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The GREAT FLOOD



U. S. DEPARTMENT OF AGRICULTURE

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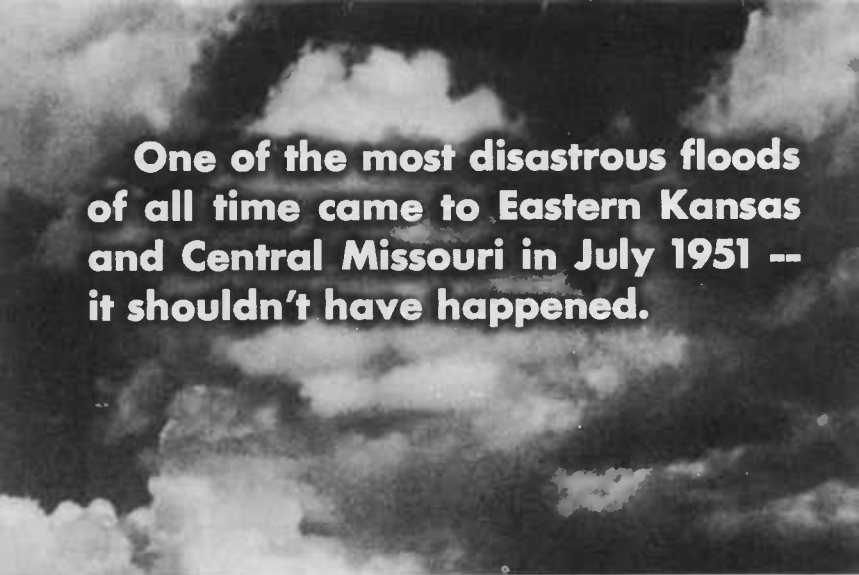
**AGRICULTURE
INFORMATION
BULLETIN No. 81**

This is a story, in pictures, about the big flood that ravaged most of Kansas and parts of neighboring States in July 1951. It is also a story about floods, in general. More important, this pamphlet depicts some of the methods by which flood and sediment damages may be reduced.

Flood control is a national problem, because floods are not confined to any particular localities, States, or regions. The Federal Government has been actively engaged in flood-control work for several decades. Within recent years, the Congress has passed legislation that provides for a comprehensive attack on this problem. Control of waters from where the raindrops first strike the ground until they reach the seas is the objective.

Only a few of the proven methods of reducing flood damage are depicted here. These should give a general idea, however, about how we may alleviate such disasters in the future.

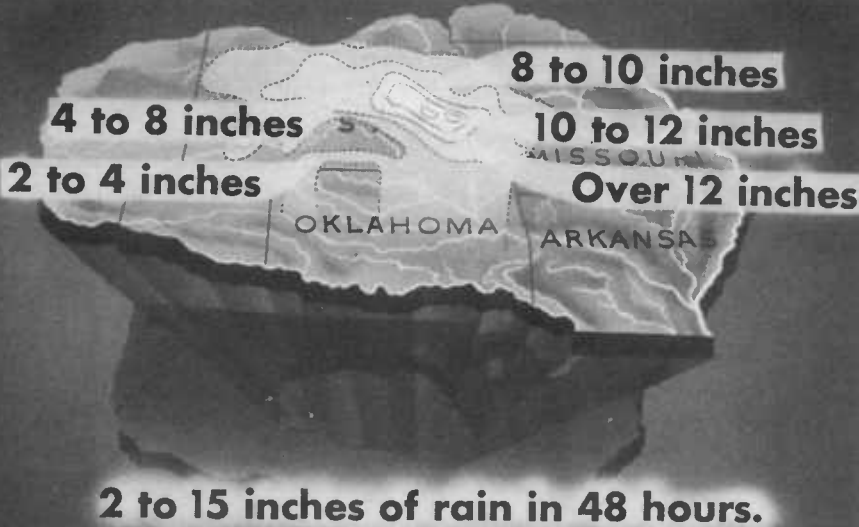
Issued April 1952



**One of the most disastrous floods
of all time came to Eastern Kansas
and Central Missouri in July 1951 --
it shouldn't have happened.**

