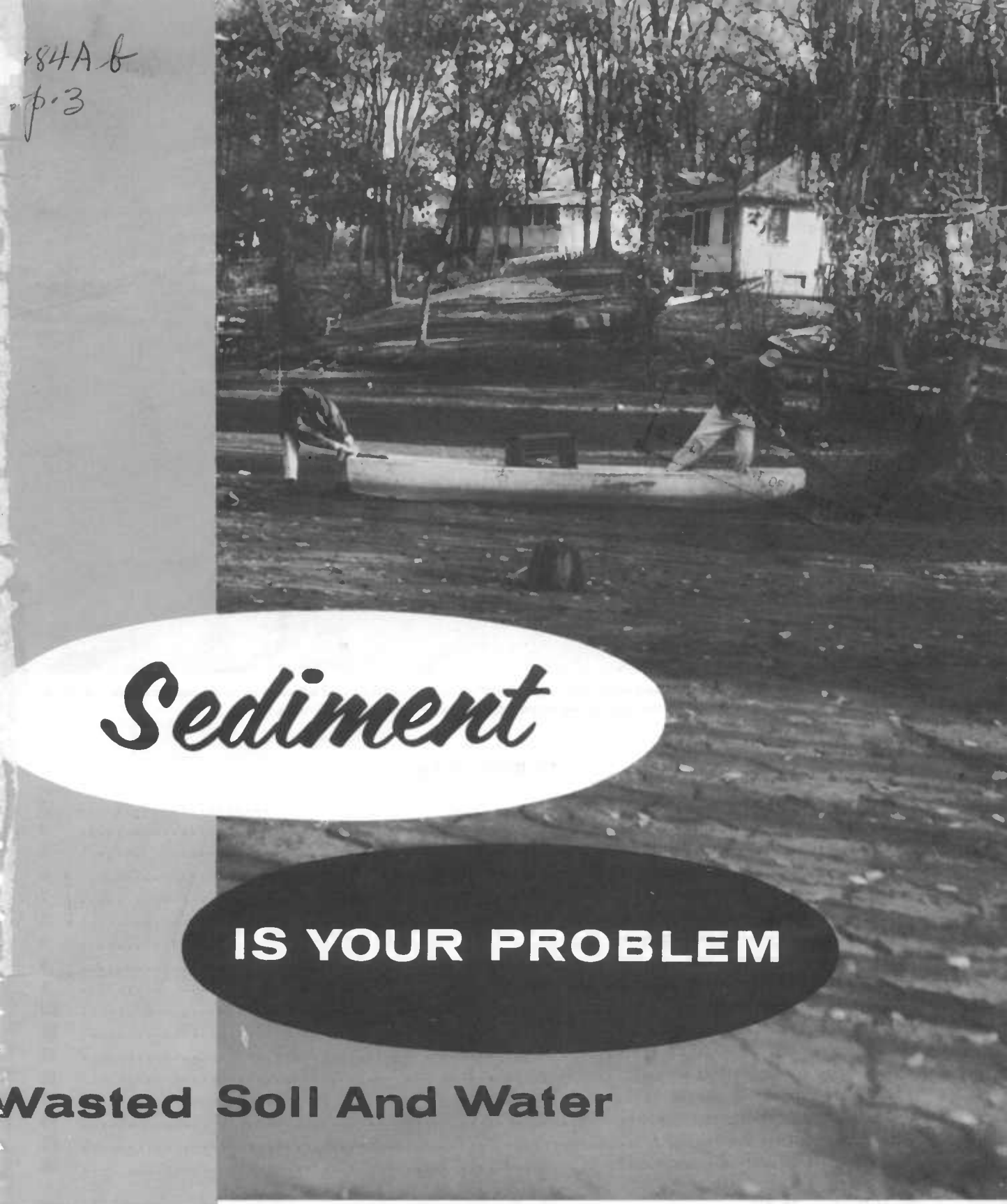

Sediment

IS YOUR PROBLEM

Wasted Soil And Water

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Schoolchildren find their route blocked with silt—a good excuse to go barefoot and a lesson in soil conservation. A landowner down the slope has lost his fishpond to sediment.

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Sediment IS YOUR PROBLEM

Wasted Soil And Water

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HOW DOES SEDIMENT AFFECT YOU?

