



# SOIL

## THE NATION'S BASIC HERITAGE

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THE RESTORATION

OF NATURAL WATER CONTROL THROUGH SOIL CONSERVATION AND IMPROVEMENT

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**THE NATION'S**

**BASIC HERITAGE**

**A STORY OF THE RESTORATION  
OF NATURAL WATER CONTROL THROUGH SOIL CONSERVATION AND IMPROVEMENT**

**PREPARED**

**BY**

The Land Grant Colleges and Universities of the Tennessee Valley States  
Cooperating with the United States Department of Agriculture and the  
Tennessee Valley Authority

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- University of Georgia . . . . . Athens, Ga.
- University of Kentucky . . . . . Lexington, Ky.
- Mississippi State College . . . . . State College, Miss.
- North Carolina State College . . . . . Raleigh, N. C.
- University of Tennessee . . . . . Knoxville, Tenn.
- Virginia Polytechnic Institute . . . . . Blacksburg, Va.

**AS A NATION** we are becoming land-conscious. The country is recognizing that soil, and its fertility, is our most valuable possession, fundamental source of wealth, and basis of prosperity; also that much of the soil's fertility is slipping away from us. • This booklet attempts to picture what is happening to the country's farm lands in one important region, the Tennessee Valley, and how agricultural forces of the land-grant colleges and universities of the seven Valley States, the United States Department of Agriculture and the Tennessee Valley Authority are encouraging the conservation of soil and the restoration of its fertility. The beginnings of this work are described on the pages that follow.

## **INTRODUCTION**

UNITED STATES GOVERNMENT PRINTING OFFICE • WASHINGTON, D. C.

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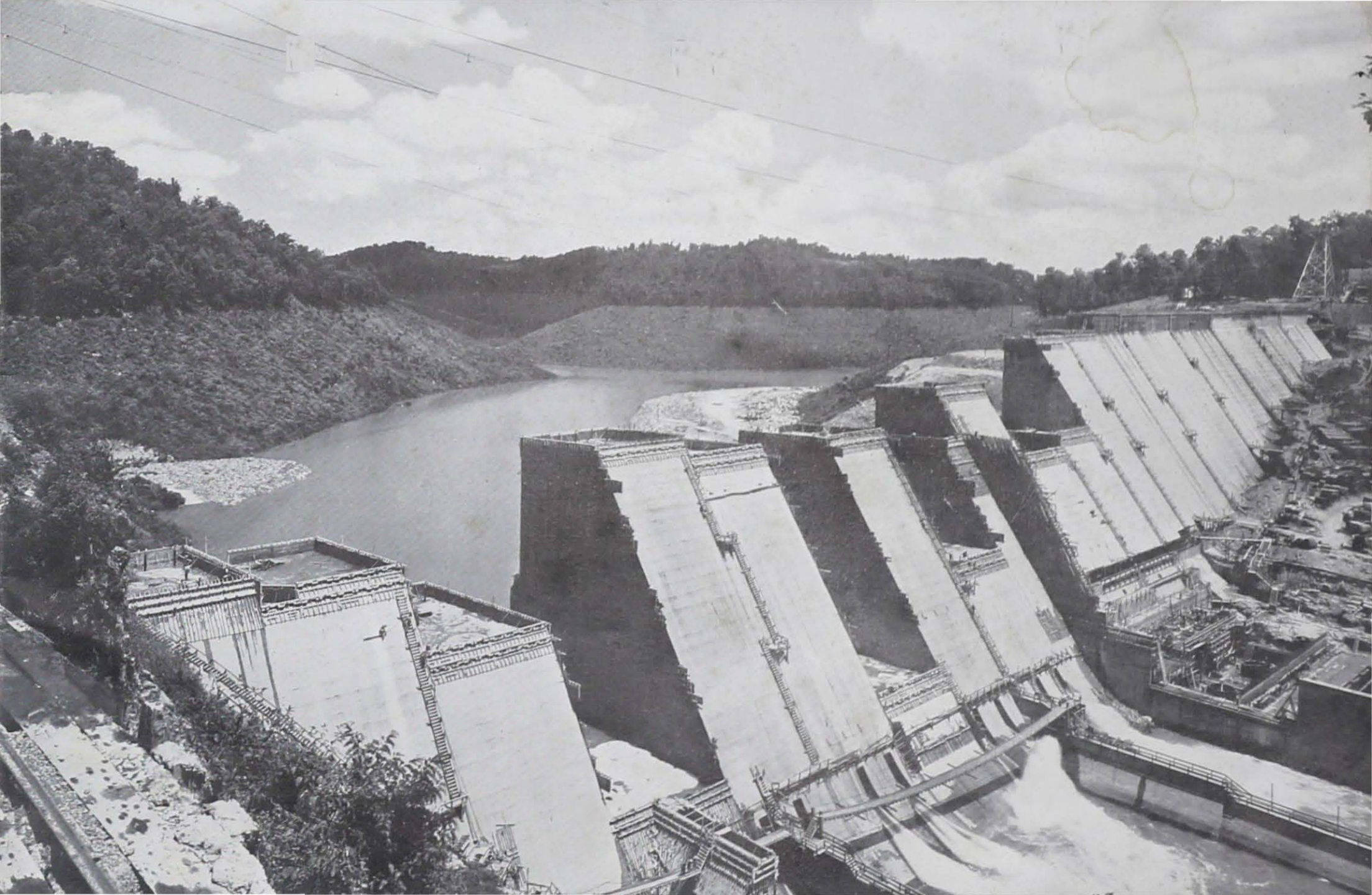
**FLOOD**  
**PREVENTION**  
•  
**NAVIGATION**  
•  
**POWER**

**WATER** may be stored in two ways. It may be artificially collected in reservoirs by building dams across valleys. Or it may be held in the ground nature's way by a thick, deep-rooted vegetative cover that puts humus into the soil.

Storage works for artificial control of water are often spectacular and attract wide attention. The accompanying photograph shows Norris Dam, built by the Tennessee Valley Authority across the Clinch River at the headwaters of the Tennessee River. The Norris Storage Reservoir fills two river valleys for a distance of some 50 miles and covers 34,000 acres. By collecting water during periods of heavy rainfall, the dam

will help prevent flood damage to farms and towns downstream, and by letting it out gradually in dry periods it will aid navigation. Power that would go to waste in water falling over the dam is chained by turbines to generate electricity.

But no matter how hard engineers work at building dams, the big problem of providing natural water storage on private land remains. Unless farmers are able to provide a vegetative cover for the ground that will prevent water from running off rapidly during rains, flooding rivers, silting reservoirs, and destroying wealth, the control of water can never be complete.