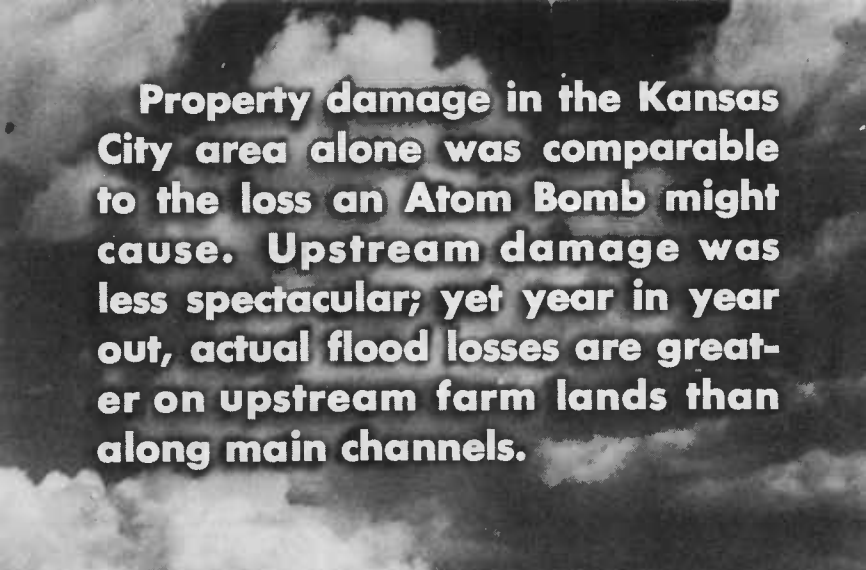
This was not the first flood disaster in the United States. In 1913 the Miami and Ohio rivers broke all previous records for destructive floods. In 1927 the Arkansas and lower Mississippi set a new record. The Ohio surpassed that record in 1937. Then in 1947 the upper Mississippi set another new record. In 1948 the Columbia had its worst flood in history.

The 1951 flood on the Kansas (Kaw) and lower Missouri Rivers surpassed all previous floods in the locality where it occurred from the standpoint of destruction of property. Why should we let these floods continue?



DN-528

Unusually heavy rains fell over most of Kansas and adjoining States throughout May, June, and the first week of July. The ground was saturated with water in most areas, and streams were already bank full. Then on July 10 the skies really opened up. The heaviest rainfall since 1844 came to central and eastern Kansas. From 2 to 15 inches of rain fell in 48 hours. The Neosho, the Verdigris, the Osage, and all the other rivers that rise in Kansas were flooded. But the Kansas River and its tributaries had to carry most of this deluge.



Property damage in the Kansas City area alone was comparable to the loss an Atom Bomb might cause. Upstream damage was less spectacular; yet year in year out, actual flood losses are greater on upstream farm lands than along main channels.

Conservative estimates put the property damage by this flood at well over a billion dollars, and 15 people lost their lives. Superfloods, of this type, usually cause the greatest destruction in the thickly settled and industrial areas of cities that lie in the main flood plains. We should bear in mind, though, that such floods do not occur often. Year in and year out the greatest damage is done to crops, farm lands, and rural communities that lie along the minor streams and to the upland farms where the water falls.