Soil erosion affects everyone. Few city dwellers, however, give it much thought because it appears to them to be a problem for farmers. But let's take a closer look at one of the products of uncontrolled soil erosion—downstream sediment damage.

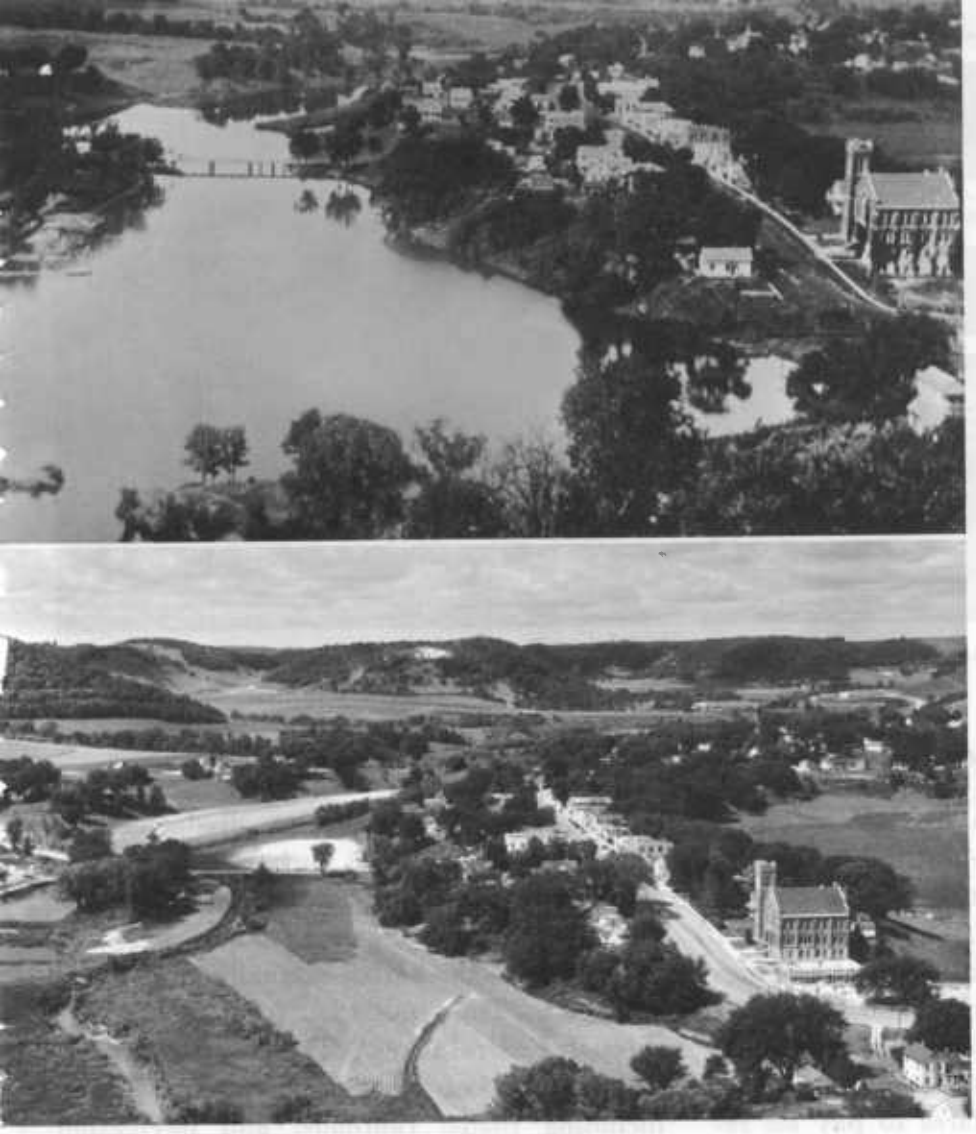
Sand deposits on fields along the Skunk River, Iowa, after the floods of June 1947. These fields have been largely ruined for crop production.

Crops and Cropland Suffer

Some of the sediment damage from soil erosion affects the farmer first and the city dweller only indirectly. For instance, during intense storms sediment ("silt") may be spread over farmland, not only destroying crops but making the land less capable of producing future crops. Drainage and irrigation ditches quickly silt up and must be cleaned out. Stream channels become clogged, causing the swamping of formerly productive farmland.

