FLOODS IN IOWA

Floods have been a source of annoyance to mankind throughout the ages, and they still continue to be a subject of world-wide interest and study. The Biblical story of the flood is subject to varied interpretations. Science seems to deny that there was ever a great universal deluge; rather, it appears, there were local floods which brought death and destruction to the inhabitants of wide areas, giving rise to the belief that the tragedy was universal.

Man's concept of floods has changed with his knowledge of geography, geology, and history. Rocks of the Mississippi Valley tell us that this area was once under the sea. After the land had been raised above the surface of the ocean or the level of the water had become lower, great sheets of ice accumulated on the frozen stretches of the land. Water from the melting glaciers caused pre-historic floods, harmless to man at least, because he had not yet appeared.

In historical times floods have been more or less confined to the river valleys and have been caused by unusual rainfall, water from melting snow, or by some interference with the course of a stream either by nature or by man. In most areas the cultivation of large areas of the drainage basins and the deforestation of the hillsides have tended to increase the danger of floods, because the water from the rainstorms runs off more quickly. Cultivation of the land contributes to flood danger in another way. The top soil of cultivated fields is easily washed downhill into the streams and more or less of it is deposited on the bed of the stream, tending to make it more shallow and more likely to spread over its banks. Man may then interfere by building

dikes to hold the river within its banks and this, under certain circumstances, creates a major flood danger.

Historically, too, the popular idea of a flood is affected by the amount of damage done. A land without buildings, trees, or improvements is harmed very little by floods, but when man builds his home, his barn, his factory, or a public building close to the river or lays out his fields with fences, floods become threats to his safety and prosperity.

Floods may occur at various seasons of the year. In Iowa there have been floods in the spring, in summer, and in the fall. Spring floods may be caused by a melting of large quantities of ice and snow in the upland areas, before the ice goes out of the rivers. Ice gorges may be formed and these may cause rivers to rise above their banks. This may be augmented by rains of moderate intensity and may result in floods in widespread areas. Occasionally the combination of extraordinary rains on frozen ground, or with rapidly melting snow, produces a flood of exceptional violence. Spring, summer, or autumnal floods may be caused by a long-continued period of heavy rainfall over a wide area, or by a very unusual and excessive rainfall along a particular river valley, or within a restricted local area during a shorter period of time.[1]

It has long been known that Iowa's greatest floods occurred in 1851 and 1881, with somewhat lesser and more

[1] *Climatological Data* (March), 1936, pp. 27, 43. This publication has been issued under various names and by various agencies. It was first published in April, 1890, under the title *Monthly Review of the Iowa Weather and Crop Service*, in coöperation with the United States Signal Service. The following year the Iowa Weather and Crop Service coöperated with the United States Weather Bureau of the Department of Agriculture. In 1906, the title page read *Iowa Section of the Climatological Service of the Weather Bureau in Cooperation with the Iowa Weather and Crop Service*. The title was changed to *Climatological Data* in 1914. It is paged by the year, but is issued monthly. In July, 1937, the Iowa Department of Agriculture became the Iowa sponsor, having absorbed the Iowa Weather and Crop Bureau. See also *Encyclopedia Americana*, Vol. XIV, p. 545.

localized floods occurring in 1858, 1903, 1905, 1918, and 1926. With floods of major proportions in many parts of Iowa in 1947 the people of the State, especially those who suffered from the inundation, have taken a new interest in the cause, frequency, intensity, and possible prevention of floods. Floods are now recognized as the result of certain conditions not entirely beyond the control of man.

There were floods of considerable magnitude on the Lower Mississippi River in the decade of the eighteen thirties and forties, but the river valleys were not then densely populated nor richly improved. So floods were not as harmful as they were in later years. The first major flood that seriously affected the settlers of Iowa was the flood of 1851. The deluge began in May, and continued at frequent intervals for more than forty days. There were seventeen rainy days in May, twenty-one in June, and fifteen in July, but data relative to the exact average rainfall for the State for that year are not available.[2]

In the decade of the eighties, H. W. Lathrop made the statement that the "greatest amount of rain in any one year of which we have any record was in 1851, when it amounted to a little over six feet (74.49 inches)". This, however, is apparently to be interpreted as the greatest amount of rainfall at any one point, probably Johnson County, not as an average for the State. Moreover, this estimate was made by the use of a crude "rain gauge", and not by a series of scientific government testings such as are available today. The average normal annual rainfall for Iowa is about 31 inches. It is to be noted that 74 inches is far in excess of the rainfall for the State as a whole, even in the years of the most devastating floods. While these figures tend to exaggerate conditions, it seems

[2] "The Weather, Past and Present" in *The Iowa Historical Record*, Vol. I, pp. 72–75; William J. Petersen's *Steamboating On the Upper Mississippi*, p. 453.

clear that at the time of this flood, neither the memory of the oldest inhabitants nor traditional accounts from the Indians afforded any evidence of a former deluge comparable to it.[3]

Rainfall in such excessive amounts was clearly not needed. During the previous year — 1850 — there had been much more than the normal amount of rain in Iowa, so before the spring rains came in 1851, the ground-water level was high, and the first rains filled the creeks and rivers to overflowing. Nor was this condition a local one. It prevailed very generally throughout the State. Even on the narrow watershed of the Missouri slope, rain fell in sufficient quantities to create flood conditions. The greatest damage occurred, however, in southeastern Iowa, where the Cedar, Iowa, Skunk, and Des Moines rivers focused to bring flood waters from two-thirds of the State. Pioneer settlers had located along the streams, and when the floods came they found their low lands submerged.[4]

Floods and desolation were widespread throughout the State. Roads, not good at best, were rendered utterly impassable. Bridges were out, ferries were practically useless and were sometimes dangerous. Mills were unable to grind flour because of high water. Fields and gardens were submerged. Food supplies were nearly exhausted. Houses were swept from their foundations and towns and isolated communities were marooned.

In this situation four citizens of Fort Des Moines determined to go by rowboat to St. Louis, charter a steamboat there, and return with supplies. When they arrived at Eddyville they found flood conditions at their height.

[3] Tacitus Hussey's "The Flood of 1851" in *The Annals of Iowa* (Third Series), Vol. V, pp. 401, 402; *History of Johnson County, Iowa* (1883), pp. 535, 536.

[4] John E. Briggs's "The Flood of 1851" in *The Palimpsest*, Vol. XV, p. 207.