**A dozen cities along the main streams
were flooded.**

C-2522

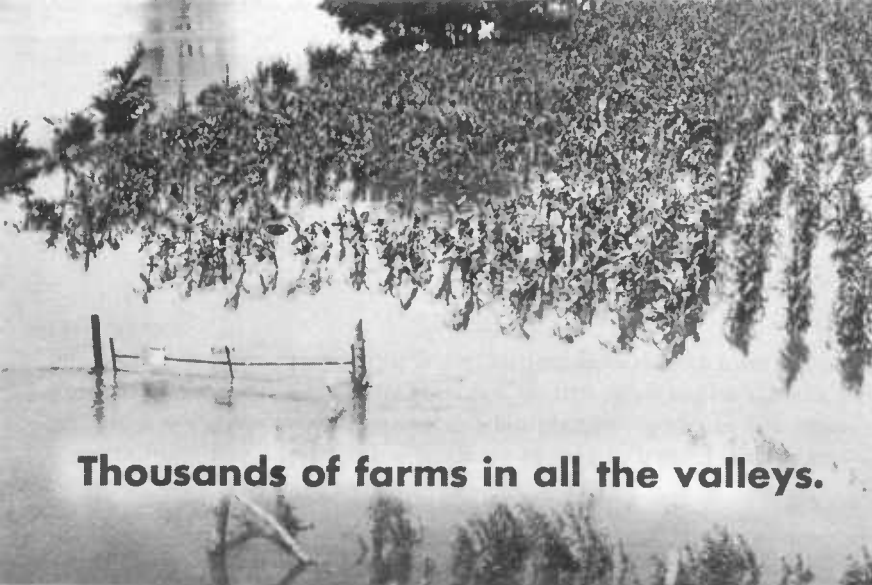
Salina, Abilene, Junction City, Manhattan, Topeka, Lawrence, Ottawa, Emporia, Iola, Chanute, Kansas City, Jefferson City, and other cities were inundated. Water was 15 feet or more deep in many city streets. The greatest damage was in the Kansas City area, but that was mainly because more high-value property was inundated there. Several smaller cities suffered greater comparative damage. This air view shows Topeka at the height of the flood.



A hundred towns along minor streams.

Kan-5665

Every town and village in the lowlands of eastern Kansas and adjoining parts of Oklahoma and Missouri were flooded. Some of the more fortunate were under water only for a few hours. Some others remained inundated for days. Altogether, a half million people were routed from their homes.



Thousands of farms in all the valleys.

Okla-9-495

About 3 million acres of farm land were inundated in Kansas alone during this one flood. Hundreds of thousands of acres in Missouri and Oklahoma were likewise flooded.



**After the flood waters receded,
the mud remained.**

C-2525

It isn't just the water that causes flood damage. Floodwater nearly always carries a large load of silt. After the floodwaters recede, the mud remains: it must be cleaned up. But you can't clean up all the mud. You can't effectively clean the fresh fruits and vegetables in the grocery stores that have been coated with mud. Nor can you ever get some of the furniture, draperies, and other articles in the home as clean as they were before the flood.

The trains didn't run for days.



N-11568

Railroads usually suffer heavy damage from floods. Many of their tracks lie along the relatively level flood plains of streams and rivers. Dozens of miles of track were washed out or covered with mud along the rivers of Kansas during this flood. Two railroad bridges at Topeka, one weighted with 10 locomotives, the other with cars loaded with rock, were washed out. The locomotives and the cars, as well as the bridges, were then added to the debris that blocked the passage of floodwater down the river. This picture shows the station at Manhattan after the flood had subsided.

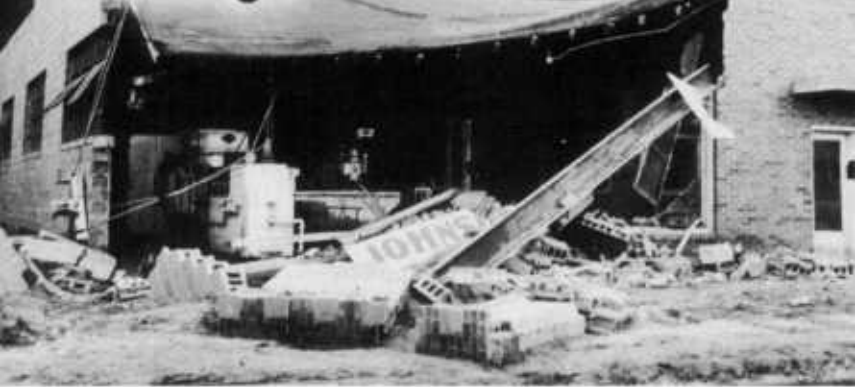
Many roads and highways were impassable.