The result is that more and more land is abandoned, the cost of farming goes up, and the cost of food and clothing also goes up. These types of sediment damage cost the Nation many millions of dollars annually. Everyone of us helps to pay for sediment damage through higher prices for the things we buy.

(Top) Sand and gravel have destroyed this Ohio corn crop. This kind of damage causes corn and hog prices to be higher. (Center) A drainage ditch with silt deposits. Note silt deposits on field in background. (Bottom) A New Jersey stream choked with sediment. The poor drainage and swamping of cropland that follows result in lower crop yields.



(Top) Lake Como, Minn., was a famous resort center and source of electric power in 1926. (Bottom) The lake has now been destroyed by sediment. Recreational opportunities have disappeared from this area.

Reservoirs and Ponds Disappear

Other sediment damage affects city dwellers more directly. More than 3,200 water-supply reservoirs are losing water-storage capacity each year to sediment. In addition, filtering and settling the sediment from muddy water is costly. Then your water bill goes up.

One-third of the electric power generated in the United States comes from hydroelectric plants. When the storage reservoirs serving these plants become silted, they produce less electricity. Consequently, auxiliary steam plants must be built, and electric bills go up.

Flood-control reservoirs too are victims of sedimentation. In the Pick-Sloan plan for the Missouri Basin, for example, 150 flood-detention reservoirs with a total capacity of 100 million acre-feet are planned. Providing storage space for the sediment that will settle in these reservoirs under present land-management practices is a big problem. For just three of them—Garrison, Oahe, and Fort Randall Reservoirs—the added cost for sediment storage is about $100 million. This means higher income tax to help pay for this added construction cost.

The annual damage caused by silting of reservoirs and ponds and the increased filtration costs for water supplies amount to millions of dollars.

Silted-up channel of Canadian River, Okla. The bridge in the background may soon need to be raised if it is to be useful.

Roads, Railroads, and Navigation Channels Are Silted

You have probably seen road graders scraping out roadside ditches. But did you realize that most of this work would not be necessary if we did not have uncontrolled soil erosion? Sediment fills road and railroad ditches, plugs culverts, and clogs stream channels so that often bridges must be raised. The inevitable result is higher State and local taxes and higher railroad and bus fares to pay for repairing this damage.

The amount of sediment dredged from navigable channels and harbors each year is staggering. At Cleveland, Ohio, for example, 881,000 cubic yards of sediment must be dredged from the harbor annually at a cost of $496,000. This must be paid for largely through Federal taxes. The annual sediment damage to all of our transportation facilities, including roads, railroads, and navigation channels, amounts to many millions of dollars.

U. S. Corps of Engineers' dredge removing sediment—product of soil erosion—from the bottom of the Wilmington Harbor and Marine Terminal, Wilmington, Del.