When they arrived at the hotel they tied their boat to the banisters of the hotel stairway, climbed to the second story, and ate a hearty dinner. The visitors predicted a further "three foot rise" in the river at Eddyville. In their survey of the flooded town they noted that a warehouseman had recently removed over a thousand bushels of corn from his upland warehouse to a crib near the river, convenient for shipping. The doors were left open to permit the corn to dry. Next morning the voyagers learned that their prediction of a rise in the river had come true, and that the corn in the crib had floated out of the open door, "lodging a portion of it in the picket fences near by, while on the river thousands of floating ears were bobbing up and down in the swift current or circling in golden eddies near the shore." Corn at the time is said to have been worth two dollars per bushel.[5]

From Eddyville the voyagers followed as nearly as possible a submerged stage road for the greater part of the way to Ottumwa. There they found that "every store, warehouse and residence on the low ground was partially submerged." At Iowaville — a village of "thirty houses, some stores, a blacksmith shop and hotel" — the flood had spread across the bottom land to the bluffs about a mile away. At Keosauqua, Bonaparte, Farmington, and Croton flood conditions prevailed — families were homeless and streets had become canals. At length the voyagers arrived at Keokuk and from there they proceeded by packet to St. Louis, where they chartered a steamboat and after many adventures and much difficulty returned to Des Moines with the much needed supplies.[6]

Newspapers were not numerous in Iowa in those early

[5] *The Annals of Iowa* (Third Series), Vol. V, pp. 409, 410; *The Palimpsest*, Vol. XV, pp. 213, 215.

[6] *The Palimpsest*, Vol. XV, p. 214; *The Annals of Iowa* (Third Series), Vol. V, p. 411.

days, but gleanings from such newspapers as are available indicate something of the devastation that was everywhere apparent. The *Oskaloosa Herald* for June of 1851 said:

> The destruction of property on the Des Moines river has been very great. Farms have been cleared of fences, growing crops, houses and everything of a movable nature. The river was never known to be so high before. A vast amount of grain in the cribs has been swept away. The inhabitants on the river bottoms have been compelled to desert their houses and flee to the bluffs for refuge. A number of dwellings were carried entirely away. This calamity will be doubly hard on the citizens of the vicinity of the Des Moines river, as it has not only destroyed the present crops but has taken away the old crops that were in store for the needs of the present season. Eddyville, Ottumwa, Red Rock, and the eastern part of Fort Des Moines are nearly submerged by the overflowing river.[7]

At Fort Des Moines the river reached a height of twenty-three feet above the low-water mark. Business was almost at a standstill. Ordinary occupations were suspended while citizens spent their time catching sawlogs, trees, and drift-wood, and anchoring them along the shore until the flood waters receded. In this hazardous occupation Conrad Youngerman lost his life. In some unaccountable manner his boat capsized and was swept away by the swift current and he drowned before aid could reach him. Two of his companions were saved after a hard struggle.

Several other deaths were caused by the flood of 1851. Two small boys were drowned at Red Rock. Sandert De Jong fell from a bridge at Union Mills and was swept away by the flood before bystanders could help him. Mr. and Mrs. Alloway, an elderly couple residing on the banks of the Maquoketa River, were routed from their home by the flood. Mrs. Alloway was drowned and her husband was

[7] *The Oskaloosa Herald* as quoted in *The Annals of Iowa* (Third Series), Vol. V, pp. 406, 407.

saved only by holding onto a partly submerged bush until rescuers could arrive.[8]

As the flood of 1851 was the first great deluge of State-wide significance recorded in Iowa history, so also it has remained one of the few major floods in Iowa in more than a hundred years. In a measure it became "the measuring rod of all subsequent floods."[9]

It was thirty years before there was another major flood in Iowa. Beginning with the year 1873, more reliable precipitation records were kept and comparative statistics became available. In the winter of 1880-1881 the Upper Mississippi Valley, including many parts of Iowa, had the heaviest snowfall in a quarter of a century. A blanket of snow varying in depth "from 3 to 5 feet" extended as far south as Burlington. With this heavy snowfall there were unusually low temperatures throughout the month of March and the cold weather tended materially to prevent the gradual and harmless disappearance of the snow. During the winter, too, ice formed in the western rivers to an unusual thickness. The month of April opened with low temperatures and more snow. About the middle of April much higher temperatures prevailed, causing a rapid melting of ice and snow in the northwest. These conditions, together with heavy rains along the Missouri slope and in the valley of the Des Moines River produced destructive floods in these areas.[10]

At Fort Dodge the Des Moines River overflowed, the water rising six feet in thirty hours. In Fremont County "great destruction of property and much suffering" pre-

[8] *The Annals of Iowa* (Third Series), Vol. V, p. 405; *The Palimpsest,* Vol. XV, p. 209.

[9] William J. Petersen's *Iowa: The Rivers of Her Valleys,* p. 197.

[10] "Annual Report of the Chief Signal Officer" in *House Executive Documents,* 47th Congress, 1st Session, Document No. 1, Pt. 2 (Serial No. 2015), pp. 1064, 1065.

vailed among the settlers on the bottom lands and hundreds of families were driven from their homes. The flood at that point was "unprecedented". The railroad was washed away between Hamburg and Council Bluffs. A part of Sioux City was flooded to a depth of four to six feet and the Big Sioux and Floyd rivers overflowed, causing great damage to roads and bridges. At Des Moines debris of buildings and bridges was to be seen floating down the stream for several days. At Council Bluffs the low-lying areas were completely submerged and many families were forced to abandon their homes.[11]

There were three periods during the year 1881 — in April, July, and October — when waters were at flood stage. But melting snow and ice, together with local spring rains, did not account for all of the Iowa flood conditions. The records for the year 1881 are unique in indicating that an excessive amount of rainfall in the State of Iowa as a whole was recorded for five different months, and it appears that 1881 was the only year between 1873 and 1947 in which the maximum monthly rainfall throughout the State was attained twice in one year. February, 1881, normally a relatively dry month, had a rainfall of 3.10 inches. In October, likewise usually a comparatively dry month, the rainfall in 1881 was 6.42 inches. In June there was a rainfall of 7.37 inches — a record which has rarely been exceeded. In July the rainfall amounted to 5.33 inches. September recorded 7.14 inches. The total record for the year was 44.16 inches — almost one and one-half times the normal rainfall.[12]

In April, flood conditions prevailed at Davenport, where

[11] "Annual Report of the Chief Signal Officer" in *House Executive Documents*, 47th Congress, 1st Session, Document No. 1, Pt. 2 (Serial No. 2015), p. 1065.

