoff water away from the farmstead lots. This reduces the amount of manure and other potential farmstead pollutants in runoff waters.



The roof over this manure stacking facility keeps rainwater from mixing with manure and creating a management problem. The settling basin and filter area to the right and in the foreground treat outdoor livestock lot runoff. Stacking facilities can be built in any size and out of a variety of materials to meet a farms needs and budget.

temporary storage

DIRECT FARMSTEAD RUNOFF away from animal feed lots and erosive areas using gutters on roofs and diversions.

PROTECT GROUND SURFACES in areas of heavy use by animals or vehicles with concrete, gravel, or gravel over geotextile fabrics. The more solid surface reduces erosion and improves animal health.

ROUTE RAINFALL AWAY FROM SILAGE to prevent the rich nutrient content of its leachate from burning nearby vegetation and polluting surface waters.



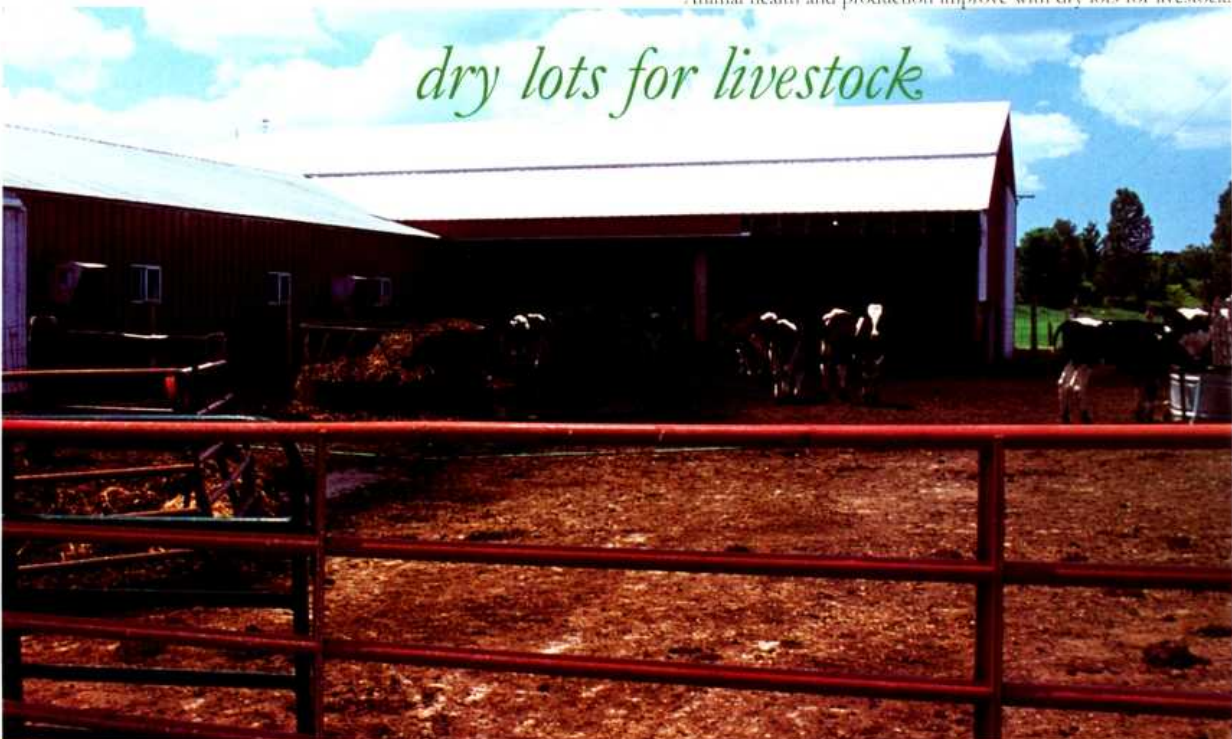
A storage pond of some kind may be needed for temporary storage for animal wastes.

rete, gravel or geotextile materials on heavy use areas to keep out of mud and manure.



Animal health and production improve with dry lots for livestock.

dry lots for livestock





MAKING A PLAN

What is a Conservation Plan

A conservation plan is a record of your decisions concerning how you plan to manage the natural resources on your land. Typically, a conservation plan will include a land use map, soils information, inventory of resources, engineering notes, and other supporting information. It is your plan, based on your goals.

You make all the decisions, but you don't have to tackle resource problems on your land alone. NRCS can help you build a conservation system one step at a time.