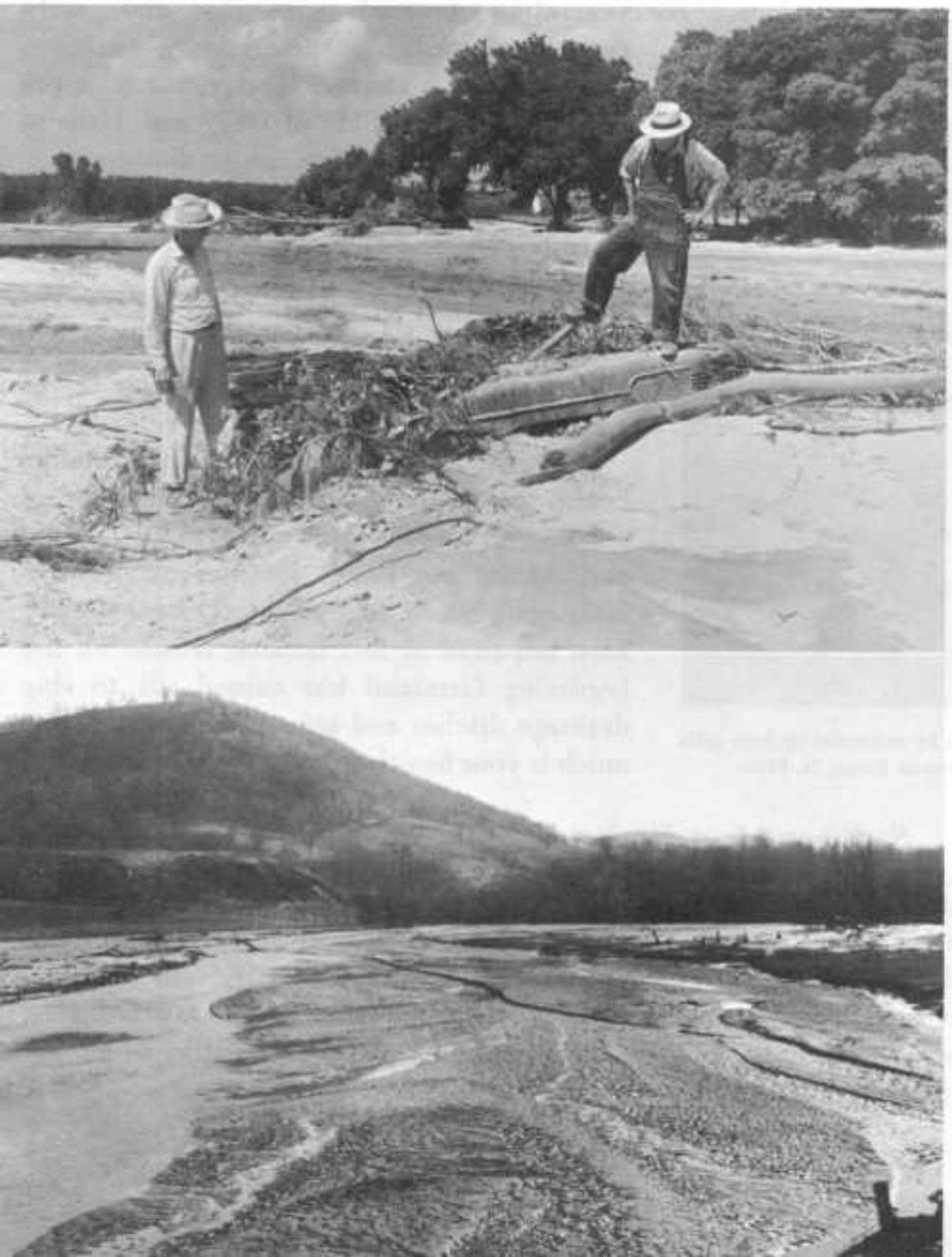
Floods Are More Frequent

In many rivers, floods are becoming more frequent each year. This is due partly to the choking of stream channels with sediment so that they have less and less capacity to carry floodwaters. The bed of the Rio Grande, for example, is rising 1 foot every 12 years.

Another cause of increasingly frequent floods is the increasingly heavier sediment loads carried by streams. In the Los Angeles area flood flows consist of as much as 85-percent mud by volume and only 15-percent water. Naturally these floods rise much higher now than before the white man came, when the waters carried little sediment.

In addition to the damage by floodwaters, there is always the cost of cleaning up sediment deposited in streets, houses, machinery, automobiles, sewer lines, wells, and other places. For example, after the flood of March 17, 1936, at Johnstown, Pa., about 1 million cubic yards of sediment and debris were removed, mostly by hand, from streets and cellars at a cost of $3,870,000.

The cost of floodwater damage from sediment is staggering. If it does not strike you directly, you still pay for it in taxes for Federal flood-control work and in contributions for flood-emergency work.



(Top) Sediment deposits after the Kaw River floods have almost covered this tractor. (Bottom) Flood crests for the same water discharge are rising to higher levels each year on many of our streams because of sediment deposits in channels. Cedar Creek in southeastern Minnesota is an example.

Sediment Hurts Recreation and Public Health

There are in this country 1,300 recreational reservoirs. Muddy water and beaches greatly reduce their attraction for swimmers.

Silt also harms fish in many ways. Silt deposits destroy the spawning grounds and eggs of game fish. Muddy water shades out light, interfering with the growth of microscopic plants that water insects and fish depend on for food. The deep pools in many streams that once provided a refuge for fish during the dry seasons are now filled with sand. Many game fish actually choke to death during floods because their gills are clogged with silt.