N-11632

All roads and highways in the flood plains were impassable for days—many of them for weeks. After the water had drained away, it was found that many paved and hard-surfaced roads, such as this one, were washed out and rendered unfit for traffic.

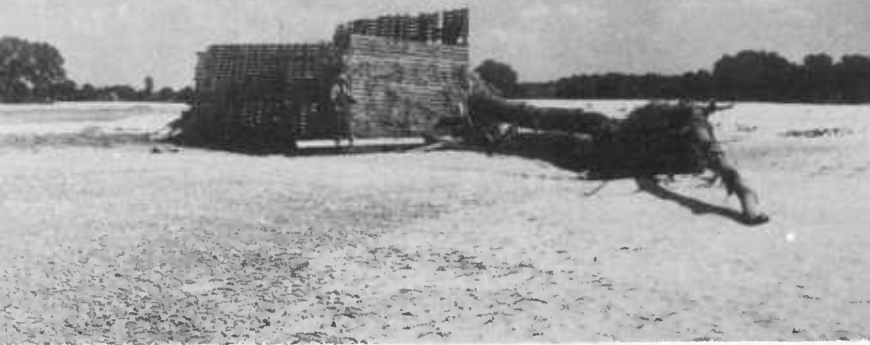
Towns and cities suffered untold damage.



N-11565

Property damage in all the towns and cities of the valleys was terrific. Many buildings, like this one, were wrecked. Merchandise was ruined by water and mud. A destructive oil fire was started by the flood in Kansas City. Damage was not confined to buildings and property above ground. City water systems and sewer systems were wrecked or destroyed in many places.

Desolation prevailed on many farms.



N-11647

Comparative damage was just as great to the farms as to the towns and cities. Here , a corncrib, washed down the river from an adjoining county, and the stump of a tree stand out as markers on a desert of sand that was once one of the richest cornfields in the Kaw valley. Total damage to farms and farm land was more than half a billion dollars.



**The rich topsoil was scoured
from thousands of acres.**

C-2521

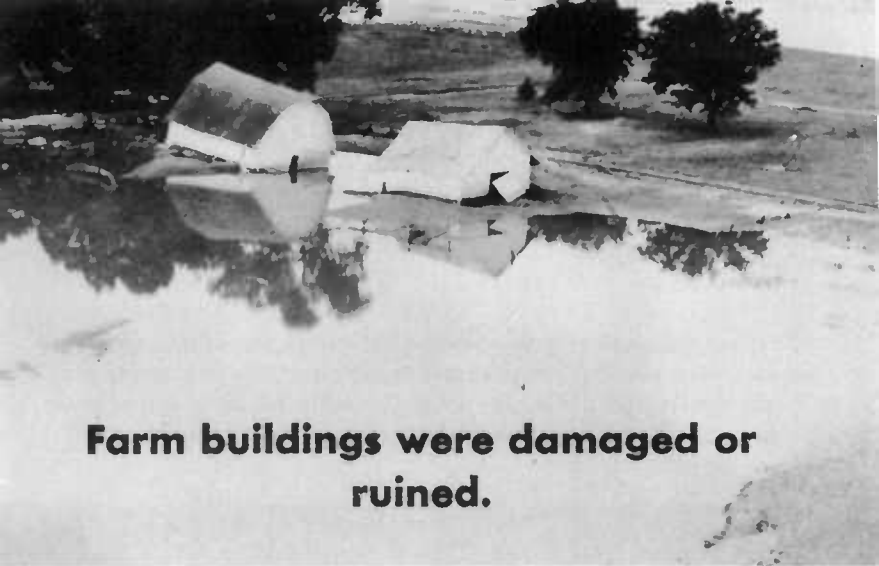
On flooded farm land where the water was swift, soil was scoured off to a depth of 3 or 4 feet in places. Some of this scoured land may be restored to production; but the millions of tons of fertile topsoil can't be brought back.