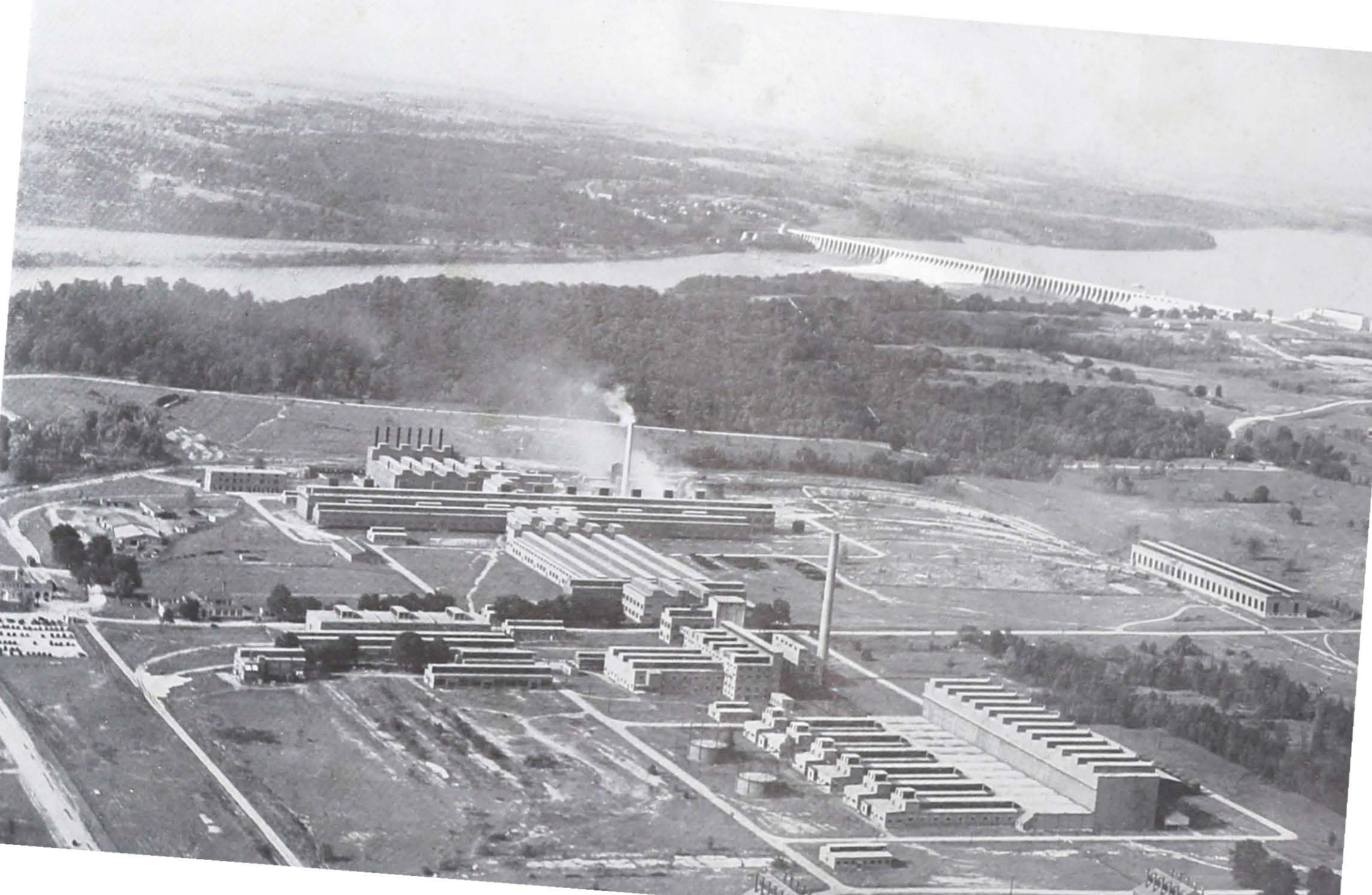


# PEACE-TIME USE OF WAR PLANT

**WILSON DAM**, now maintained by TVA, is best known on account of its World War emergency need. The picture also shows original nitrate plant no. 2, never used for production of nitrates because the war ended before it was completed.

Upon recommendation of leading soil scientists and chemical engineers, the Tennessee Valley Authority is using portions of the old plant and power from the dam to test new equipment and methods for manufac-

turing phosphate plant foods. The product of these experiments is distributed to outstanding farmers selected by their neighbors to test and demonstrate the place of these plant foods in a program of readjusted land use. This demonstration on the land is administered by public-spirited farmers, organized into soil conservation associations, with the cooperation of the United States Department of Agriculture and their State agricultural extension services and experiment stations.



## **RICH LAND GOOD HOMES**

**SOME FARMERS** of the Tennessee Valley live in homes, like the one on the knoll at the left, that must be worth many thousands of dollars. The photograph was taken in a limited area where the soil of the Tennessee watershed is as fertile as any in the Nation because it was formed from underlying rocks rich in mineral plant foods, especially phosphate and lime. In the phosphate-lime, bluegrass sections of central Kentucky and Tennessee one can find many such farmsteads. Most of these lands are in thick pastures and farming has been carried on there for generations without artificial fertilization.

In other areas, where the soil lacks these elements, farmers work harder than those in the bluegrass regions but produce less

wealth. They labor to till and crop their fields because their soils lack the plant foods needed for pastures.

But even in such poor-land areas some farmers have developed rich pastures. These farmers are conserving their soil and its fertility and are reproducing conditions of the naturally rich areas. They cultivate only a small portion of the land and live prosperously like people of the famous bluegrass regions. They have followed demonstrations based on results of experiments by the University of Kentucky and have enriched their lands with artificial applications of phosphate and lime. Kentuckians are especially active in supplementing phosphate treatments with liberal liming.



## A BLEEDING HILLSIDE

**UNFORTUNATELY**, only a small section of the Tennessee Valley contains such prosperous farms as the one in the preceding picture. Though most of the topsoil on this land was reasonably productive at one time, it has, along with the rest of the country, been seriously injured by erosion. A rain of just 1 hour's duration washed out gullies on this newly-plowed field. The land was bled of its life-supporting, rich topsoil. A second plowing that turned up infertile subsoil was necessary before the crop could be planted. Such gullies are the final stages of erosion's

sinister work. A large part of the topsoil has already been washed away by little-noticed sheet erosion before gullying begins.

The extent to which erosion has devastated the land is amazing. Of all farm land in the Tennessee Valley, for example, careful estimates show that more than a million acres have been destroyed for future farm use, half the topsoil has been washed off many more, and nearly all the land has suffered to some extent from erosion.

And erosion continues practically uncontrolled. Its ravages multiply with every rain.



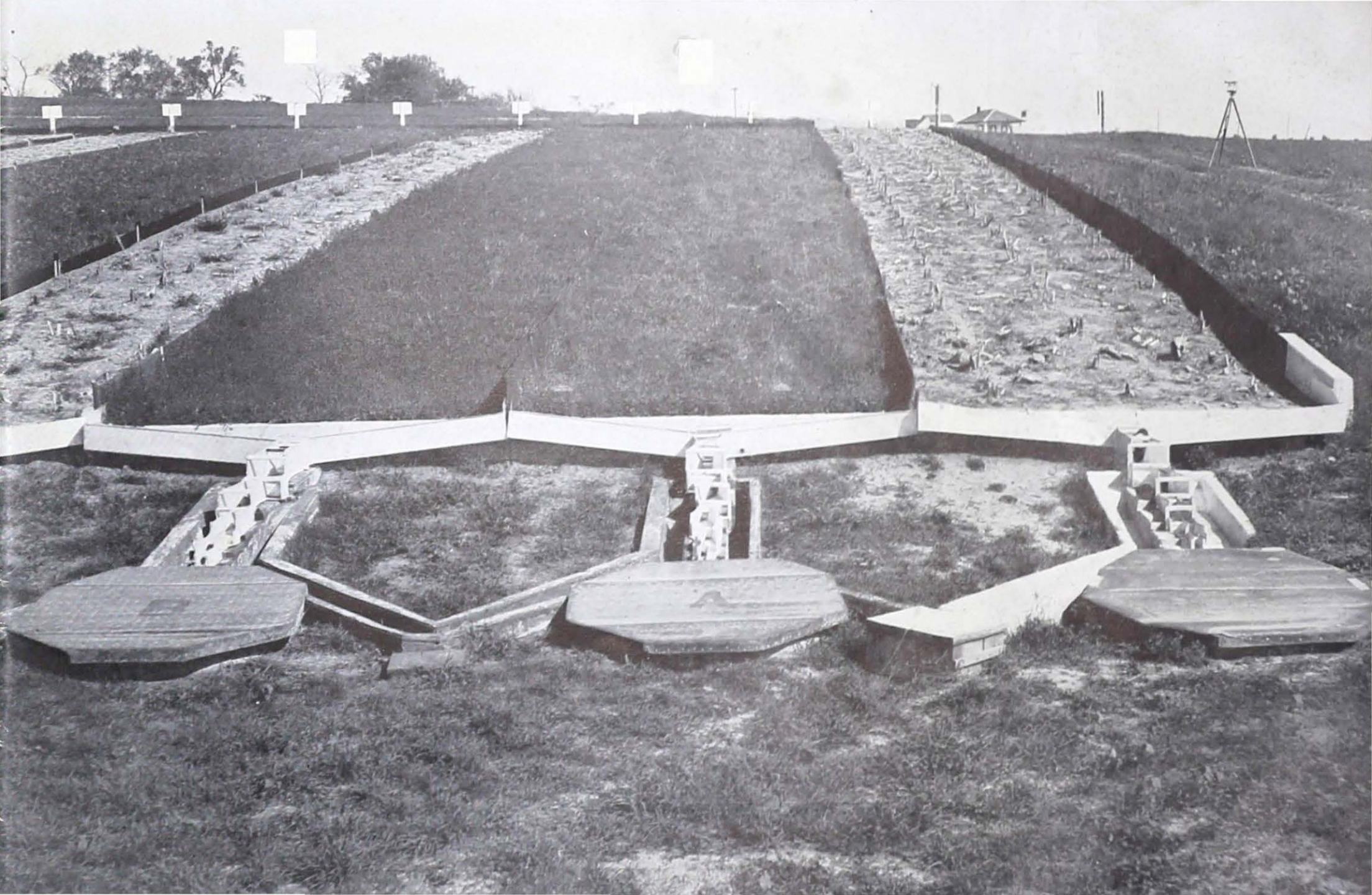
# EROSION CLINICS

**ONLY** in recent years have people generally come to a realization of erosion's increasingly great damage to land. Until erosion experiment stations were put in operation by agricultural institutions a few years ago, there was no way of measuring the losses of soil and water from sloping fields.

This picture shows erosion test plots at the Bethany, Mo., station conducted cooperatively by the Soil Conservation Service of the United States Department of Agriculture and

the University of Missouri. Actual field cultivated areas are enclosed by sheet-metal fencing sunk several inches into the ground and the "run-off" of soil and water is caught and measured on the downhill side. Thus, accurate comparison of losses from different kinds of crops and sods are obtained and effects of the kind of soil, its slope, and other factors are determined.

These scientific measurements present a true picture of erosion's destructiveness.