These fish were choked to death by sediment in their gills during heavy mudflow in Pecos River, N. Mex.

The result is that most streams and lakes no longer have the game-fish population they once had. In many, less desirable species such as carp, sheepshead, and buffalo, which can get along in turbid waters, have replaced the game fish. Most people enjoy fishing or swimming. How much have you suffered through muddy beaches or poor fishing caused by sediment? It is difficult to place a monetary value on such recreational losses.

Commercial fisheries also have suffered. In the broad shallow bays of western Lake Erie, yellow perch, cisco, and whitefish thrived when clean, gravelly bottoms and abundant vegetation favored spawning and early growth. Fishing for these species was then an important industry. Today, silt from the neighboring farmlands of Ohio and Indiana has caused most of those fish to disappear.

Similarly, sediment is causing oysters to disappear from Chesapeake Bay and other areas. You know what this means to you—the price of fish and shellfish is higher today than it used to be, and it will be still higher when these species become increasingly scarce and hard to find.

Sediment also has a direct effect on public health in many areas. Large amounts of public-works funds were spent in the Southeast during the 1930's for mosquito-control drainage. Much of this work has already been impaired or lost because erosion on the bordering farmland has caused silt to clog drainage ditches and stream channels. How much is your health worth? It is hard to say.

Sediment Is a National Problem

Thus it is apparent that sediment damage directly affects every citizen, not just the farmer who lives on the land where the sediment comes from. For every citizen it means higher taxes, railway fares, electricity and water bills; higher food and clothing prices; and more contributions to relief agencies.

The national sediment damage amounts to millions of dollars annually. In addition, there are other damages such as poorer fishing and swimming and poorer health, which are difficult to evaluate.

WHERE DOES SEDIMENT COME FROM?

All sediment has its source in erosion of one form or another. Most types of erosion have been greatly accelerated where man indiscriminately cut the forests, plowed up the grassland, and misused the land. In humid areas erosion and the sediment load of streams have increased as much as a hundred times since settlers first came here.

Sheet erosion in the Palouse area of Washington.

Advanced gully erosion has almost ruined this land.

Farmland—the Greatest Contributor

In the more humid areas sheet erosion on cultivated land is usually the source of the sediment that causes most downstream damage. It usually results from straight-row cultivation of land with slopes too steep or too long for such cultivation or from failure to use protective measures.

In the arid and semiarid areas, overgrazing of grasses also leads to sheet erosion.

Wrong farming methods often cause, in addition to sheet erosion and streambank erosion, deep channels, gullies, and arroyos.

Stream-Channel Erosion

When white men first settled this country, they cleared the river bottoms. After the trees around the riverbanks were removed, streams began to erode their banks and meander with a freedom never known before. When the waters overflowed onto the flood plains, the freshly plowed fields were easy marks for floodwater erosion.

In the arid West, overgrazing led to the cutting of deep arroyos or valley trenches where there had never been stream channels.

Here are three common sources of sediment in stream channels: (Top) Undercutting has widened the channel of the Whitewater River, Minn., at this point to six times its width when man first cleared the trees from its banks. (Center) This unprotected valley bottom was scoured by floodwaters. (Bottom) Overgrazing has led to the formation of this deep arroyo.

Other Sources of Sediment

Erosion along roads and railroads is sometimes an important source of harmful sediment. This results from ditch scraping and improper sloping and lack of vegetative protection of cuts, fills, and ditches.

Soil blown from place to place, another sediment source, is common in many parts of the country.

Industrial and mine wastes are sometimes dumped into streams or left in places favorable to erosion.

(Top) Wind erosion has severely damaged this Texas farm. Note the high piles of sand around farmhouse and in field at upper left. (Center) Sediment from this stripmined area is feeding into a stream which will carry it downstream into reservoirs and navigation channels. (Bottom) Severe roadside erosion of this deep silty soil in Illinois is the source of much downstream sediment damage.

WHAT CAN WE DO?

Nearly all the forms of erosion mentioned here are the result of man's removal or disturbance of the natural cover of trees and grass. Of course, all land can't be returned to its original cover; some of it must be used to grow cultivated crops. But wise farming methods—and if necessary, structural measures—can greatly reduce accelerated erosion.

