DEVELOPMENT of the FEDERAL FLOOD CONTROL of the MISSISSIPPI RIVER

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Submitted by

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Foreword

The greatest natural enemy of the people of the United States has been the floods of the Mississippi River. This vast fertile valley constitutes the greatest garden spot of the world. From early times this valuable land has lured men by its tremendous potentialities for which they have been willing to fight almost insurmountable difficulties.

For many years the riparian owners carried on their struggle to conquer this region, unaided by the government. Then parishes, counties and states began their fight.

Finally it became evident that this colossal system of internal improvement was a problem for the Federal Government.

This program of Federal Control has expanded until now it has assumed practically all the responsibility.

It is my purpose to trace the development of the ever increasing need of Federal Control of the Mississippi River and to point out the great economic losses incurred by the lack and delay of such control.

Many theories have been advanced, many controversies have occurred. I mention the outstanding ones as they have affected the development of the program of Federal Control.

Acknowledgments

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L. M. F.

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Chapter I

Historical Sketch of Early Beginnings of Flood Control of the Mississippi

Development of Federal Flood Control of the Mississippi River

Historical Sketch of Early Beginnings of Flood Control of the Mississippi

The exact date of the beginning of national interest in the control of the Mississippi River has not been established. History tells us that the flood problem extended back to the native Indians of the lower valley. An early account of De Soto's expedition tells us that the great inundations in the Mississippi Valley forced the Indians to use only the highest ground on which to build their homes. In places where no high ground could be found the floods forced them to build huge earthen mounds with flat tops on which they could live during the flood season. Several of these mounds are in existence today in the delta region. Many of them have connecting elevated runways, apparently for the purpose of communication during floods. De Soto's men gave an interesting account about an Indian chief's house on one of these gigantic mounds. This house was surrounded by palisades and a village of huts encircled the foot of the mound.[1]

1 John B. McMaster--History of People of United States, p. 143

Photograph from Acme News Pictures

FROM THE AIR THIS MOUND LOOKS LIKE A GIANT TURTLE

In flood times, it is believed, the early Indians used such mounds as places of refuge. For decades past, whites and their livestock have fled to them during high water. This mound is near Greenville, Mississippi.

"The Great Mississippi Flood of 1927"
The National Geographic Sept. 1927--p. 261

The first white men learned from the natives that floods made yearly appearances which proved very destructive. From the very birth of our nation the disposition of the waters of the Mississippi Valley furnished one of the difficult problems. Each year the river took heavy tolls while the settlers prepared plans for defense against inundations.

France, Spain, England, and the United States figured prominently in the control of this important stream, which all seemed to recognize would play a most important part in the history of the entire continent and incidentally the world.

The settlers from Europe knew a better way to control the river than to build mounds. They knew the value of levees. The Pharoahs built levees along the Nile. The Europeans had built levees along the Po before 1300 A. D. Holland made extensive use of levees. The Danube, Rhine, Rhone, and Volga rivers had levees for protection against floods before 1700 A. D.[1] Thus the Europeans had the advantages of experience in flood control before coming to America.

The disposition of the lower Mississippi valley furnished one of the difficult problems during the negotiations at Paris (1783) in making the treaty that recognized the independence of the United States. The question of the control of the Mississippi, however, was not settled at Paris.

England, Spain, and France continued to struggle over

1 B. G. Humphreys' Floods and Levees of the Mississippi River p. 16

their interests in the valley. Intrigues of these nations among the inhabitants of the Western frontier especially in Kentucky and Tennessee, and the Indians of the valley, gave evidence that these nations were willing to take great risks to secure a foothold there. The attitude of these western settlers gave rise to a very critical situation in the early development of the United States. The Western settlers threatened to withdraw from the Union and ally themselves with whatever nation was in control of this important waterway, so essential did they consider the navigation of the Mississippi to their development and welfare. This dispute extended over a period of years. The Pickney treaty of 1795 temporarily settled the right of deposit at New Orleans. The attitude of the people of the United States showed convincing evidence of a national interest in the valley far beyond the question of navigation toward the transfer of Louisiana from Spain to France in 1800.[1]

Thomas Jefferson wrote to James Madison in May 1801 that the transfer of Louisiana to France would prove "very ominous to us."[2] In his message to Congress in 1802 Jefferson stated that the transfer of Louisiana by the San Ildefonso Treaty seriously affected the interests of the United States.[3]

Meanwhile the people of the United States talked and

1 Frederic Ogg's Opening of Mississippi, p. 423
2 Henry S. Randall's Life of Thomas Jefferson, Vol. III p. 6
3 Ibid

wrote much about the natural right of the Free Navigation of the Mississippi. They repeatedly pointed out the "grave dangers of permitting a European nation to establish a strong colony in the lower valley".[1]

This interest of the people of the United States became so tense that Jefferson determined to secure control of at least the east bank of the river. When the opportunity presented itself Jefferson committed an act "beyond the Constitution" by purchasing the whole of the Louisiana Territory. That Jefferson should take such a step, furnishes proof that the people of the United States were seriously concerned in the control of the Mississippi.