# **SOD, NATURE'S STORAGE RESERVOIR**

**THE RESULTS** of erosion measurements are startling. Consider average figures covering a 4-year period at the Bethany station on areas of the same slope and soil receiving the same rainfall. Plowed, unplanted land suffered greatest loss, 105 tons of soil being washed off an acre in a year's time, and open-tilled corn land came second with 67 tons. The other extreme is represented by alfalfa- and grass-planted areas that lost a mere fraction of a ton. Between these high

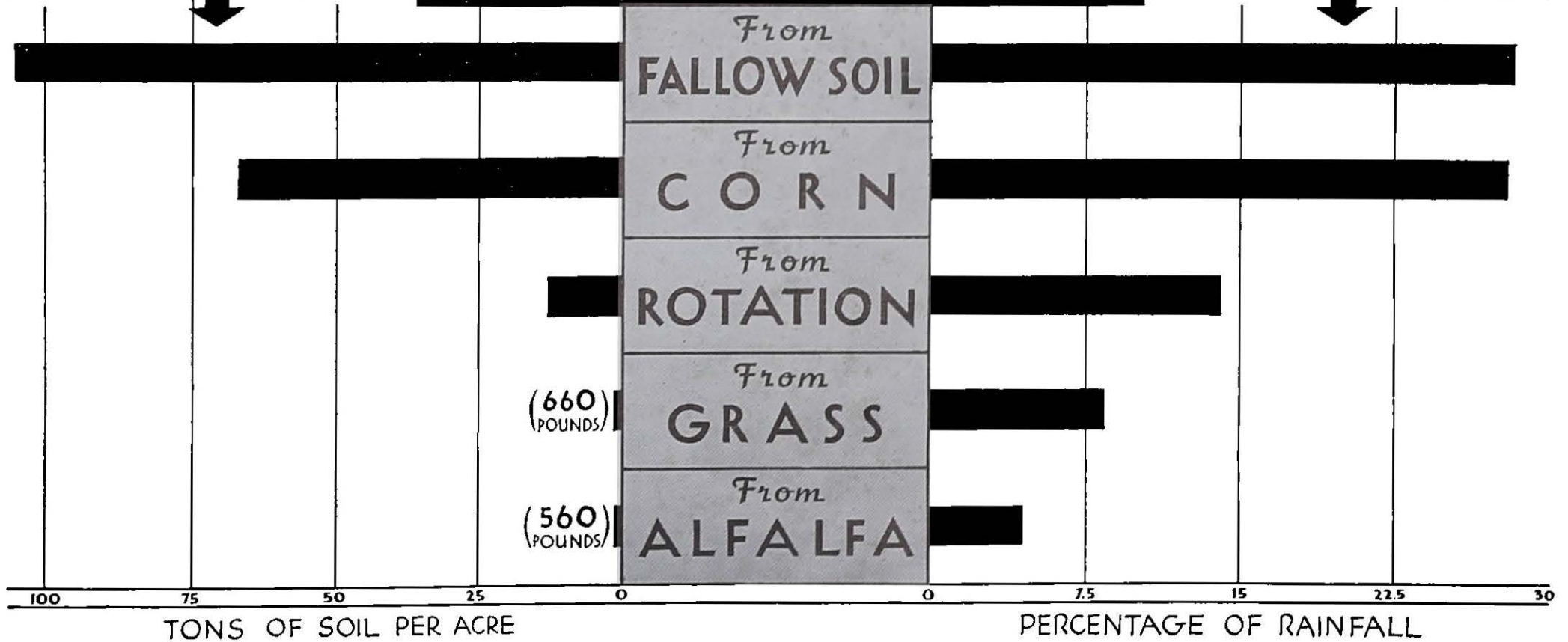
and low extremes lies the modest loss of 13 tons from a practical rotation of corn, wheat, and clover.

Land uses that caused the largest soil losses were also responsible for the greatest loss of water. Rainwater that ran off the soil surface covered and made spongy by grass and alfalfa was negligible compared with that lost from unprotected land. Well-sodded land is indeed nature's storage reservoir.

# WHAT HAPPENS WHEN IT RAINS?

TOP SOIL IS LOST

WATER IS LOST



Average results of experiments for 4 years at Bethany, Mo., station on Shelby loam of 8-percent slope with 40-inch average rainfall. Fallow land was spaded once a year (in fall) and left to grow to weeds rest of time.

# **MONEY WASHING AWAY**

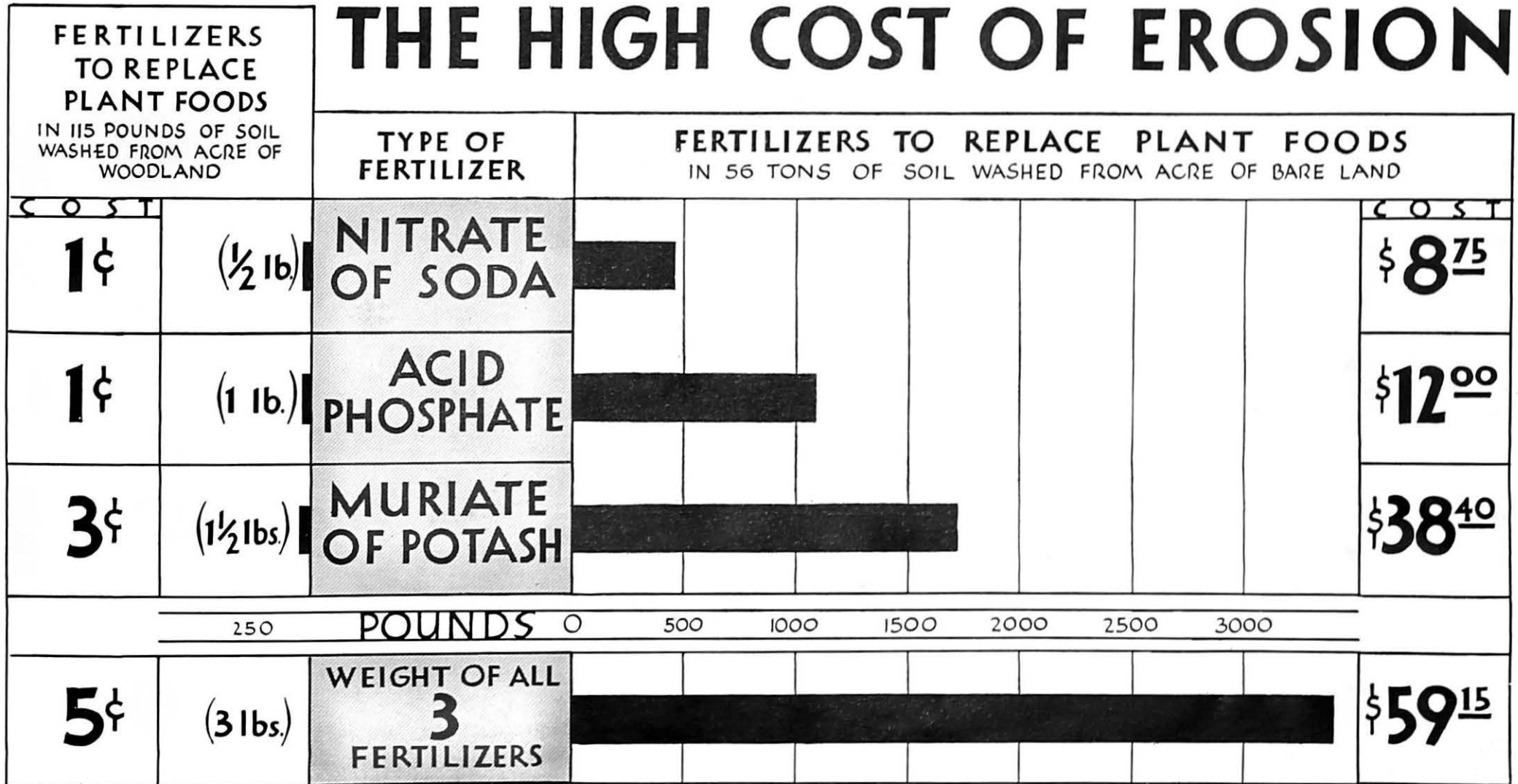
**THE** University of Georgia has translated soil erosion losses into dollars and cents. A comparison was made between 115 pounds of soil washed from an acre of woodland in a year and 112,316 pounds (56 tons) eroded from the same area of typically bare soil in the same time. Soil from each test area was analyzed to determine the amount of plant foods each contained. The results are surprising.

It was learned that if a farmer bought commercial fertilizer at 1935 prices to replace the plant foods washed from the wood-

land, the cost would be just 5 cents an acre. But he would have to spend \$59.15 to replace the loss from bare soil. Had these wasted plant foods stayed in the soil, they would have been sufficient to make an acre of land yield 50 bushels of corn for 4 separate seasons.

As real estate, the land itself is seldom worth as much as the plant foods that wash and leach out of its soil in a year's time. But, as the difference between a desert and green hills and valleys, land is life itself. America cannot live on a desert.

# THE HIGH COST OF EROSION



Experiments at University of Georgia on Cecil sandy clay loam of 5 percent slope covering 1-year period, 42-inch rainfall.  
Woodland is original hard wood forest area; bare land is subsoil or badly eroded (desurfaced) area.

## **POOR SOIL, POOR HOMES**

**POOR SOIL** cannot support comfortable homes, good schools, opportunity for recreation and enjoyment of the advantages of modern life. This was a splendid home when the land was fertile, but as the soil went down the home went down with it. The owners of many such homes have moved away, leaving their land in care of tenants.