[12] Data compiled from *The Monthly Review of Iowa Weather and Crop Service*, later *Climatological Data*.

the Mississippi River rose to a height of 18 feet 8 inches above the low-water mark. "From Harrison street to the bridge the water rushed into the stores until it stood from 2 to 7 inches in all." Reimers & Fernald, at the corner of Perry and Front streets, had four inches of water on their floor. "J. S. Wylie & Co. were driven out of their office by 7 inches of water, and north of Third street in that part of town, the flood was general. . . . At the foot of Harrison, Main, Brady, Perry, Rock Island, and Iowa streets, and from the north side of Front to the river there was all the *debris* of a flood — timbers, logs, driftwood, boards, brush and immense cakes of ice."[13]

The April floods were local, but the months of June and July brought greater deluges and more widespread inundations. In Des Moines the month of June, 1881, is recorded as the wettest month in the history of that city, with a rainfall of 15.79 inches. On June 19th and 20th of that year, in a single twenty-four hour period, there was a rainfall of 5.14 inches. This was never exceeded until June 12, 1947, when there was a rainfall of 5.42 inches in a single twenty-four hour period. More significant, however, is the rainfall for the entire State for the two months of June and July, 1881, which aggregated 12.7 inches — a condition that created flood stages in many parts of the State.[14]

The *Iowa Weather Report* for June, 1881, reveals that precipitation was high throughout Iowa except in the northeast area. "The highest rainfall occurred in southeastern Iowa; from seventeen inches at New London, Henry county, it diminished in all directions, exceeding twelve inches at Iowa City, Grinnell and Des Moines." Heavy rains, exceeding two inches in one day, occurred in nearly all of

[13] *The Davenport Gazette* as quoted in *The Iowa City Weekly Republican*, April 20, 1881.

[14] *The Des Moines Register*, June 29, 1947.

southern Iowa, causing floods in creeks and rivers. In some parts of southeastern Iowa there were nineteen rainy days in June. On June 28th, flood conditions prevailed at Iowa City. The local newspaper there reported that never before in the history of the city had so much damage been done by a single rainstorm. Ralston Creek was flooded, with fences, board sidewalks, and other debris floating rapidly downstream. The bridge over the Burlington, Cedar Rapids & Northern Railroad track, east of Iowa City, was washed out.[15]

Excessive rainfall continued through June and into July and flood conditions were widespread by the middle of that month. In his weather report for July, Gustavus Hinrichs said: "The principle storm days were the 6th, the 9th and 10th, and the 17th. The rain-fall of the 6th was quite abundant from Sac and Greene counties over Story and Marshall to the northeast of Iowa. But the great flood of the rivers of middle and southeastern Iowa was due to the excessive rain-fall of the 9th and 10th, giving nearly 12 inches at Ames and about 11 inches at Marshalltown; that is, from 1100 to 1200 tons of water to the acre in Marshall and Story counties. The rain-fall during these two days exceeded five inches in a broad belt running through middle Iowa, and expanding mainly in the middle valley of the Iowa, but reaching up to the northeast, causing a local flood at McGregor." This was the most extensive flood in Iowa since 1851.[16]

Flood conditions prevailed on a State-wide basis and continued through a greater part of the month of July. Early in the month the valley of the Des Moines was flooded. It was there that Kate Shelley performed her act of heroism.

[15] *Annual Report of the Iowa Weather Service,* 1881, p. 97; *The Iowa City Weekly Republican,* June 29, July 13, 1881.

[16] *Annual Report of the Iowa Weather Service,* 1881, p. 113.

Kate, aged fifteen, lived with her widowed mother in the valley of Honey Creek, beside the Chicago and North Western Railroad, about half a mile from the Des Moines River, and near the town of Moingona. On the night of July 6, 1881, Honey Creek and the valley of the Des Moines River were flooded. Kate's father, M. J. Shelley, had been a section foreman, and Kate knew the perils of railroad men on such a night. Watching the storm from her window, she saw the "pusher" — the auxiliary engine from Moingona — move onto the bridge of Honey Creek and suddenly disappear. The engine and crew had become victims of the flood. Worse still was the danger to a passenger train soon due to arrive at Moingona. Braving the storm, Kate crawled across the long wooden bridge that spanned the Des Moines River, and hastened to Moingona to report the ravages of the flood. She arrived at the station in time to flag the on-coming train, with its many passengers, and in time for the rescuers to return to Honey Creek to give aid to the train crew at the Honey Creek bridge. The flood of July 6, 1881, on Honey Creek and in the valley of the Des Moines River still remains a significant and memorable event in Iowa history.[17]

But flood conditions were more widespread. On the 9th and 10th of July, Story and Marshall counties were flooded. As the crest of the waters moved downstream, cities farther south and east were in peril. On July 12th, Mayor W. A. Morrison of Iowa City received a dispatch from Marengo warning him of a four-foot rise in the Iowa River. He promptly issued the following proclamation:

A great flood threatens! Overflow of the lower parts of the city. Marengo under four feet of water. The flood may reach here before morning. Be on your guard so as to move on approach of danger.

[17] Jacob A. Swisher's "Kate Shelley" in *The Palimpsest*, Vol. VI, pp. 45–55.

The Iowa City Republican press immediately struck off five hundred posters which were distributed to residents along the river. The next morning the river had risen, as had been predicted; it had overflowed its banks and spread out over the lowlands. "Far out in the stream stood the orchards and out-buildings which but a short time before had been high and dry." At nine o'clock in the morning the gauge at the north bridge, now known as the Park Bridge, marked seventeen feet above the low-water mark. The road leading to the south bridge, the Benton Street Bridge, being lower than the one farther north, was covered with water to a depth of about two feet.

At Coralville the dam at Miller's flour mill was destroyed, and thirty feet of the north wall of the paper mill was washed out into the river. At Marengo "the river rose to an unprecedented height and the town was submerged." Because of flood conditions a drowning occurred in Old Man's Creek at Lytle City in Iowa County.[18]

The flood season did not end with July. August was a month of about normal rainfall, but September and October were excessively wet. There were more than seven inches of rain in September and, reporting for October, Mr. Hinrichs said:

> The total precipitation averaged over six inches throughout Iowa, which is fully three times the normal value for October. Hence rivers have been very high, in fact we are having the third flood for this year . . . The most extended high rain-fall occurred during the early hours of the 17th throughout the eastern two-thirds of Iowa; over two inches fell generally from Story to Muscatine and Jackson, and down to Wayne and Van Buren counties.[19]

Thirty years had elapsed between the flood of 1851 and the flood of 1881, and there were many who believed that

[18] *The Iowa City Weekly Republican*, July 20, 1881.