The purchase of Louisiana indicated an interest in a condition out of which would grow a favorable attitude toward Flood Control. The Federal Government appeared to take an interest in the problem of floods from the date of the Louisiana purchase.

From the early settlement of Louisiana the people of the lower valley gave much time, effort and money in an attempt to solve the problems of the great inundations.

Bienville selected the site for New Orleans because the land there was above water when he arrived, while all the surrounding territory was inundated by the Mississippi River.[2] This New Orleans settlement suffered heavily from

1 John B. McMaster's History of People of United States, p. 803
2 Rightor's Standard History of New Orleans, p. 171

annual spring floods. While the other settlements lower than New Orleans were "almost destroyed by mighty floods".[1]

The settlers at New Orleans began the construction of levees on the banks of the Mississippi in 1717. "Ten years later, Governor Perrier announced proudly that New Orleans had a levee a mile long and eight feet wide, that within another year the embankment would be extended above and below the city for a total distance of eighteen miles."[2]

In 1812, when Louisiana became a state, the levees extended 155 miles on the east bank and 185 miles on the west bank of the Mississippi. The cost of these 340 miles of levees has been estimated at $6,000,000.[3]

One of the conditions of the grants by which the early settlers received the land from the King of France, obliged the planters to build levees.

"In 1743 the Governor of the territory promulgated an ordinance that required the inhabitants to complete their portions of the levees by January 1, 1744 or forfeit their grants as penalties."[4] Such facts give proof that a governmental interest existed in the protection of the lower valley of the Mississippi long before Louisiana became a state. The national interest, however, during the first half of the

1 Lyon Saxon's Father Mississippi, p. 121
2 Humphrey and Abbott's Hydraulics of Mississippi River, p. 150
3 Tompkin's Riparian Lands of the Mississippi River, p. 22
4 Lyon Saxon's Father Mississippi, p. 139

nineteenth century, was directed to the improvement of navigation, rather than flood control. The demands of the early settlers of the lower Mississippi were not directed toward improved navigation because the type of boats used at that date did not need an improved river. These early settlers were interested in free navigation. The coming of the steamboat and its development created a demand for the improvement of navigation, especially on the Mississippi River.

In 1820 Congress appropriated $5,000 for a survey of the Ohio and Mississippi Rivers for the purpose of determining the most practicable way of improving navigation. No attention was given for flood protection. Two young army engineers, S. Bernard and Joseph G. Totten were chosen to make the survey.[1]

"These engineers concluded that the only way to prevent the accumulation of snags was to construct dykes to prevent the lateral currents."[2] They reported that the levees on the lower river served both as protective works against floods and as a preventive against lateral currents. These engineers believed that while the levees had been built as protection against floods, they also served to improve the navigation. Thus while navigation improvement remained the chief consideration of those interested in the welfare of the Mississippi Valley, flood control became of

1 17th Congress--House Doc. No. 35, 2nd Sess. 1823, p. 3
2 House Report No. 300, pt. 2, 63rd Cong. 2nd Sess., p. 21

increasing interest. Appeals were made before Congressional Committees in 1827. The Federal Government began to do some work in the improvement of the river through members of the Corps of Engineers. In 1831 this committee urged the Federal Government to continue the development of the river commerce.[1] Again in 1843 the Senate Committee of Congress urged improvement of the river by Federal Government. In 1846 John C. Calhoun introduced a bill in the Senate for the improvement of the Mississippi.[2] As late as 1855 the Senate engaged in a lengthy debate concerning improvement of the Mississippi without mentioning Flood Control. These complaints came chiefly from merchants and owners of boats. This powerful group of business men demanded river improvement in aid of navigation. They gave graphic accounts of the exceedingly heavy losses from wrecks of river boats due to the boats striking snags.

The land owners said little. Every movement for improving navigation meant the construction of more levees, which would protect their lands from inundation.