Farm the Conservation Way

Experiments show that contour farming brings a sharp reduction in soil loss as compared with straight-row farming. Terracing does also. For example, experiments made at the Clarinda, Iowa, Conservation Experiment Station during 1934–41, show that the total soil loss was 6.67 tons per acre less on a terraced plot than on an unterraced one where both plots had the same crop rotation and the same direction of slope. Other conservation-farming practices that greatly reduce soil loss include contour stripcropping and the right crop rotations, control of grazing, and fire-prevention measures for woodland. Some steep cultivated land needs to be returned to woods or pasture.

These are practices that any farmer can use with only a little technical assistance. Gully control is more difficult. Some gullies may be sloped in and seeded to grass or trees. Others may need small drop structures. Farmers can get technical assistance from the Soil Conservation Service through locally organized soil conservation districts.

Contour stripcropping has brought erosion—the source of the sediment load of streams in this area—under control.

(Left) Terraces, such as these in Wisconsin, help reduce sheet erosion on cultivated land. (Right) The sod outlet and drop structure on this Indiana farm will help prevent gullies.

Stabilize Stream Channels

Raw streambanks can be protected by rock riprapping, jetty construction, planting of willows, and other methods. Flood plains subject to scour by floodwaters can be protected by leaving them in grass or brush.

The growth of valley trenches or arroyos can be stopped by dams or drop structures. Such structures usually require action by a group of landowners. Often they are assisted by downstream interests, such as a city or an industry that is being damaged by sediment, and by the Federal Government under the Watershed Protection and Flood Prevention Act, Public Law 566.

(Left) Willow plantings have stabilized this eroding streambank. (Right) Floodwater-retarding structures can help stabilize stream channels and keep gullies from spreading.

Control Other Sediment Sources

Many highway departments and railways are finding it pays to slope road cuts and fills properly and to control erosion here with grass, vines, or shrubs.

Wind erosion can be controlled by such farming methods as stubble mulching, improved rotations, and wind stripcropping. Severe "blow" areas may need to be planted to trees or dune grasses.

Industrial- and mine-waste areas are usually a local problem. They may be stabilized in most cases by vines, shrubs, or trees.

Soil erosion is controlled on this road cut by a thick protective cover of grass and shrubs.

Severe sand blowing is being brought under control with beachgrass and pine plantings.

Soil conservation helps to promote better recreation and better health for you and your children.

WHAT ALTERNATIVES ARE THERE?

There are alternatives to soil conservation. In many parts of the country these alternatives are still practiced. They consist of allowing soil erosion to continue unchecked and paying the consequences, not only for damage to the land itself, but for downstream sediment damage. There is no longer any doubt that these alternatives are many times as costly as soil conservation.

It costs over $1 a cubic yard to dredge sediment from the Milwaukee harbor. Costs of removing sediment from roads and reservoirs range from 25 to 50 cents a cubic yard. Some cities, when their water-supply reservoirs silt up, find it is cheaper to build a new reservoir than to dredge the old one. Providing new storage capacity usually costs from 10 to 30 cents a cubic yard. On the other hand, the cost of holding the soil on the farm by soil conservation measures is less than 3 cents a cubic yard.

Whether you live on a farm or in the city, soil conservation pays for itself many times over. By encouraging it whenever you can, you help to reduce taxes; food, clothing, electricity, and water bills; railway and bus fares; and other expenses that come out of your pocket. You also promote better recreational opportunities and better health for you and your children.

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HOW EFFECTIVE IS SOIL CONSERVATION?

Sheet erosion that causes sediment can be reduced up to 90 percent with soil conservation measures without changing materially our basic agricultural pattern.

For example, by reforestation and gully control on 83 percent of the 890 acres of rolling and badly eroded land above the municipal reservoir at Newnan, Ga., the sedimentation rate in the reservoir was reduced 62 percent during the period 1937–45, as compared with the earlier period 1925–37. Less and less sediment will collect in the reservoir as the watershed-protection work becomes more effective.

Many other cities have found it pays to work with the farmers and the Soil Conservation Service on such soil conservation measures as gully-control structures, flood-prevention dams, and tree planting. Still others have bought all or part of their reservoir watersheds and retired the critical sediment-source areas to pasture or woods.

A community protected from erosion and sedimentation.