Sterile sand and trash covered some of the richest land.



N-11653

On farms where the water slowed down, sterile sand and trash were deposited in huge quantities. Fertile soil lies beneath such layers of flood debris; but the trash must be removed and the sand mixed with the soil by deep plowing before such fields can produce profitable crops again.



Farm buildings were damaged or ruined.

N-11603

More than 3,000 farm buildings in Kansas were totally destroyed by this one flood. Many thousands of others were seriously damaged. The total damage to farm buildings was about 13 million dollars. More than 25,000 head of livestock and 250,000 poultry were drowned in Kansas alone.

Growing crops were destroyed.



N-11572

More than 2 million acres of growing crops in Kansas were submerged by floodwater. The total damage to such crops was estimated at about 55 million dollars. In addition, about 12 million acres of growing crops were damaged or destroyed on upland farms of Kansas during the heavy rains of May, June, and July. The total damage to upland crops was estimated at about 160 million dollars. Crop damage in adjoining States was also serious.



N-11660

Even crops that were harvested and stored in bins or cribs did not escape damage. In Kansas alone, about 375 thousand bushels of corn, 230 thousand bushels of wheat, and many other stored crops were totally destroyed. Additional crops, such as the wheat shown here, were seriously damaged. Altogether, the flood damage to stored crops in Kansas was about 3 million dollars.

Farm machinery was ruined.



N-11651

More than 1,500 tractors, about 2,000 cars and trucks, about 3,000 combines, hay balers, and corn pickers, and much other equipment, were damaged or destroyed on Kansas farms. The total damage to farm equipment of the State was about 3 million dollars. In addition, about 10 thousand miles of fence was destroyed and another 13 thousand miles damaged at a cost of nearly 4 million dollars.



N-11579

Around 250 farm homes were totally destroyed and about 3,500 were wrecked or severely damaged in Kansas. Thousands of others were slightly damaged. The damage to the home shown here was estimated at about \$3,000. The total damage to farm homes in the State was more than 6 million dollars.



Upland farms, where the flood waters started, were also ravaged.

C-2523

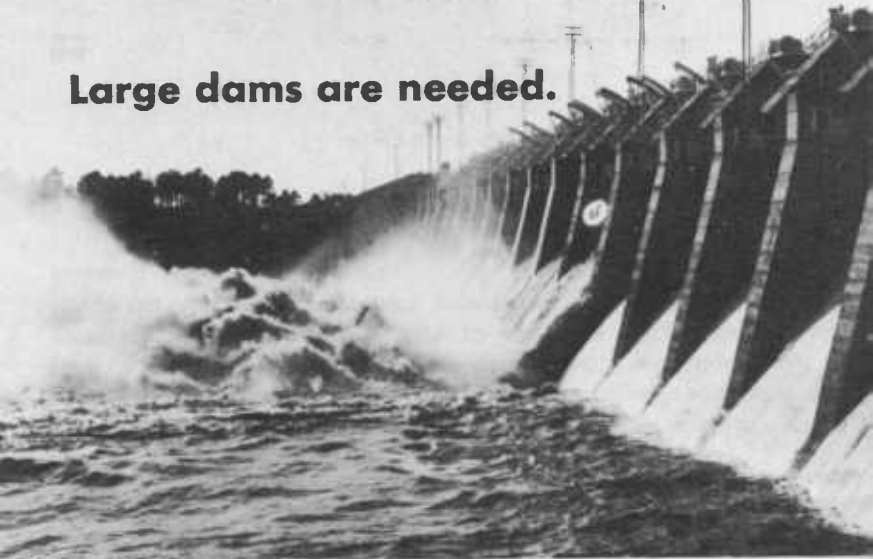
The Soil Conservation Service estimates that at least 300 million dollars worth of topsoil was washed off the upland farms of Kansas during the heavy rains of May, June, and July. It was on such slopes as the one shown here that most of the flood waters first started. It was here that a great part of the mud originated.