There will be no money with which to rebuild this old home as long as the land washes away and the hillsides remain streaked with gullies. Rural areas through-

out America are dotted with such skeletons of once substantial homes.

Short-term tenantry hastens soil depletion. Why should a "cropper" bother to save the soil when he knows he must move to another place at the end of the season? Only when tenants have long-term leases looking to ownership is it to their advantage to plant more soil-building crops and follow a system of land use that conserves the soil and increases its fertility. Over a period of years this type of farming returns as profits the fertility that is put into the soil.



# LAND A HERITAGE

**A STRIKING** picture of children playing on eroding soil. They may be happy today, but what of the morrow? Though their parents labor long to till this field, this land cannot, so long as its topsoil continues to wash away, yield the substance needed to build these children into strong citizens well prepared to serve their community. They are victims of poor soil. But in the background there is a newly cleared field with tree stumps still in place. It yields abundantly because erosion has not yet damaged it.

Great was the task of the pioneers of America, forefathers of those who farm the land now, to fell the forests so that they might cultivate the soil and live. They labored to leave greater opportunity to their

children, and they were successful at the expense of the soil.

Henry A. Wallace, Secretary of Agriculture, says: "No civilization has ever builded in so short a time what our forefathers have builded in America." Cities, schools, roads—every evidence of culture and advancement—sprung into reality as though by magic; and the wealth that created them came out of the soil.

Farmers of today who would pass a greater opportunity on to their children face a different problem; it is the problem of the eroded field, of conserving and building rather than of clearing. So long as the land continues to wash away, this opportunity created by the pioneers is being lost with it.





# ARTIFICIAL DESERT

**PARTLY** protected land suffers so seriously from erosion, one wonders what would happen if land were stripped entirely of its vegetative covering.

The Ducktown copper mining area at the corner of North Carolina, Tennessee, and Georgia answers the question. Until a few generations ago this land was as fully clothed with green as any virgin southern highland area. Then the mining began, and fumes from smelting by early methods killed vegetation in an area of 50 square miles. Unchecked, the force of water soon tore the land into gullies, as shown by the picture. Now, however, since preventive measures were taken, erosion is diminishing and

nature's protection cover is slowly returning to parts of the area. The State highway, visible in the right corner of the photograph, goes through this man-made desert for several miles.

It is still impossible to cross the country on horseback because many of the gullies are from 10 to 20 feet deep and their sides are often vertical. During a heavy rain small streams not more than 3 or 4 miles long become great yellow torrents sweeping everything before them and tiny rills become good-sized creeks.

Cover is, indeed, the secret to land conservation. Farm lands should be kept protected by cover crops just as much as possible.



# **TWO KINDS OF RESERVOIRS**

**EROSION'S** destructiveness is double-barreled. With topsoil robbed from farm lands, erosion chokes reservoirs and streams. For example, silt, largely from the Ducktown area, has created many acres of land in a lake formed by a power dam. The picture shows a telephone pole almost buried in silt. Much of the storage capacity of the dam has been destroyed and silting continues at an alarming rate. A smaller reservoir upstream from the big dam has filled completely. The United States Soil Conservation

Service reports that on Deep River in North Carolina during the past 40 or 50 years, 11 of 15 power reservoirs have entirely filled with the products of erosion.

The usefulness of TVA's concrete dams on the rivers is being protected by cover crops on the fields, which act as reservoirs for holding the water that would carry soil down to fill the flood control and navigation lakes. Good farming is just as essential to the full development of the Tennessee Valley as Wilson, Norris, or other big dams.



# THE WELL-FED PLANT

**MANY FARMERS** are saying that it is not right for soil from their fields to wash downstream and damage and destroy the property of others. They realize that if streams are to be protected from silting, if reservoirs are to be preserved, and if soil is to be held and improved, a more abundant vegetative cover is necessary.

This picture shows strikingly how the proper use of the right kind of plant foods will increase vegetative covering. A Georgia farmer planted two fields of lespedeza, the popular forage crop, and treated one field with limestone and concentrated demonstration phosphate while the other was left unfertilized. The chart tells what hap-

pened. These plant foods not only make the protective cover more abundant, but, when this cover is a legume, they lead to additional increase in fertility through the transfer of nitrogen from air to soil.

Though soils of the Tennessee Valley are generally very deficient in phosphorus and lime, this is not necessarily true of all sections of the country. Even in the Valley other plant foods are used to advantage under special conditions and, while building for permanent soil fertility, a farmer may profit by wise application of nitrate and potash fertilizers. It is possible for research at any time to yield discoveries of new and better ways of achieving proper land use.

## **STARVED**

BY LACK OF SUFFICIENT  
PLANT FOOD



## **NOURISHED**

ON LIMESTONE AND  
DEMONSTRATION CONCENTRATED  
PHOSPHATE

•  
AN INCREASE OF MORE THAN

**3 $\frac{1}{2}$**  TIMES

**TYPICAL** samples of Korean lespedeza from demonstration farm of W. P. Nation, soil conservation association member at Chickamauga, Georgia. Seven hundred pounds per acre of ground Georgia limestone and 125 pounds per acre of demonstration concentrated phosphate plant food applied to part of field on April 29, 1934; remainder of field left untreated. Samples from both sections taken two months later. Soil type, Clarksville Gravelly loam. Weight of crop increase conservatively estimated to be more than 350 per cent.

**PROPER  
PLANT  
FOODS  
PROTECT  
SOIL**

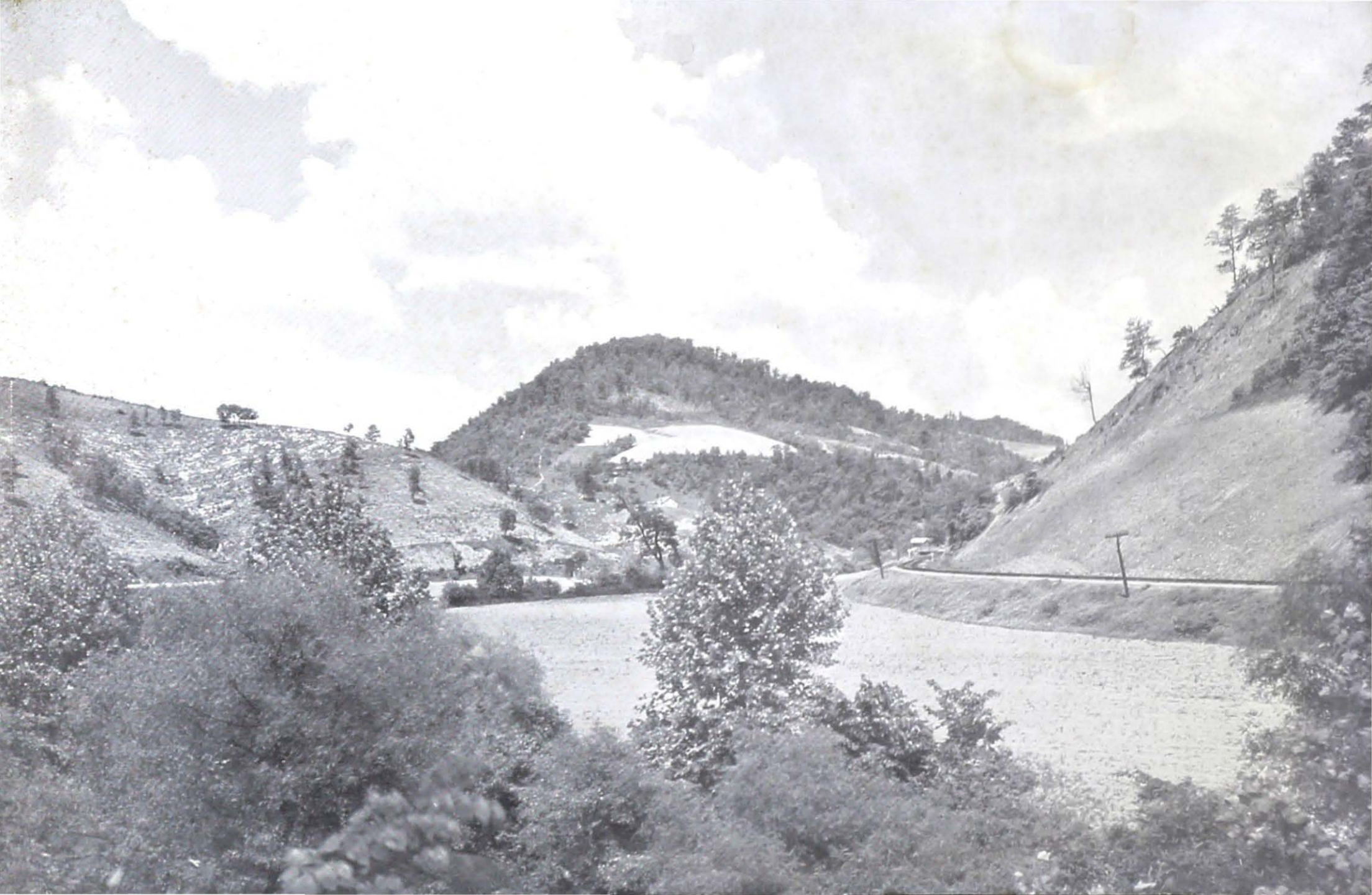
# **EACH FARM A NEW PROBLEM**

**IF THE STORY** about the farmer who fell out of his corn field has any foundation of fact, it is found in the hill country of the Tennessee watershed. There are some extremely steep hillsides in cultivation, and here is one of them. It has an 85-percent slope; that is, for every 100 feet measured horizontally the surface rises 85 feet vertically.