In 1845 a Convention of Southern and Western States assembled at Memphis for the purpose of considering means of the entire section.[3] John C. Calhoun presided over this important meeting. He pleaded for the control of the Miss-

1 Senate Document No. 72, 21st Cong. 2nd Sess. 1831, p. 7
2 Cong. Globe, 29th Cong., 1st Sess., 1846, p. 1028
3 House Report No. 300, pt. 2, 63rd Cong. 2nd Sess., p. 12

issippi floods by the Federal Government. He took particular caution to say that flood control was not internal improvement.[1]

Henry Clay proposed a resolution directing the Secretary of the Treasury to have "an estimate made of the probable expense of constructing a levee on the public land on the western bank of the Mississippi and the southern bank of the Red River; the probable effects upon the health and prosperity of the country----and the probable quantity of public land that might be reclaimed by such works."[2] The increased valuation of the lands that could be drained and reclaimed furnished great inducement to those who favored internal improvements for voting for this resolution.

In 1848 Abraham Lincoln argued in favor of the Federal Control of the Mississippi.[3] In 1855 considerable discussion took place in the senate over another bill to improve the Mississippi. Senator Robert Toombs made a very strong argument against internal improvements by the Federal Government.[4] All this agitation helped to create favorable public sentiment for the project.

Meanwhile the movement for flood control by the Federal Government developed. Through the efforts of the individual riparian proprietor, through parishes, through counties, the

1 Flood Control Hearings 1916, p. 12
2 House Document No. 11, 24th Cong., 1st Sess. 1835, p. 3
3 House Committee on Flood Control, Hearings 1916, p. 17
4 Cong. Globe, 34th Cong. 1st Sess., pt. 3, 1855, p. 1908

levees grew in length and strength. As various states in the lower valley came into the Union they enacted statutes for regulation and supervision of levee building. [1]

The planters in the valley were enabled by slave-labor to build most of the levees at the least possible cost. Most of the work could be done at odd times and during seasons when there was little farm work.

Counties and parishes went so far as to make appropriations for levees, as it became apparent that the riparian owners could not cope with the task. This aid was too small to amount to much.

Conventions had met on several occasions in the valley states for the purpose of promoting the interests of the Mississippi Valley Flood Control. These conventions were composed of leading men such as Abraham Lincoln, Thomas H. Benton, John C. Calhoun, and Horace Greeley. [2] Daniel Webster predicted in 1850 that "ere long the strength of America will be in the Valley of the Mississippi." [3]

Congress required that all such problems be investigated, but little came of such investigations except an increase of public interest in flood control.

As early as 1845, John C. Calhoun suggested the assigning of certain public lands to the states concerned to be used for the purpose of flood protection. [4]

1 Flood Control--Commercial Document No. 5, House Com., p. 94
2 House Report, No. 300, pt. 2, 63rd Cong. 2nd Sess., 1914, p. 22
3 Manufacturers Record, Vol. 91, June 2, 1927, p. 69
4 B. G. Humphrey's Floods and Levees of Mississippi River, p. 29

The sentiment in behalf of flood control by the Federal Government grew very rapidly from 1840-1860. A series of bad floods made it evident that the problem was too large for the planters. Two severe floods in 1849 and 1850 caused serious damage and created much complaint from the delta people. The problem had gone beyond the capacity of the parishes and counties, it seemed too great for even State governments. The inadequacy of the existing levees convinced a large number of Congress that the time had come when the Federal Government should give some aid to the people of the Mississippi Delta.

First Aid from Federal Government

The first aid from the Federal Government for Flood Control on the Mississippi River came in 1849 and 1850. The first aid applied only to Louisiana. The second to several states. By these acts Congress granted to the several states the swamp and overflowed lands within their borders unfit for cultivation and provided that the proceeds from the sale of the lands must be spent for drainage and flood protection. The chief cause for these donations was flood control, although drainage and reclamation were important considerations.[1]

Louisiana received the largest share with Arkansas next. Several states that had no serious flood problems received donations of large acreages. Illinois, Minnesota, and Wisconsin were among the large beneficiaries, each received more than Mississippi. The swamp and overflowed land acts of 1849 and 1850 could not be considered strictly as flood-control legislation, yet they did represent the beginning of Federal aid for Flood Control.[2]

In 1850 Congress passed another act which "directed a topographical and hydrographical survey of the delta of

1 Rightor's Standard History of New Orleans, p. 173
2 Flood Control--House Committee Bill 8219, p. 13

the Mississippi River with such investigation as might lead to determine the most practical plan for securing it from inundation." [1] Congress then appropriated a sum of $50,000 to carry out the provisions of this act. Two years later this appropriation was increased by another $50,000.