We can prevent most flood damage. Large structures along the main streams will help.

We can stop much of the damage from all floods to upland farms and eliminate a major part of the damage to farms and towns along the minor streams. And we can lessen the damage along the larger streams. Large structures on the big rivers are needed to protect the cities and industrial plants.

Large dams are needed.



C-2524

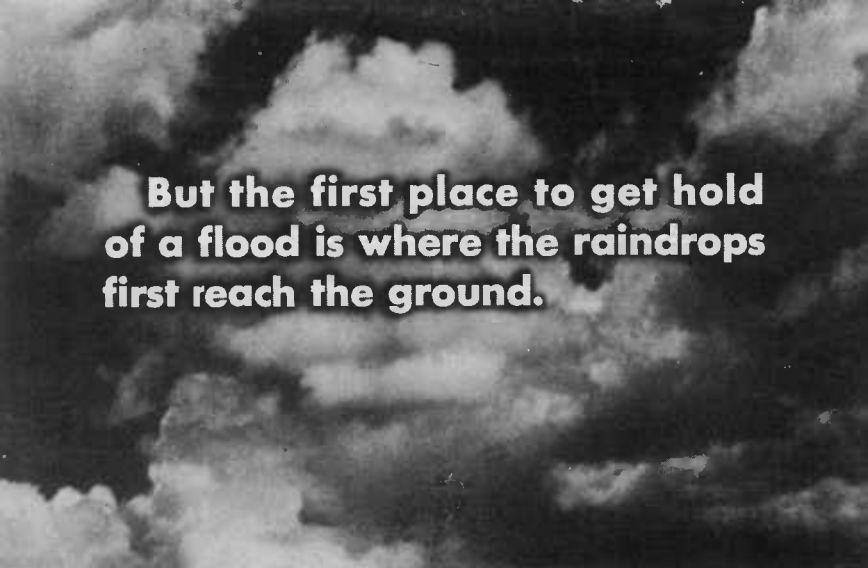
Large flood-control dams, such as the one shown here, are needed on many major streams. Even though we use the best soil and water-conservation practices on all the land, the runoff from such heavy rains as this one in Kansas will cause overflow of the major streams. Dams, of this type, will hold back the floodwater on large rivers and prevent much property damage to cities and farms that lie in the flood plains below.

Levees are needed at some places.



War-10320

If all the land in a watershed were properly treated with soil and water conservation measures, and flood-control dams were constructed at proper places, damages would be greatly reduced. Yet, levees should still be constructed to give full protection to some low lying industrial and residential sections against such superfloods as that of 1951 on the Kansas River.



**But the first place to get hold
of a flood is where the raindrops
first reach the ground.**

Effective flood control must start where the rains fall and runoff begins. Large dams and levees downstream give no protection to the upland farms and to the farms and towns that lie along the minor tributary streams. Moreover, if we start by reducing the amount of runoff and silt from upland farms, we will have less water and mud to contend with on the major streams. The effective life of dams will be much longer because the reservoirs will not fill up with silt and mud so soon.



**Conservation farming can help
prevent floods.**

Ia-1841

The right kind of conservation farming will hold back part of the runoff that causes the floods in the valleys below. It will keep some of the silt out of the floodwaters—the silt that fills the reservoirs, clogs the stream channels, and covers the flooded land and buildings with sand and mud.

An aerial photograph of a farm showing contour strip cropping. The land is divided into long, narrow strips of crops, with rows of grasses or legumes acting as buffers between rows of corn or other crops. A winding dirt road or path is visible in the upper portion of the image.

Contour strips of grass help keep both soil and water on the farm.

Wis-367

Contour strip cropping is an effective soil and water conservation practice for most sloping fields. Strips of close-growing grasses or legumes planted between strips of clean-tilled crops helps filter out eroded soil that comes from the bare land. The grass strips also tend to slow down the runoff and cause more water to soak into the ground.