[19] *Annual Report of the Iowa Weather Service*, 1881, p. 161.

floods came in thirty-year cycles. They prophesied another great flood for the year 1911. As the years passed, there were brief periods of great precipitation and now and again there were flash floods in local areas. January, 1886, was the wettest January in Iowa history, with almost three inches of rainfall in a month that is normally relatively dry. In May, 1888, there was a rainfall of more than 6½ inches — a record that exceeded all former reports. In 1892, Iowa had the wettest May in history with a rainfall of 8.77 inches. In 1896 a flash flood at Bellevue carried away the mill dam, leaving the mill to be operated in more recent years by other means.[20]

On the night of August 15, 1898, a storm of great intensity occurred in Des Moines County. This storm and the damage done by it were later discussed before the Iowa Academy of Science under the title "*The August Cloudburst in Iowa*". The storm was confined to about two-thirds of Des Moines County, or an area of about 250 square miles. Unfortunately there were no rain gauges in this area, but it was estimated that over an area of some fifty square miles the rainfall was about sixteen inches. This is perhaps an exaggerated report, but at all events there was an unprecedented deluge. Twenty-three county bridges were swept away by the flood, and the Burlington, Cedar Rapids and Northern Railway lost five bridges and two miles of track.[21]

The year 1902 affords a unique record in the fact that during a five-months period — May to September inclusive — there was excessive rainfall. The record is as follows: May, 5.39 inches; June, 7.16 inches; July, 8.67 inches (the wettest July in Iowa history); August, 6.58 inches; and

[20] Jacob A. Swisher's *Iowa: Land of Many Mills*, p. 102.

[21] "Destructive Floods in the United States in 1905" in U. S. Geological Survey's *Irrigation Paper*, No. 162, p. 31.

September, 4.35 inches. The total rainfall for the year was 43.82 inches — one of the high records of all times.

The year 1903 produced a total rainfall of less than 36 inches, but there were periods of heavy precipitation, and there were occasions when local flood conditions prevailed. "Excessive May rains sent the Des Moines over its banks on June 1, 1903, paralyzing traffic in Ottumwa and the vicinity, driving 8000 persons from their homes and causing damage to the extent of $100,000. The maximum discharge at Ottumwa was 100,000 cubic feet per second on May 31st, while at Keosauqua the flow measured 97,000 cubic feet per second on June 1st. Eldon was partially under water. In Van Buren County the damages exceeded $200,000. Tributary streams were also on the rampage: the Raccoon overflowed at Valley Junction and the Boone was out of its banks at Webster City. On June 6, 1903, the Des Moines discharged 70,000 cubic feet per second into the Mississippi, which was 26.2 per cent of the total flow of the two streams. This was the highest proportion recorded between 1903 and 1927." The high water of 1903 had a crest of 24.5 feet at Ottumwa and 25.0 feet at Tracy simultaneously.[22]

A phenomenal rainfall over a comparatively small area was the "ten-inch cloudburst", which fell upon the Devils Creek Valley in Lee County on June 9, 1905. The little stream, twenty-one miles in length, was quickly transformed into a raging torrent that discharged 85,000 cubic feet of water per second. The Mississippi River rose eight feet in nineteen hours, and stood within three feet of the high-water mark of 1851. As a result of this storm numerous bridges were washed out, railroad embankments were carried away, and flood conditions prevailed throughout

[22] Petersen's *Iowa: The Rivers of Her Valleys*, p. 198; *Climatological Data*, 1935, p. 47.

that area. A newspaper in Fort Madison reported that that city was "virtually off the map", there being no communication by railroad, telegraph, or telephone with the outside world. This was one of the heaviest rainfalls, for a 24-hour period, ever recorded in Iowa.[23]

It is interesting to note that the year 1911 — the year which marked the end of the thirty-year cycle, and the time at which it was prophesied there would be another major flood — was in reality a very normal year, with 31.37 inches of precipitation. In September, there was excessive rain — 13.73 inches at Bloomfield — and Davis and Louisa counties were temporarily flooded, but there was nothing that resembled a State-wide major flood. September, 1914, was another period of great precipitation. The average rainfall for the State during that month was 7.22 inches. The greatest amount reported from any one station was 16.24 inches, at Lenox, in Taylor County. The greatest amount in any twenty-four consecutive hours was 7.78 inches at Cedar Rapids on September 14th. At Des Moines 3.24 inches of rain fell in one hour and forty minutes. This was one of the heaviest rainfalls for a brief period ever recorded in Iowa. But the rainfall recorded did not produce a major flood.[24]

In 1916 there was a spring flood in northeastern Iowa, due chiefly to the rapid melting of snow in Minnesota, which caused a rapid rise in the Upper Mississippi River. At Dubuque the Mississippi rose from a level of 10.4 feet to 18.1 feet. This was the highest recorded in that area since 1888. The flood crest had scarcely passed down the Mississippi, when heavy rains in Wisconsin sent new flood waters down the Wisconsin River, causing the Mississippi to rise

[23] "Destructive Floods in the United States in 1905" in U. S. Geological Survey's *Irrigation Paper*, No. 162, pp. 24, 29; Petersen's *Iowa: The Rivers of Her Valleys*, p. 169.

[24] *Monthly Review of the Iowa Weather and Crop Service*, 1911, p. 127; *Climatological Data*, 1914, p. 89.

to a height of 19.8 feet at Dubuque. Factories and mills were compelled to close down, business houses sustained heavy losses, families were driven from their homes, and thousands of acres of farm lands were under water. Flood conditions prevailed also at Clinton, LeClaire, Davenport, Muscatine, and other river towns. But even this did not take on the proportions of a major flood.[25]

In 1918 there were flood conditions in certain areas of the State, and some writers concluded that another major flood had come — seven years after the time for which it was prophesied. Writers who took this viewpoint asserted that there had been three great floods in Iowa — in 1851, 1881, and 1918. In support of this viewpoint one needs only to examine the records for Hardin County, for Marshall and Tama counties, for Jasper and Poweshiek, or for counties to the south and east of these areas, where flood waters from the north overflowed the river banks farther downstream. Flood conditions prevailed at Iowa City because of heavy rains in Hardin, Marshall, and Tama counties. The greatest amount of rainfall was at Monroe in Jasper County where 10.19 inches of rain were recorded. The greatest amount in twenty-four consecutive hours was 5.37 inches at Monroe on June 24th. The weather report for June 11, 1918, records that:

> Excessive rains . . . caused much damage by overflow and erosion, particularly in central tiers of counties, extending from the Missouri nearly to the Mississippi; also in some of the south central counties. In the Skunk, Iowa, and Cedar valleys, many bridges were washed out, the damage running into the hundreds of thousands of dollars.