This field was cleared from woodland and cultivated for 3 years. At the end of that time the land was so completely washed away that it was worthless for cultivated crops. The farmer then cleared more forest

and began in like manner the destruction of another field.

Obviously a readjusted agriculture based on proper land use is necessary. Some land is so steep that it should not be cultivated at all. Perhaps it should be returned to forest; perhaps seeded for pasture. Each farm, even each field, presents a new problem, and it is the responsibility of the farmer to study his land so that he may learn how to put every acre to its proper use in his farming system. His county agent is ready to help him with this problem.





# **NATURE'S EFFICIENT METHOD**

**NATURE'S** woodland gives amazingly efficient protection against erosion. Here is an analysis of nature's method, a cross-section of the forest cover and the earth beneath, revealed by a highway cut.

The force of falling water is first checked by the dense forest growth of trees and lower vegetation. A thick carpet of leaves and twigs slowly filters the water down into the soil, anchored to the rocks below by a labyrinth of interlocking roots.

This picture explains why water that falls

on the forest quickly sinks into the ground where most of it is held to fill wells and springs during rainless periods and finally to flow out through clear springs, creeks and rivers. The water table is raised, making moisture available to crops during exceptionally dry weather.

Man best controls erosion on his farm lands when he most closely duplicates this woodland sponge, applying nature's methods to a natural problem. In fact, replanting open land to forest is one of his methods.



# RESTORA- TION TO NATURAL USE

**IN THIS COUNTRY** much land that the farmer has been forced to cultivate is being replanted with trees by both public forestry agencies and landowners themselves. Abandoned land of many sections is also returning to forest naturally.

This photograph is a winter scene of young pines set out as seedlings in a previously cultivated mountain-side field of the Great Smokies. Being well spaced and unretarded by woodland brush, the little trees are growing rapidly; some only 8 years old have

reached a height of 15 feet. In addition to providing the land with cover, such a forest is a source of firewood and building lumber for use on the farm, and a cash income may be realized from marketing the surplus.

Black locust has been found to be the best tree for controlling badly eroding land. The young trees are hardy, they have a matted root system, and grow rapidly even on land unsuited for farm crops. Since the locust is a legume it enriches the soil with nitrogen. The tough wood makes lasting fence posts.



# **HOW DENMARK VALUES FOREST**

**THE PEOPLE** of the United States are just beginning to recognize fully the value of woodland in a system of making each farm acre produce a pay crop. But Denmark, the little country that boasts the world's most highly developed agricultural society, has always made a place for forests, in spite of the fact that the demand for land in the small country is many times as great as in the United States.

This forest was hand planted. In fact, Denmark has doubled her forest area in the

past 75 years by planting much land least suited for agriculture to valuable trees. When properly cared for and cropped, the forest yields from this land a greater income than if cultivation were continued.

Though the soils of Denmark are not so rich as the more fertile agricultural areas of the United States, they have been vastly improved in the last 50 years by proper land management and by barnyard manures. Commercial fertilizers have been applied supplementally in recent decades.



# **PASTURES SAVE THE SOIL**

**ANOTHER MEANS** of conserving the soil and water is the planting of more land to permanent pastures.

Though bluegrass grows naturally in southwestern Virginia's limestone valleys, a heavy natural sod does not, without treatment, survive the grazing to which it is subjected. In many localities, however, the people have aided nature by not permitting overgrazing and by feeding the grass artificial applications of plant foods, chiefly phosphate and additional lime.

Where this has been done, the pasture provides abundant feed for cattle and at the same time forms such a heavy sod that serious erosion is impossible. The plant foods

promote the growth of white clover, a natural companion of bluegrass, and the clover, in turn, transfers nitrogen from air to soil to feed the grass.

Years ago, experiments and demonstrations conducted by the Virginia Polytechnic Institute showed that by restoring needed plant foods to the soil, farmers can make the heavy growth of bluegrass pastures continuous. The owner of the pasture pictured here was one of the first to apply these recommendations. Over a period of years an acre of rolling land will produce more feed from well-fertilized grass, which improves and holds the soil, than from corn, which exhausts the soil and allows erosion to waste it.





# MAKING RUNNING WATER WALK

**TIMBER**, clover, and pastures are good cover for land, but all the land cannot be kept under cover; some of it must be cultivated. The tilled fields can be given substantial protection by terracing, a method of land preservation used for centuries and now being revived extensively in this country. Terracing, however, is not fully effective unless reinforced by protective, soil-building systems of land use which include abundant winter cover crops.

It is being found necessary to confine cultivation as much as possible to the level areas and less steep slopes. But even gentle

slopes are more subject to soil and water loss than one would think. Under continued cultivation, sheet erosion, a washing away of topsoil not revealed by telltale gullies, goes on at almost unbelievable rates.

Terraces, such as this one being thrown up in Georgia by a tractor and grader, retain from 85 to 90 percent of the rainfall. Terraced fields produce better crops because they hold more moisture and slow down the water run-off so that it does not carry so much rich topsoil away as sediment. Water "walks" down the hill instead of rushing down destructively.



# CROPS ON TERRACES

**TERRACES** are plowed and planted over as though they did not exist, as this photograph from Limestone County, Ala., shows. A few furrows with an ordinary plow will open them up again if they become too flattened. Thus cared for, they last indefinitely. A terrace follows the contour except for a slight fall; and row crops are planted in the direction of the terrace.

During exceptionally heavy rainfall, water drains from terraces and is allowed to escape over check dams, such as this one, so that it will not set up an erosion menace as it leaves the field.

It is often wise to terrace permanent pastures; in fact, by confining the water, terraces give immediate protection and hold moisture

on eroded fields while a permanent pasture is being built. Terraced land can be used for any rotation.

Alabama Polytechnic Institute pioneered in scientific study and demonstrations concerning terracing and erosion problems, and that State is now a leader in terracing activity. In the spring of 1932, sixteen farmers of Tallapoosa County held a 3-day terracing school at which they learned how to build the lasting broad-base terrace. They went back home and terraced their own fields. From this beginning just 4 years ago terracing activity has spread, until now farmers in different parts of the State are operating many scores of power terracing units.