Stubble mulching helps prevent erosion and runoff.

Ore-5055

Tillage operations that leave part of the stalks and stubble on top of the ground tend to check erosion and runoff in several ways. The mulch helps protect the soil from the raindrop's blast. It keeps the soil more porous so that water will soak in faster. The straw and stalks act as tiny dams to slow down runoff, and they help hold the soil together and prevent either washing or blowing.

Terraces and contour furrows hold back water.



Kan-5277

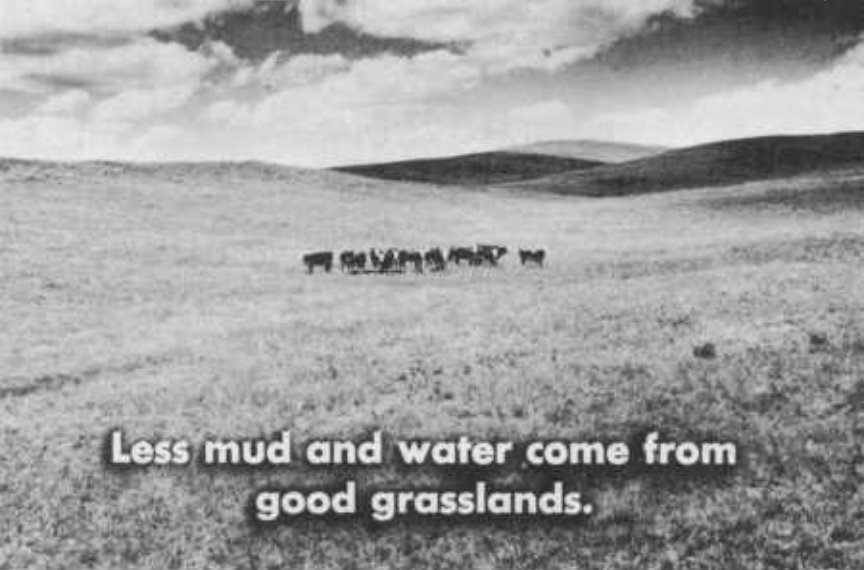
Terracing and contour tillage help to hold water on the land until the soil is saturated. The surplus that cannot be absorbed by the soil flows off more slowly, and the runoff does not carry much soil with it. This helps to lower the peak flood crests.



**The runoff is clear when it flows
over grass.**

Okla-5495

Grass waterways are an essential part of a conservation program for most farms. Runoff from a farm, including the water from terrace outlets, should be carried in grass waterways. Much silt is dropped by the water as it flows over the grass. Furthermore, such waterways are usually located where gullies probably would have been except for the grass protection.



Less mud and water come from good grasslands.

Neb-1587

Experimental records show that the runoff from well-sodded grasslands is only a fraction of what it is from most clean tilled fields. The amount of mud that washes from good grassland is negligible. The records also show that the runoff from good pastures is usually less than half of that from overgrazed pastures.



Trees check erosion and runoff.

Minn-1041 B

Forests and farm woodlands play an important part in flood control. Experimental records show that well-managed forests are even more effective than grasslands in checking runoff. Most of the steep and eroding land that is unsuited for cultivation or pasture should be planted to trees.

Check dams and grass retard the flow of water and mud in gullies.



5-604

Controlling erosion and slowing down runoff in gullies are important phases of upstream flood control. The water and silt that pour out of badly gullied areas contribute a major part of the flood water and mud to creeks and rivers below. Check dams and grass, as shown here, almost completely eliminate the silt and do much to retard the runoff. Trees and shrubs may also be effective in controlling gullies.



**Grass covered roadside ditches help
protect highways and roads.**

Ark-20012-C

Highways and roads suffer heavy damage from most floods. A great part of this damage can be eliminated by providing broad grass-covered ditches, as shown here, to carry off the excess water that might undermine the road. Ditches of this type can also be used as drainageways for adjacent farms.