Perhaps the greatest damage caused by flood waters occurred in Marshall and Hardin counties where bridges and

[25] *Climatological Data*, 1916, p. 43.

railway embankments were washed out in the vicinity of Marietta and Abbott.[26]

In reality, however, the floods of 1918 were not State-wide. While there were areas where flood conditions were comparable to the floods of 1851 and 1881, yet, in general, it was not a flood of equal or comparable proportions. If the State as a whole is to be considered, the year 1918 is not to be regarded as a period of major flood. By and large, it was a year of minor floods, for there were only three or four comparatively small areas in the State where the monthly rainfall for June — the flood month — exceeded ten inches. Indeed, the annual precipitation for the State as a whole was only 32.78 inches.[27]

More and more as we read the records of the past we are impressed by the fact that floods are not universal nor even State-wide. Almost every year some small areas are temporarily flooded. Viewed from the standpoint of the local reporter or historian these may be classified as major floods, but viewed on the wider scale they do not assume that proportion.

The year 1919 was another season of comparative, though not excessive floods. The total average rainfall for the year reached 36.73 inches — four inches in excess of the 1918 record. Moreover, the precipitation for the period from February to April inclusive was greater than it had been in any like period in a period of 30 years. Charles D. Reed, Iowa meteorologist, reported in May, 1919: "Flood stages prevailed on the Mississippi River below LeClaire during the first part of the month with a crest stage of 17.4 feet at Keokuk on the 8th."

[26] *Climatological Data,* 1918, pp. 63, 64, also map on page 70; *Annual Report of the Iowa Weather and Crop Service,* 1918, p. 64; *The Marshalltown Times-Republican,* May 30, 31, 1918.

[27] *Climatological Data,* 1918, p. 144; *Water-Supply Bulletin* No. 1. (Summary of Yearly and Flood Flow Relating to Iowa Streams, 1873–1940), pp. 48, 49.

On the Missouri River "moderate stages prevailed" and on the Des Moines River flood conditions existed only in the area below Ottumwa. Flood conditions continued at Ottumwa in June and the Des Moines River rose to "within 2.1 feet of the flood stage at Boone." Rain fell "at a record breaking rate at Dubuque on July 9, drowning 7 persons, injuring a number of others and damaging property to the amount of $125,000." On October 4th, at Dubuque "the second excessive and damaging downpour of rain this year occurred." The damage amounted to about $60,000.[28]

In 1920 conditions were again conducive to the development of a spring flood. The interior rivers were frozen until toward the middle of March. Moderately high water prevailed after the break-up, but the flood stage was not reached except on the Des Moines below Tracy in Marion County to some distance below Ottumwa, where floods were due to the formation of ice gorges. At Ottumwa a crest stage of 12.3 feet was reached. The Mississippi River was likewise flooded, with the highest water at Dubuque since the year 1888. The weather report for April relative to this area said: "For over a week the railroads fought the flood, and scores of carloads of material were used in building temporary dikes to keep the water from undermining the tracks. The same was true of the ice companies along the river bank, whose ice houses were threatened." But only temporarily and over comparatively small areas did flood conditions prevail.[29]

The year 1924 again brought flood conditions to Iowa. The month of June that year had the greatest average precipitation of any June of record for the State as a whole — 8.10 inches. In the central area there was a rainfall of 9.20 inches and in the southern section 9.7 inches. The greatest

[28] *Climatological Data*, 1919, pp. 43, 53, 67, 82, 119, 151, 152.

[29] *Climatological Data*, 1920, pp. 31, 45.

amount of rainfall, 14.92 inches, occurred at Cumberland in Cass County. Following the heavy rains of the 23rd and 24th of June many miles of railroad track were inundated in Carroll, Guthrie, Audubon, Shelby, Harrison, Pottawattamie, and Cass counties in the western portion of the State, and in Monroe and Wapello counties in the southern area. All railroads in the western portion of the State were injured, but the Chicago, Milwaukee & St. Paul Railway was the greatest sufferer, having about sixteen miles of a roadbed washed out in a stretch of about seventy-five miles north of Underwood in Pottawattamie County. Serious floods followed the rainfall of June 28th. The Chicago, Rock Island & Pacific Railway suffered the greatest loss, with ten miles of track and two bridges out between Grinnell and Iowa City. Damages at Marengo were estimated at $200,000. Much damage was done to crops in the area around Wapello, Columbus Junction, and Burlington.[30]

The year 1925 was a period of spring freshets and flash floods. A series of four heavy rainstorms visited northeastern Iowa in June, resulting in floods which took a toll of ten lives and cost in damages to property, including livestock, prospective crops, highways and bridges, railway trackage and bridges, and town properties, a total of approximately $1,888,000. The Maquoketa River freshet was perhaps the most damaging, due to its being the largest stream in the flooded area, and due to the fact that the three towns, Manchester, Dyersville, and Cascade, each of considerable size and each directly in the storm area, were badly damaged.

At Manchester one-third of the city was under water. There were two deaths as a result of the flood, and property damages were estimated at $200,000. At Dyersville the entire west end of town, including 100 residences, was inun-

[30] *Climatological Data,* 1924, pp. 41, 45.

dated. The Illinois Central and the Great Western depots were flooded for the first time in history. A bridge, 120 feet in length, was moved 900 feet. Three cars of lumber were lost. Total damages were estimated at $100,000. In Cascade the water was reported as being five feet higher than it had been in 1896, the greatest previous flood in that area. Seven residences and stores, a number of out-buildings, and one church were reported as "completely demolished".[31]

The year 1926 gave to Iowa the wettest September in history, with an average State-wide rainfall of 9.76 in a single month. Unprecedented rains caused floods over a large part of Iowa. At Sioux Center 11.52 inches of rain fell in fourteen hours and thirty minutes. At a point near Red Oak in Montgomery County, in the Nishnabotna drainage basin, 5.75 inches of rain fell in nineteen hours. At Centerville 4.56 inches of rain fell in about eighteen hours. Floods of almost equal proportions occurred in central, in northwestern, and in eastern portions of Iowa. The Des Moines River at Tracy reached a stage of 16.3 feet and at Ottumwa a height of 12.3 feet, 2.3 feet above flood stages at that point. Damages along the Des Moines River alone were placed at $100,000 and the total flood damages in Iowa during the one month of September, 1926, were estimated at between $4,000,000 and $5,000,000.[32]

In March, 1929, widespread floods embraced practically all the river valleys of Iowa — typical and extensive spring floods. The abnormally heavy snowfall of January and February had melted very little, except in the southern district. Over most of the central and northern portions of the State there was little thawing until the second week of March. With the advent of mild weather a rapid thaw set

[31] *Climatological Data,* 1925, pp. 45, 46, 47.