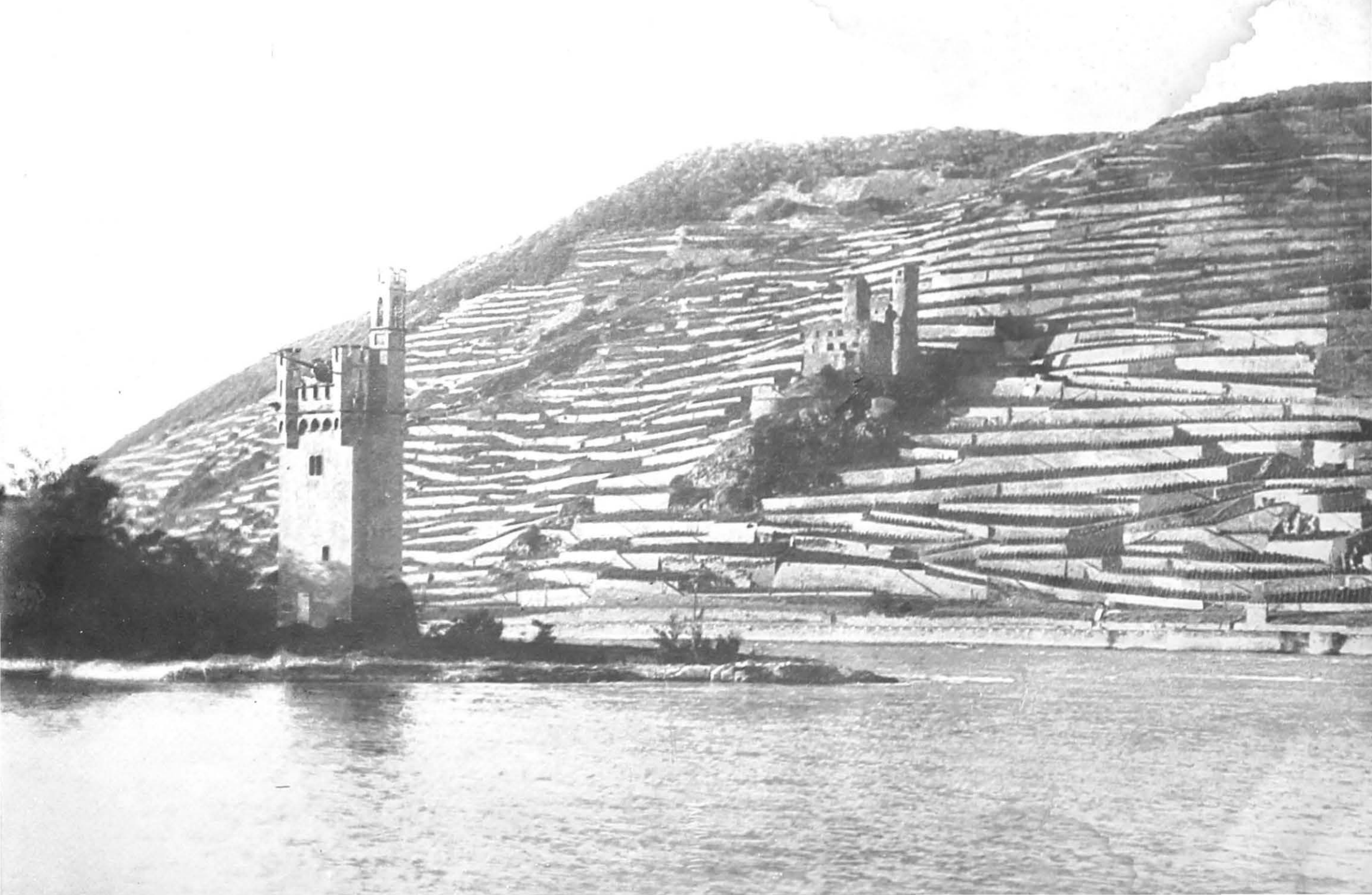
# **OLD COUNTRIES CHERISH LAND**

**HERE** is an example of terracing along the banks of the Rhine River in Germany. This extensive stonework must have cost hundreds of days' labor per acre, while the cost of terracing such as that pictured on the preceding page seldom exceeds \$2 or \$3 per acre.

Is such expensive terracing worthwhile? The Germans will tell you yes, because land is the basis of life itself. The real worth of land cannot be measured in terms of its dollars and cents value.

It is much easier to maintain fertile land

than to bring back eroded land. If the Germans allow their fields to be ruined, they have no new land to turn to. That is now the reality facing farmers of this country. There is no unconquered West as in generations past. The frontier is the farm property line and the land enclosed by that line must be so cared for that father will proudly pass it on to son and son to succeeding generations. Not a barren waste, but fertile fields capable of nurturing a better civilization should be the heritage of future Americans.



# BLESSINGS IN DISGUISE

**CULTIVATED** land in the South suffers severely during winter. Usually left unprotected, it is washed and leached by the heaviest rains of the year. There is no friendly cold weather to keep it frozen together and no slowly melting snow from which water gradually trickles, as is the case farther north.

But these destructive rains and mild temperatures become a blessing for lands planted in winter cover crops. The cover grows to maturity when the land would otherwise be idle, between fall harvest and spring planting time, and thus does not interfere with the regular cropping system. Crimson clover is

a winter cover that admirably protects the soil from erosion. At the same time it puts humus into the soil, provides pasture, and transfers more nitrogen from air to ground than could be reasonably obtained by artificial means. Because it is a deep-growing plant, the clover also draws plant food up from the subsoil and sends water down.

A small grain or vetch is often added to clover because its mat of roots binds the soil even more securely to keep it from washing away. Broad base terraces and winter covers of this kind make an excellent soil-building team for the Tennessee Valley.



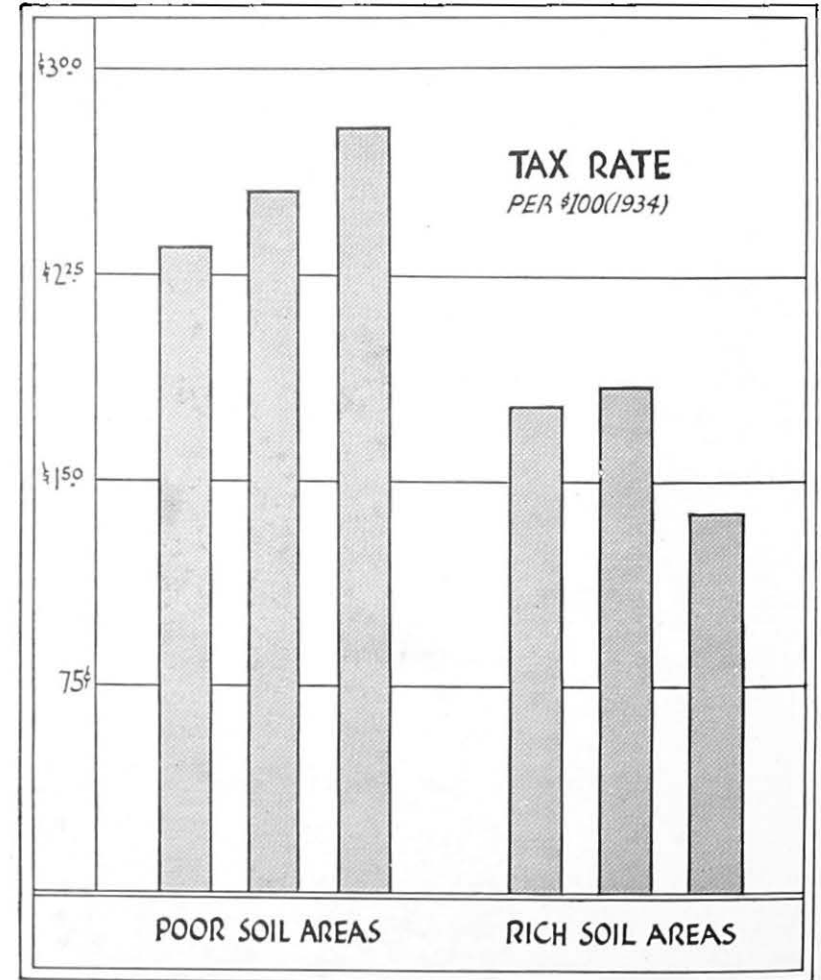


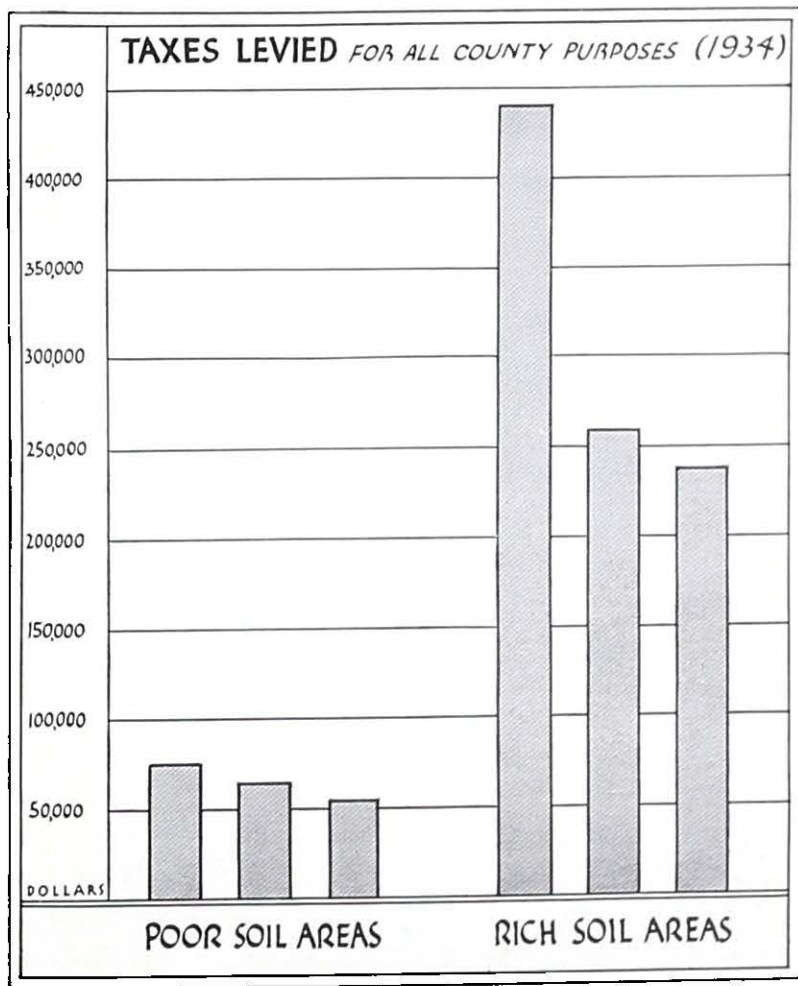
## BURDEN ON THE LEAST ABLE

**A CONVINCING** dollars-and-cents study of the value of fertile land to the taxpayer has been made by the University of Tennessee, which compared the tax rates of six typical Tennessee counties, three representative of poor-land areas and three of fertile areas. Though this study was made in only one State, its findings apply nationally and are borne out by research of the same kind in other parts of the country.

It was found that the counties whose soil is low in fertility have much higher tax rates than those whose soil is rich. The chart shows that the tax rates in the poor-land counties approximate \$2.50 per hundred while for the fertile counties the rates are only about \$1.50.

Startling, is it not? But the reason is readily apparent. Rich land is so much more valuable than poor land that the low rates probably yield the greater returns. And that is just what happens, as the next chart explains.