Some of the flood waters can be stored in farm ponds.

Neb-1514


The average farm pond will not hold all the runoff from its drainage area during the heaviest rains; but it will help. Numerous ponds on the farms of a watershed, if partially empty may help in preventing floods. Ponds may also furnish stock water and recreation and serve other useful purposes.



Dams on small streams hold back more of the flood water.

Okla-9714-B

Dams on small tributary streams, as shown here are: (1) Usually located so that they do not flood valuable farm land, and (2) give protection to the farms and towns along the smaller streams. In watersheds where a sufficient number of small dams can be constructed, much of the upstream damage can be prevented.



**Channel improvement
lessens flood damage
along some small
streams.**

C-2520

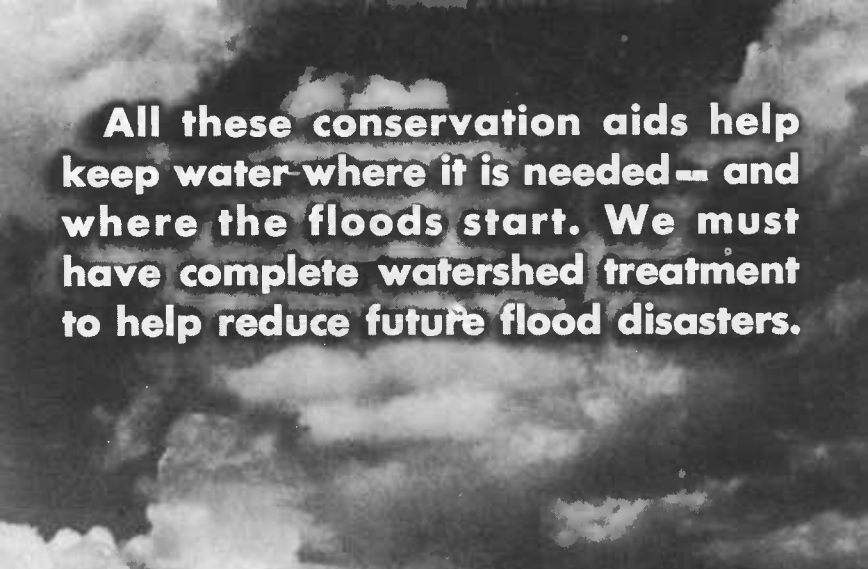
Straightening and improving channels of small streams, as shown here, does not lessen the amount of floodwater below. In fact, such improvements tend to speed up the flow of water and thus may increase flood crests below. Nevertheless, such improvements are often needed to prevent serious local damage to valuable land and buildings. Channel improvement of this type should be done only where a careful survey shows that the local benefits exceed the cost and that downstream damage will not be increased.

Stream bank protection saves farm land and helps keep the water clear.



Vt-141 B

A considerable part of the mud carried by floodwaters comes from the caving in of stream banks. Furthermore, such caving of banks may destroy valuable farm land or buildings. Stream banks can be stabilized by the proper planting of trees and shrubs and by rock riprapping, as shown here. Such work helps to lessen flood damage.



All these conservation aids help keep water where it is needed-- and where the floods start. We must have complete watershed treatment to help reduce future flood disasters.

Complete watershed treatment protects upland farms and lessens damage along the minor tributaries from the numerous local floods that occur every year at various places in the Nation and helps reduce flood crests of occasional super floods.

The photographs used in this bulletin are from the film strip "The Great Flood." Photos are available at 60 cents each from Press Service, Office of Information, U. S. Department of Agriculture, Washington 25, D. C. Checks or money orders should be made payable to "The Treasurer of the United States."

Copies of the film strip may be purchased from Photo Lab Inc., 3825 Georgia Avenue NW., Washington 11, D. C., \$1 for double frame and 60 cents for single frame. Remit by money order or check made payable to Photo Lab Inc., and forward direct to that firm.