[32] *Climatological Data,* 1926, pp. 65, 67, 69, 71, 98, 100.

in and within a week most of the snow was melted. The ground was still frozen and could absorb very little water and this made conditions ideal for producing floods in many portions of the State. Charles D. Reed, in his weather report for that month, said:

> Never before, at any time, had there been as high stages on the Nishnabotna and Cedar rivers. The worst situation developed on the interior rivers, and practically all streams within the State overflowed at some part of their courses. The first serious flood developed on the Nishnabotna river, and the situation was the worst in Fremont county. At the same time the Boyer river was also at flood stage, and the situation on both streams was aggravated by the formation of huge ice gorges that destroyed bridges, damaged highways, caused washouts and carried away farm property. The Raccoon river at Van Meter had been frozen continuously until the 11th, but with the rapid thawing a gorge formed that caused a rise to above flood stage overnight, and continued above flood stage for eight days, with a crest stage of 18.5 feet, just a few tenths less than the record stage.

Flood conditions prevailed also along the Des Moines, especially at Tracy and at Ottumwa. But according to the report of Mr. Reed:

> The Cedar River experienced probably the worst condition. Floods were reported throughout its course, but the situation was the worst at Cedar Rapids and Waterloo. The crest stages were reported to have been the highest ever experienced at these points. The principal industrial plants were forced to suspend, business houses were flooded, and many homes abandoned. At many places power plants and water works were forced to suspend, and great inconveniences were experienced due to the lack of light and water. High water was also experienced in the Iowa, Maquoketa, Wapsipinicon and upper Iowa rivers, but by the manipulation of dams and use of dynamite at the proper times, the situation was kept well under control.

Flood conditions also prevailed along the Mississippi River, particularly at Muscatine and Keokuk.[33]

[33] *Climatological Data*, 1929, pp. 17–21.

Local floods were experienced on the Little Sioux River in April, 1932, and on the Big Sioux in September, 1933, but these were not widespread, nor as devastating as other floods had been.[34]

June, 1935, witnessed flood conditions again in the valley of the Des Moines, with a stage of 20.1 feet at Tracy and 15.45 feet at Ottumwa. From Des Moines to Eldon it was estimated that 40,000 acres of land were inundated. Many highway bridges were damaged and some of the paved highways were submerged. The town of Eddyville was cut off from highway communication, except north to Oskaloosa. The river was a mile wide in several places where at moderate stages it was less than 500 feet wide. At Eddyville 100 men used 14,000 bags of sand to raise a levee to prevent an overflow. In Ottumwa 80 families were driven from their homes and quartered in 50 tents with 150 cots supplied by the Iowa National Guard. "The Milwaukee railway bridge across the waterworks channel was held down by a train of cars loaded with coal", and the Morrell Packing Company moved 2,500 head of cattle from a feed yard along the river to a place of safety.

The year 1936 brought new spring floods. At the close of the cold and snowy winter practically all of the winter precipitation remained as a possible source of flood waters. Ice of record thickness had formed in the streams, and some, like the Floyd River, had frozen to the bottom, so there was a minimum of winter discharge through the streams. A sudden rise in temperature caused a quick melting on the surface and many areas were flooded before the rivers were open. The Nishnabotna, Boyer, Little Sioux, Floyd, and Big Sioux were all involved in the area, as were also the Raccoon and Des Moines. These floods were due

[34] *Climatological Data*, 1932, p. 35, 1933, p. 71.

chiefly to winter precipitation and when the ice was out of the rivers in the spring the flood season was over.[35]

In July, 1940, local floods in northeastern Iowa caused damages estimated at $300,000. In May, 1941, flood conditions prevailed in northeastern Iowa, particularly in Winneshiek, Mitchell, Floyd, Butler, and Howard counties. And in September of the same year there were floods along the Maquoketa and Wapsipinicon rivers. Losses in that area were estimated at $641,000.[36]

On the night of July 6, 1944, excessively heavy rains fell over the lower Floyd River and the Perry Creek valleys. Both streams rose sharply and overflowed, but the Perry Creek flood caused the greatest damage, which was estimated at $750,000 in Sioux City. The flooded area was relatively small, but for the most part it fell within the city limits of Sioux City, which made the losses excessively high considering the area covered.[37]

The rains and floods of 1947 set new records in Iowa, against which rains and floods will probably be measured for years to come. The months of April and May had been wet, and the ground was already water-soaked when the June rains began. During the early days of June high waters from heavy rainfall blocked several eastern Iowa highways, and washed out at least two sections of railroad track — the Chicago and Rock Island Railroad between Reinbeck and Morrison and between La Porte City and Washburn.

Highway 218 was blocked between La Porte City and Washburn. Highway 34 was flooded between Albia and Ottumwa, also Highway 8 between Dysart and Traer, and Highway 63 in Black Hawk County and south of Traer in

[35] *Climatological Data,* 1935, pp. 47, 48, 1936, p. 27.

[36] *Climatological Data,* 1940, p. 60, 1941, pp. 41, 62, 95.

[37] *Climatological Data,* 1944, p. 82.

Tama County. Highway 14 north of Marshalltown was also under water.[38]

Hundreds of acres of farm land in river bottom areas were under water. Johnson County was the State's "chief flood zone", as the Iowa River spread out over the lowlands to a width of a mile and a half at the widest point. The Amana Colony in Iowa County suffered heavy losses. More than a hundred acres of Amana wheat and oats were under flood waters, and other hundreds of acres of pasture lands were flooded.[39]

On June 6th *The Des Moines Register* displayed the headline: "Boat Upsets in Flood: 7 Saved." "Swirling, muddy waters", the newspaper said, continued "to overspread central and southern Iowa". Wide sections of the State "were paralyzed after a series of cloudbursts and all night rainstorms."

"Seldom in Iowa's century-old history had there been such a water-soaked spring, and never as far back as weather bureau records go had there been so much rain in the lower Raccoon and lower Des Moines river valleys." Most heavily damaged among the larger cities of the State was Ottumwa. There on June 7th, the Des Moines River "surged to its historic all-time record of 20.2 feet" — 11.2 feet above flood stage.

Early in June three deaths were reported as a result of the flood. Lee C. Anson, 39, Muscatine power-line foreman, was electrocuted while repairing storm damages at Nichols. Keith Howell, 10, drowned at Iowa City while playing near the Iowa River. Mrs. Jack Hamilton of Independence was killed when the car in which she was riding plunged into a bridge washout.

[38] *The Des Moines Register*, June 2, 1947; *The Des Moines Sunday Register*, July 20, 1947.

[39] *The Des Moines Register*, June 5, 1947.

Because of flood-cut highways near Indianola, three airplanes were used on June 5th to carry the *Des Moines Tribune* to that community. At Ottumwa, families left their homes in the Central Addition and were taken to the barracks at the U. S. navy airbase; the Red Cross provided food. At Glenwood flood damages were estimated at $200,000.[40]

By June 6th Eddyville was virtually submerged. "Water was so high that the river gauge was covered, but the stage was approximately 27.8 feet. Entire population of 900 persons had to leave. Most of the business and residential districts were under 8 to 12 feet of water. All highways were blocked."