**THE SAME** three poor Tennessee counties with oppressively high tax rates have starvation governments. Their public buildings are antiquated, their services limited because of paltry incomes. On the other hand, the same three rich-land counties with the much lower tax rates have incomes many times larger.

Thus the public welfare is directly dependent upon the condition of the farm land. Good land results in good government services at a low tax rate; from poor land there can come only limited services at a high tax burden. And little can be accomplished toward more complete and more economical public services until most of the farm lands of a community are improved.

Realizing this, farmers of the Brushy Fork watershed in Watauga County, N. C., are making their neighbors' soil conservation problems their own. With the help of North Carolina State College they have organized to hasten the effective protection of their watershed, and an important activity will be the financing of essential plant foods for those unable to meet this cost at the present time.

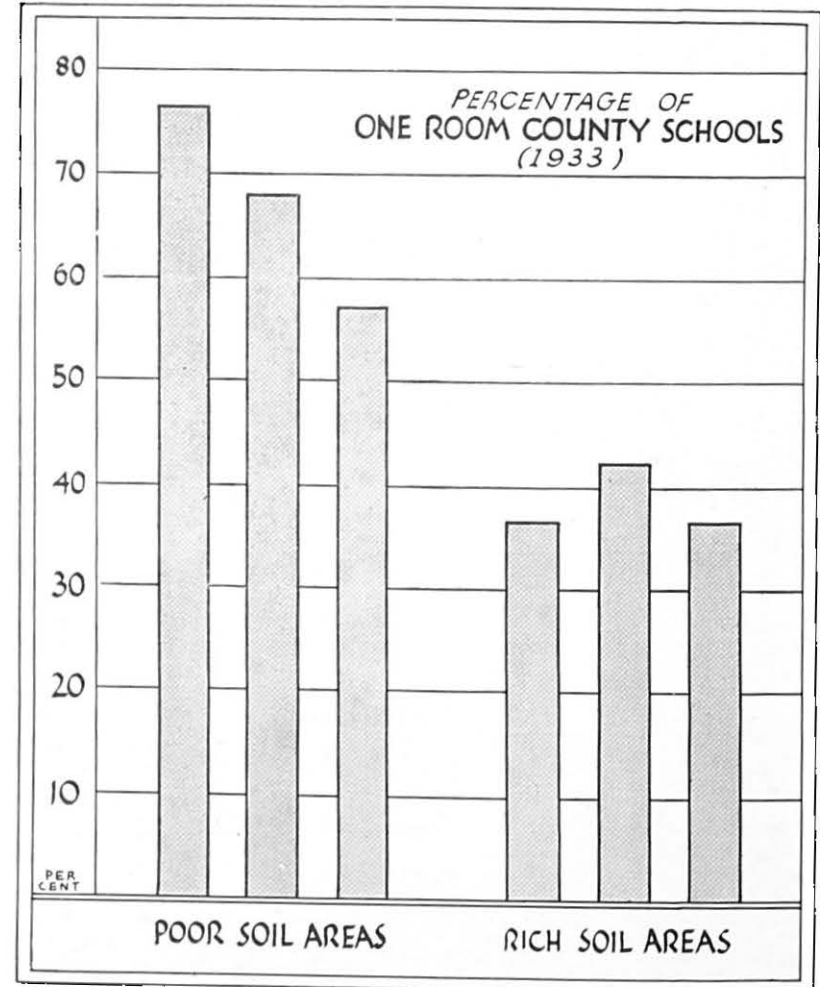
**MOST  
MONEY  
FROM  
LOWEST  
RATE**

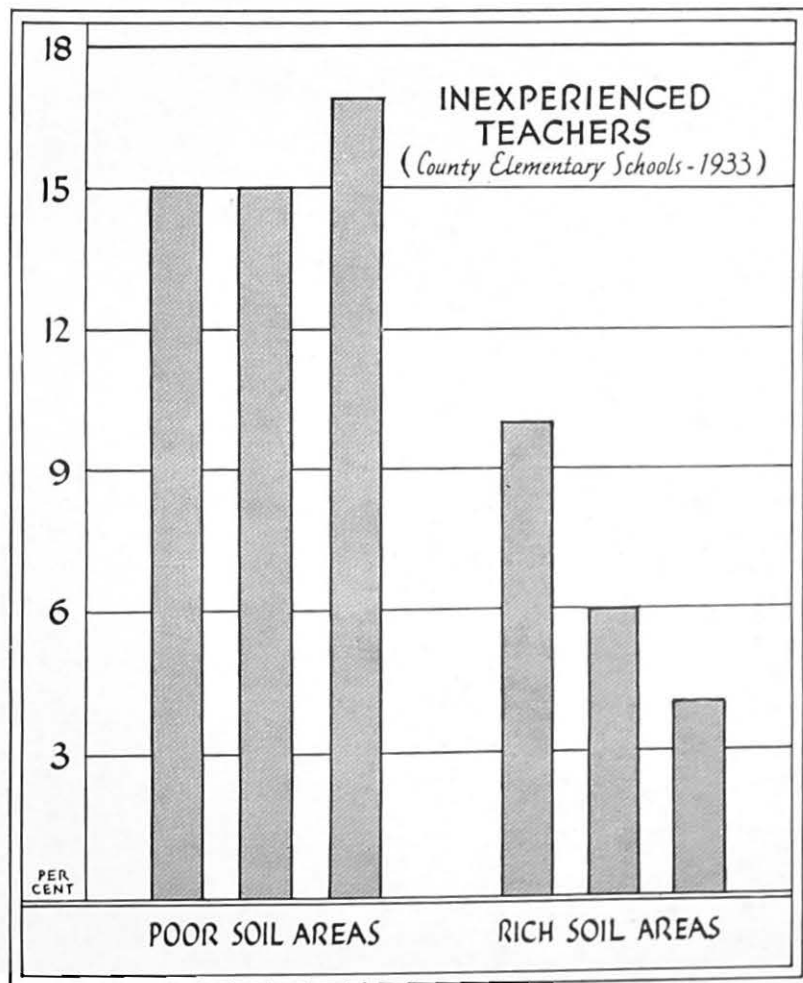
**BEST  
SCHOOLS  
ON  
BEST LAND**

**SCHOOLS** also show evidence of rich-land, low-tax-rate prosperity and poor-land, high-tax-rate hardship. The University of Tennessee has compared the school buildings of the counties included in its study. Approximately 65 percent of the schools in the poor-land counties are antiquated, one-room buildings; whereas less than 40 percent of the rich-land schools are one-room structures. There is this great difference in spite of the fact that State aid helps to maintain educational advantages in poor counties.

Children whose fathers pay the lowest tax rate are carried by bus to large, modern schools that give the best educational advantages. They study in comfort in well heated and ventilated buildings and profit by such advantages as specialized laboratory equipment, gymnasiums, and good libraries. On the other hand, children whose fathers pay the highest tax rate walk to one-room buildings just as their parents did.

Poor soil does not convey greater opportunity to new generations.





**THE STUDY** also compared poor-land teachers with rich-land teachers of the same six Tennessee counties.

Again the lowest tax rate gets the best teacher.

This chart shows that about one-sixth of the elementary school teachers in poor areas have had no previous experience. Thus each year one out of every six poor-land teachers leaves, usually to accept a better position elsewhere, and is replaced by an inexperienced young person just out of school.

This turnover in the poor-land counties is nearly three times as great as in the fertile areas. The education of poor-land children is entrusted to inexperienced teachers to a much greater extent than in rich-land counties.

Future America is being born in the country. While city birth rates decline, rural people continue to have large families. These children will be the men and women of the future, and it is important that they be given the best educational equipment with which to solve the problems they will face.

**POOR LAND**

**GETS LESS**

**EXPERIENCED**

**TEACHERS**

# POOR SOIL, DISTRESSED TOWNS

**THE PRECEDING** charts show how the welfare of rural areas depends upon good farming on fertile soil. City and town people generally do not realize that the influence of the soil does not stop at their corporate limits. Successful farming in the country surrounding a city is just as responsible for low taxes, modern schools, and good public services in the city itself as in the strictly rural districts.

Yes, good farming has a dollars-and-cents value to the city man as well as to the farmer. When the care of the land does not return profits to the farmer, he cannot buy

goods made by city industries and sold in city stores. The welfare of the factory worker, the banker, the storekeeper, in fact of every town dweller cannot be separated from the welfare of the farmer. Good soil generally means good towns. It is the difference between the Tennessee Valley town pictured here in the midst of a prosperous farm community and the town in the inset, which is the center of an area of impoverished soil.

Many cities and towns have recognized this bond of interest and are cooperating in adjustments of agricultural procedure directed to bring greater returns to the farmer.



# LAND USE AND ELECTRICITY

**RURAL** electrification is important in a program of land improvement not only for production of necessary plant foods such as phosphates but also for broad, lasting application of soil-conserving practices and desirable self-containment of the rural family.

Farmers now raise an appreciable portion of their hogs, necessarily fed on soil-depleting corn, for home consumption because the meat can be cured and kept at ordinary temperatures. With electric refrigeration, perhaps community storage boxes, they could eat pasture-raised beef instead of corn-fed hogs, and thus turn a considerable part of their land into soil-building pastures. Much of the cost and labor of curing could be elimi-

nated, and it would be possible to eat and market fresh meat at any time. Fruits and vegetables also could be stored.