CONSIDER THE TOTAL EFFECTS

A very good reason for creating a conservation plan is that solving one environmental problem may create additional problems. For instance, if you build a waterway without considering how to dispose of the water at the lower end, you may cause a serious gully to develop that destroys your waterway. Or, if you attempt to kill insect pests without proper technology, you may kill the beneficial insects as well.

WHAT ARE THE PROBLEMS, GOALS

Prepare a list of problems you need to solve by implementing your plan. You should also consider the effects a planned practice may have on a neighboring field or farm. Think on-site as well as off-site, and consult a professional, if you need help. You can easily learn to recognize "red flags" that indicate something is wrong out there.

- Is runoff muddy? Carrying excess nutrients?
- Are gullies growing, difficult to cross?
- Do you see sediment accumulations at the lower part of the field?
- Is your soil soft and crumbly or hard and cloddy?
- Are the plants growing out there healthy and productive?
- Do you see wildlife on your land?

WHAT ARE THE SOLUTIONS

The function of most conservation practices is to reduce the forces of wind and water. Managing vegetative cover often accomplishes that objective. However, it may be necessary to change the topography by construction activities, and the identified problems may require a combination of construction and vegetative practices. This document contains many of the common conservation practices used to protect the natural resources.

Improving land, water, and fish and wildlife habitat are goals of most conservation plans on small farms.



improving the land

Plan to manage livestock for both production and environmental protection



conservation planning

wildlife habitat

Roger Hill



Food, cover and shelter in the winter are part of the planning considerations for wildlife habitat.

TAKE CARE OF THE SOIL FIRST

Erosion still tops the list of agricultural conservation issues. A conservation plan based on protection of the soil will also protect the other natural resources. Think about it! All natural resources are tied to the soil in one way or the other. When you lose topsoil, you lose organic matter that is vitally important to soil productivity, water conservation, carbon sequestration, animal health, and much more.

WHERE DO YOU START

You can do a lot yourself by researching available literature, and reading your landscape signs to identify problems. Professional, common-sense help in both planning and installing complete conservation systems is available upon request through your local conservation district from the Natural Resources Conservation Service (NRCS). NRCS will have an abundance of information, and can provide on-site technical assistance if you need help.

PLANNING FUNDAMENTALS

- **Know your soil** - Soils vary widely even on small fields. Different soils require different management and support different types of plants.
- **Know your plants** - which plants will survive. Use native plants as often as possible.
- **Think about topography** - The size of the drainage area, slope, and cover will help determine how much runoff water to expect and how fast it will move.

- **Know how conservation practices work** - Grass, trees, downed logs, and rocks are all obstacles that slowdown or reduce the forces of nature. Conservation practices work the same way. If water erosion is the problem, the objective is to slow the moving water. If wind erosion is the problem, the objective is to slow the wind at or near the soil surface.
- **Scout** - Look around and see what's going on. If you have a gully problem, go out while it is raining and observe nature in action. Watch conservation practices to see if they are working as designed. If the practice isn't working, figure out why and try to fix it or request technical help to solve the problem.



*technical help
at no cost*

NRCS offers engineering and agronomic assistance in helping owners apply conservation practices to small fields.



Gary Kramer

TECHNICAL HELP AVAILABLE

Making a plan and following through to protect the entire farm can seem to be a huge task, and intimidating at first. That's where the Natural Resources Conservation Service comes in. NRCS has more than 60 years of experience in helping landowners plan and install conservation practices to reduce soil erosion; improve soil, water, and air quality; improve and restore wetlands; enhance fish and wildlife habitat; improve pasture and rangeland; reduce upstream flooding; and improve woodlands. NRCS is the country's premier conservation agency, with offices in most local counties. All people who use the land may receive technical help from NRCS at no charge. And NRCS can help direct you to sources of financial cost-share help or incentive programs of both public and private agencies to establish conservation measures on your land. NRCS works closely with the local Soil and Water Conservation District (SWCD), and encourages you to become a district cooperator to take full advantage of programs available.

Contact your local USDA Natural Resources Conservation Service or Conservation District office for more information. Or, find us on the web at www.nrcs.usda.gov/

conservation systems consider the offsite effects of actions on the farm, including improvements to overall water quality.

NRCS helps people with small fields or small scale conservation practices to protect all the natural resources on the farm.



SOIL



WATER



AIR



PLANTS



ANIMALS



Most of the photos in this publication are available free of charge.

Search and download from the web at <http://photogallery.nrcs.usda.gov>

Cover photo courtesy of John Vogel, Editor, American Agriculturist. Inside USDA/NRCS photos by Lynn Betts, Fred Gasper, Lisa Krall, Tim McCabe, Bill Hughey, Bob Nichols, and Paul Wallace.

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