At Red Rock the crest was reached on June 6th. Mass evacuation had started the previous day, but some residents were caught and had to be rescued on the 6th. Water rolled six to ten feet deep through the main street as the flood reached its height. The townspeople found refuge in a church on high ground some distance back from the river.

By June 8th more than one-third of the city of Ottumwa was under water. Men and women struggled for survival in the flooded section of the city. "They clung to the keels of capsized boats, struggled in deadly swirls of brown water from the flooded Des Moines river, and called for food from homes eaves-deep in the flood in the south part of the city". There was no electric light, or power, no gas, and no drinking water available except that being sent in by truck.

> Water, water, everywhere,
> Nor any drop to drink.[41]

Just as the residents of Ottumwa had begun to have hopes of better weather, other and more devastating floods

[40] *The Des Moines Register*, June 6, July 20, 1947.

[41] *The Des Moines Register*, June 8, July 20, 1947.

arrived. On June 16th *The Des Moines Register* said: "The relentless Des Moines river is inflicting its second major blow in eight days on the battered and soggy city of Ottumwa." It was estimated that 9,000 people were homeless — 1,000 more than had been driven from their homes the previous week. Other rivers that were at flood stage were the Iowa, Cedar, Wapsipinicon, Maquoketa, Nishnabotna, and the Raccoon.[42]

Floods continued to rage throughout a greater part of Iowa during most of the month of June. On June 24th Fort Dodge experienced the worst flood in its history, when the flood crest reached a height of 16.5 feet — roughly 13 feet above the normal level of the river. At Jefferson the flood crest reached a height of 22.5 feet. As the flood waters moved downstream Des Moines was again seriously flooded, and an estimated 1,800 families were homeless. All in all the flood of 1947 was the most devastating in the history of Iowa.[43]

FLOOD PREVENTION AND CONTROL

Floods are quite generally regarded as disastrous and devastating, and indeed, in many respects, they are. But even floods sometimes have some compensating values. The valley of the Nile River is widely known for its fertility, and rightly so, due in a large measure, to the annual floods. Each year the rich soil from the hilltops and surrounding areas is washed by floodwaters down into the valley, making it a veritable garden. Valleys, the world over, are made rich in the same manner. Indeed, there is a Hindu proverb which declares that: "One good flood is better than a hundred baskets of manure."[44]

When the first pioneers came to Iowa they found that the

[42] *The Des Moines Register*, June 15, 1947.

[43] *The Des Moines Register*, June 24, 26, 1947.

[44] H. L. Mencken's *A New Dictionary of Quotations*, p. 407.

rains and floods of a thousand summers had been carrying rich silt into the river valleys. Pioneers tended to settle along the rivers because of the accessibility of water, the proximity of timberland, and the great fertility of the soil. Throughout the history of more than one hundred years Iowa settlers have continued to seek homes in the river valleys, for there is to be found the richest soil of the State.

But frequently floods of greater or less intensity come to the river valleys, and land made rich by the deposits carried in by floods is rendered temporarily of little or no use. Indeed, if valuable improvements are placed in the low lands, great property loss and even the loss of human lives may result. Moreover, the greater part of the soil carried away by floods is not deposited in the valleys of Iowa, but is carried on down to the Gulf of Mexico. Hence Iowans, as citizens everywhere, are deeply interested in the problems of flood prevention and flood control.

Floods, it seems, may be looked upon as inevitable. When rains fall in excessive quantities, at frequent intervals, over a considerable period of time, flood waters are bound to accumulate. How best to avoid or control them and how to minimize their disastrous effects is a problem to conjure with. A knowledge of floods in a given area may be especially valuable to settlers in that region. If a man knows that his land is subject to overflow he may devote it to such uses as will minimize his losses. The fertility of the soil may compensate for an occasional crop loss, but costly permanent improvements in the same area may not be economically sound. Hence one of the ways to reduce flood losses is to place permanent improvements on the high lands and leave the low-lying lands to other uses.

Moreover, a knowledge of the frequency and intensity of floods in a given area is valuable to engineers. If a bridge is to be built across a river, with the expectation that it will

stand for a period of fifty years before being replaced, the engineer should know the anticipated frequency and height of floods in that area. With this knowledge he may be able to build the bridge high enough and strong enough to withstand any except the most unusual floods.[45]

When individual owners have exercised due care in the construction of permanent improvements in places of security, and when construction engineers have built roads and bridges in accordance with their best knowledge and judgment, there still remains much to be done in the realm of flood prevention and flood control. Indeed, it may be said that floods have a lesson for us all — a lesson in the conservation of resources.[46]

If one looks at a map it may appear that the rivers are laid down by design, so that the water upstream may have an unimpeded pathway to the sea. But in reality rivers are not laid out by design. They are carved out of the soil and the rock by the water itself, as it follows the line of least resistance in its journey to the sea. In Iowa, as in many other areas, rivers are of various types, and they are in various stages of development. Some have deep channels which seldom overflow, others have shallow channels that traverse wide areas of low land and frequently overflow. In some instances the best method of avoiding damage by flood waters is to build securely on the high land and surrender the low land in so far as may be required. In other cases a well-planned program of flood prevention and flood control is essential.[47]

One widely advocated method of flood prevention is that

[45] George H. Hickox's "A Study of Iowa River Floods at Iowa City", (Manuscript thesis, 1926), pp. 1, 2.

[46] "National Flood Control" in *The Nation,* Vol. CXXV, p. 467; *The Outlook,* Vol. CIII, pp. 749, 750.

[47] *Scientific American Supplement,* December 19, 1914, Vol. LXXVIII, pp. 392–394.

of building dams to make reservoirs and artificial lakes where flood waters may be restrained for a period of days or weeks, the excess being let out slowly in accordance with the capacity of the channel to receive it. But reservoirs and artificial lakes are exceedingly costly and at present seem to belong to the Federal government. Governmental problems tend to become political problems. Thus when rivers get out of their banks they frequently get into politics. Despite this fact, however, this type of control, to some extent, seems inevitable. Indeed, it is already here. In 1938, Congress passed a $386,500,000 Flood Control Bill, authorizing many public works on rivers and harbors to eliminate floods. An additional $285,000,000 was vetoed in 1941.[48]

Two major reservoir projects in Iowa have received much consideration — one on the Des Moines River near Red Rock in Marion County, and the other on the Iowa River near Coralville in Johnson County. Colonel W. N. Leaf, District Army Engineer, expressed the view that a dam at Red Rock would have saved Ottumwa, Eddyville, and Red Rock from major damages in the devastating floods of 1947. Similar opinions have frequently been expressed relative to the proposed dam near Coralville. Indeed, it is believed that the major losses throughout Iowa could have been avoided if dams that have been proposed had been in operation.[49]

But there is opposition to the reservoir system, and it is widely recognized that it is not a solution of the whole problem. A large reservoir would take many thousands of acres of farm land out of production. Public utility companies oppose the reservoir system of flood control, since dams for

[48] "The Flood-Control Fight in Congress" in *The Literary Digest* (December 24, 1927), Vol. XCV, p. 8; *The World Book Encyclopedia,* Vol. VI, p. 2472.