Electricity on the farm develops new sources of income and aids the farmer at scores of tasks. It lifts the burden of work for the housewife also and makes available more time for recreation and enjoyment of conveniences of the electric age. This is well illustrated in northeastern Mississippi, where citizens, with the help of Mississippi State College, are developing a program for spreading the benefits of rural electricity. Farm life made attractive by electricity draws people to the country and keeps youth from leaving the country for the city.







10 - RE-ADJUSTED LAND USE

2 - REMOVAL OF COVER

## NATURE'S PROTECTED ABUNDANCE

9 - DEMONSTRATIONS

3 - CLEAN CULTIVATION

### FROM ABUNDANCE TO ABUNDANCE - The Cycle of Soil Depletion and Rebuilding

1. Forest and grass protect nature's abundance. From decaying vegetable and animal matter the soil is enriched and built up faster than natural erosion carries it away.
2. The cycle down to the right illustrates the removal of timber and sod that protect the soil. The pioneers cleared the forest to plant crops, and, when the fertility of a field was exhausted, more trees were felled. This practice was continued through the years.
3. Clean cultivation with row crops such as corn, cotton, and tobacco, and the absence of winter cover crops encourage erosion. Unterraced fields also leave the topsoil free to wash away.

4. Severe erosion is the result. Organic and mineral plant foods are carried off in the soil to clog streams and destroy reservoirs. Floods and droughts follow.
5. Land becomes poorer and poorer, and less able to resist erosion. Even good farming practice is impotent in the face of advancing erosion. More labor and more land are necessary to produce the same quantity of crops. Farm income dwindles.
6. The relief load increases. Taxable values diminish; the tax rate goes up. Farms are abandoned and revert to the county. There are created pauper counties, dependent on the State and Nation.

7. The cycle turns up. People become aware of disaster threatened by erosion and begin to improve their farm management procedure. Fields are terraced and gullies clothed with vegetation. Dams are built. Inland waterways are created and floods are controlled.
8. Electric power from controlled water makes possible the manufacture of phosphate plant food, key to land conservation and restoration.
9. Organized into soil conservation associations, the people readjust their farm practices to conserve land and increase fertility. The proper kinds of plant foods are

used. Nitrogen is put into the soil through legumes. More cover crops are planted.

10. The steeper sloping land not terraced is returned to forest. Cover crops, pastures, and livestock are emphasized. Food is raised for the family and feed for animals. Diversification is practiced. Soil rotations are followed.

Thus land rightly used yields from its abundance to benefit man and at the same time preserves this abundance for future generations.

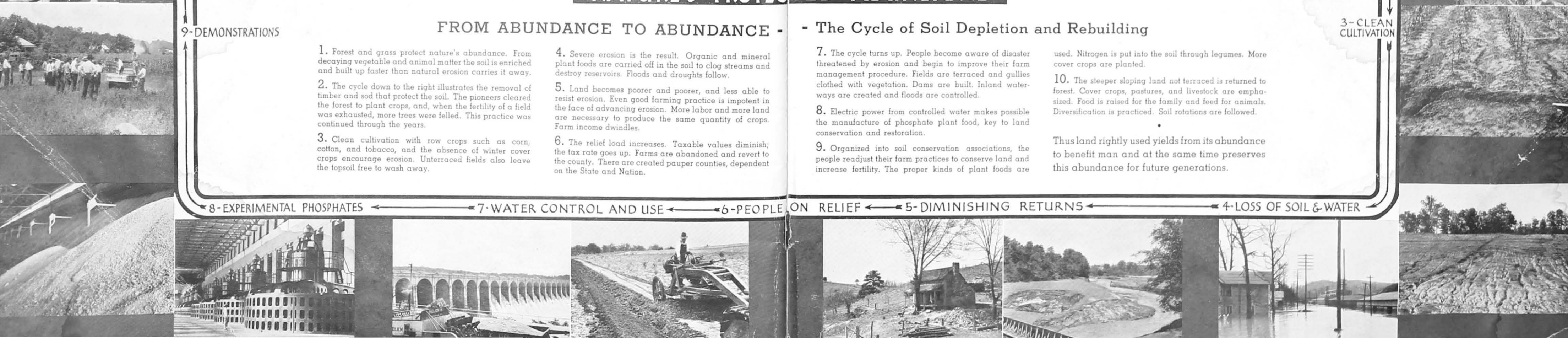
8 - EXPERIMENTAL PHOSPHATES

7 - WATER CONTROL AND USE

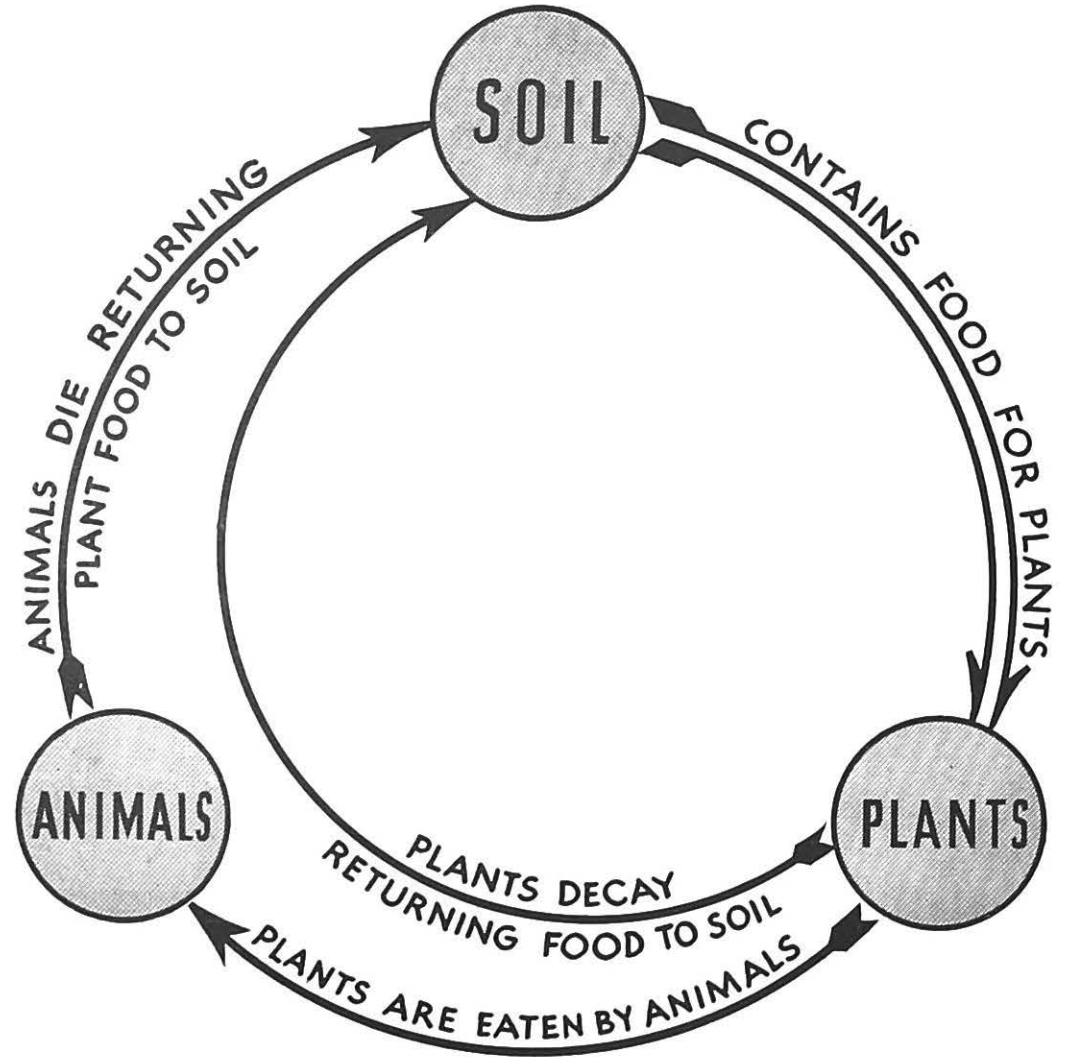
6 - PEOPLE ON RELIEF

5 - DIMINISHING RETURNS

4 - LOSS OF SOIL & WATER



# THE NATURAL CYCLE



# TVA AREA

LAH

K Y.

VA

NASHVILLE

NORRIS DAM

NORRIS

T E N N .

KNOXVILLE

ASHEVILLE

DUCK RIVER  
COLUMBIA

GREAT SMOKY MOUNTAINS NATIONAL PARK

PICKWICK LANDING DAM

CHICKAMAUGA DAM

FOWLER BEND DAM

ELK RIVER

CHATTANOOGA

WILSON DAM

WHEELER DAM

HUNTSVILLE

HALES BAR DAM

T E N N E S S E E R I V E R

GUNTERSVILLE DAM

ALABAMA FOREST

S. C

A L A .

G A

\* INDICATES PRIVATELY OWNED DAMS  
||||| INDICATES NATIONAL FOREST AREA

ATLANTA