[49] *The Des Moines Register,* June 15, July 3, 1947.

flood control are not ideal for water power and utility officers contend that the construction of flood control dams would prove to be a "disappointment". With the thousands of tons of silt that is washed in annually from the surrounding areas, artificial lakes will tend to be filled in and dams will become less and less effective as the years go by. Dams and lakes will need constant attention to make them most effective. The building of reservoirs may also necessitate the rerouting of highways or railways.

As opposed to the reservoir plan, or in coöperation with it, conservationists would "hold the water back on the land where it falls". "Slow the run off water down to a walk", is their theory. They advocate "grass waterways", "farm ponds", terracing, contour plowing, and "strip cropping". Reservoirs and dams would cost millions and take years for construction. Other methods, say the conservationists, can be employed at once, and at relatively little cost. But despite the arguments to the contrary it appears that the building of dams and reservoirs constitutes one solution and that the promotion of them is inevitable.[50]

In flood protection for local areas a method which is frequently employed is that of building levees, dikes, or walls in an effort to retain the flood waters within a relatively narrow channel. This may, in a large measure, solve the problem for any given area, but it does not assist other threatened points in the same manner as reservoirs would do. In fact the protection of one area may jeopardize another by increasing the flood height.

An example of what may be done by levees in an emergency is shown in the experience of the city of Council Bluffs in the spring of 1944 when more than 700 workmen were called into action to re-inforce seven miles of levee with 175,000 bags of sand. The task was a gigantic one, but

[50] *The Des Moines Register*, June 15, 1947.

it saved the city from what might otherwise have been a disastrous flood. But dikes and levees, at best, are for local protection and are more or less temporary in nature. They may break when the pressure is greatest and thus fail at the time they are most needed.[51]

In June, 1947, when the floods in Iowa were at their height a $15,000,000 emergency flood relief bill was introduced in the United States Senate. Senator Bourke B. Hickenlooper described the extent of flood damages suffered in Iowa and other sections of the Mississippi and Missouri river valleys and urged the necessity for immediate action to assure repair of damaged protective works. The bill was quickly made into law. This law did not, however, provide relief for individual losses, neither did it provide for the construction of major flood prevention projects. The money was designated for the repair of dikes, levees, and other government-constructed protective works that had been damaged by the flood.[52]

Supplementing the work of dikes and levees large pumps are frequently used to keep overflow waters from flooding buildings or to relieve the pressure at particular points where costly buildings or equipment have been placed in lowland areas. Such methods were employed at the Iowa Memorial Union at the State University during the flood season of 1947. It is reported that a small boy, who had accompanied his father to the scene of action at the Union where pumps were being used, asked why the workmen were pumping water back into the river when it was "already too high".

In addition to dikes, levees, and supplementary pumps, spillways or floodways are sometimes constructed. These

[51] *The Encyclopedia Americana,* Vol. XIV, p. 546; *The American City,* Vol. LVII, August, 1943, p. 44.

[52] *The Des Moines Register,* June 19, 1947.

are in effect channels parallel to the main stream. When the river rises to flood stage it will overflow into the floodway which will carry the water off into the Gulf. By this means the capacity of the stream may be substantially increased. Spillways have been used successfully in the lower Mississippi Valley, but they have not been used extensively in Iowa.[53]

Flood prevention and flood control is a problem of ancient origin and one which has been of interest to Iowans for over a century. Various plans of relief have been suggested — reservoirs, dams, dikes, levees, and spillways. No one of these remedies seems to afford a complete answer. A combination of these may approach a solution. However, it appears that all such direct methods of approach should be supplemented by a thoroŭgh-going soil conservation program, which, indeed, seems to strike at the root of the whole problem.

In 1943, Dr. Hugh H. Bennett, Chief of United States Conservation Service, supported the contention that "the universal adoption of soil conservation practices in this country would increase our food production by at least 20 per cent". Moreover, "such practices could virtually wipe out the menace of disastrous floods."

Dr. Elmer T. Peterson writing for the *Saturday Evening Post* said: "All you have to do to end erosion, supply our fields and pastures with life-giving moisture and prevent the annual catastrophe of accelerated floods is to stop the water where it falls." Floods are usually thought of as affecting only inhabitants of the lowlands. But in reality the effects of floods are much wider than that. It was estimated that in the June floods of 1947 in Iowa more than 102,000,000 tons of top soil were washed from 5,000,000 acres of sloping land which was under cultivation. Thus it

[53] *Louisville Herald-Post* as quoted in *The Literary Digest*, Vol. XCV, p. 8.

is not only the lowlands, but often the highlands and the sloping fields, that suffer loss. The best soil on the hilltop is frequently lost in floods. In the opinion of conservationists everywhere, the best single solution to the problem of flood control, indeed the only sound economic solution, lies in a well-developed program of soil conservation.[54]

A survey of floods in Iowa during the past one hundred years presents interesting data, and lessons of value for us all. There have been a few great losses — floods of 1851, 1881, and 1947, and many lesser ones. Floods of greater or lesser intensity seem to have been more numerous in recent years than formerly. This seeming increase in floods, however, may be more apparent than real. In recent years, Iowans have becomme increasingly flood-conscious. They have become more and more aware not only of the existence of floods, but of the methods of prevention and control as well. One reason for this increased interest lies in the fact that in some lowland areas, populations have increased and homes and costly improvements have been erected, thus increasing the potential damages that may result from floods. Moreover, in recent years there have been adequate government reports and extensive newspaper discussions as well as radio comments relative to floods. All of these tend to stimulate an awareness that floods are, at present, inevitable and destructive.

Fortunately this awareness helps to develop an interest in flood prevention and flood control, in so far as these are humanly possible. The floods of a hundred summers have cost Iowa many lives and many millions of dollars. The situation calls for the coöperation of all agencies which can contribute to the reduction of flood losses in the future.

JACOB A. SWISHER

THE STATE HISTORICAL SOCIETY OF IOWA
IOWA CITY IOWA

[54] *The Saturday Evening Post*, August 21, 1943, p. 16.