These two appropriations made possible two surveys and two reports. "The report made by A. A. Humphreys and H. S. Abbott, engineers of the United States army under the title of the Physics and Hydraulics of the Mississippi River still remains one of the most weighty authorities on any of the Mississippi River Problems." [2] The second report which was less scholarly than that of Humphreys and Abbott, resulted from a survey of Charles Ellet. The Ellet report preceded the other by ten years. It was the result of the first study by the Federal government for the purpose of determining how to control or to prevent destructive floods on the Mississippi River. [3] In this report Ellet concluded that the control of the Mississippi floods was the duty of the Federal Government.

Prior to 1849 the Federal Government had not recognized in any material way the responsibility that rested

1 1922 House Committee Hearings on Flood Control, p. 180
2 Ibid
3 Senate Executive Document No. 20, 32nd Cong. 1852, p. 2

upon it to aid the local governments and individual property owners in control of floods. In this report Mr. Ellet contended that "fairness dictated that the first Congressional aid should be extended to the area from the Red River to the Gulf of Mexico."[1] He further stated that increased cultivation and improved drainage in the upper valley areas had caused the increased flood heights. "The process by which the country above is relieved is that by which the country below is ruined."[2] Mr. Ellet further recommended that Congress aid in building levees and that it should also investigate the advisability of constructing reservoirs and diversion channels.

Mr. Humphreys began the work with Mr. Ellet but he was obliged to return North to regain his health. The report of Humphreys and Abbott which came in 1861 was the result of ten years of research and profound study. Every phase of the problem was covered in a most scientific manner. Meanwhile the states of the lower Mississippi Valley had showed increased interests in the problem. Many problems arose in which the necessary protective works overlapped county or parish lines. Protective works had to be constructed in some places for the protection of areas

1 Senate Executive Document No. 20, p. 98
2 House Committee on Flood Control--70th Congress--Doc. No. 5 p. 107

in other counties or parishes. The states were forced to revise their laws to make them more uniform and to meet more effectively the problems arising in the solution of so great a problem. The states created Levee Districts and Levee Boards. The first Levee Board was created almost immediately after the swamp and overflowed land act of 1850.

The acts of Congress in 1849, 1850 and 1852 represented the first actual beginning of Federal Control. This beginning of Federal Control may be attributed to the importance of President Taylor's attitude toward advancing the interests of this great movement. President Taylor came from Louisiana where he owned a large plantation which had suffered from floods. "His knowledge of actual conditions gave him an insight to the problem that must have had much influence on his ideas concerning it." [1]

By 1858 the Mississippi had levees for a total distance of two thousand miles along the two banks. The average height had reached from eight to ten feet, while the width at the base was from fifty to seventy feet. The people of the lower Mississippi had spent more than $40,000,000 in building that levee line. [2]

1 Congressional Record--45th Congress, 3rd Sess. 1879, p. 503
2 Congressional Record--43rd Congress--part 5, p. 4654

Louisiana had most of the levees, as she had spent more than all other states together.

The people of the delta had come to feel quite secure by 1858 behind their extensive line of defense. But in the fall of 1858 and the winter and spring of 1859 occurred the worst flood they had ever known in the history of the Mississippi Valley. This great inundation tore through the levees by numerous crevasses and devastated most of the delta area.[1]

This general destruction of the levee system at the time when the people expected it to be powerful enough to cope with any flood, gave conclusive evidence that the flood control works must be built higher and stronger, that the problem was too great for them to cope with. The local governments naturally turned to the Federal Government with this great problem.

1 American Railway Engineering Association Vol. 29, p. 11

Chapter II

Creation
of the
Mississippi River Commission

Creation of the Mississippi River Commission

The lower valley states of the Mississippi River enjoyed prosperity during the years 1850 to 1857. This period of prosperity resulted largely from the increased returns from the cotton crops, the general prosperity of the section and the land acts of 1849 and 1850.[1] Because of this prosperity the planters along the river used their increased funds for the further protection from floods.

The levees were more rapidly extended than in any former period. The embankments were constructed very rapidly and often very poorly. No opportunity for testing this poorly constructed work was given until the great flood in the spring of 1859. The people believed th t the levees would offer ample protection. Great was their disappointment when the flood waters poured upon them through twenty-five miles of crevasses and left the people of the delta in an impoverished condition. These victims would not be defeated and courageously began the great and burdensome task all over again with more determination than ever to continue to fight this great enemy.

1 Floods and Levees of the Mississippi River--Humphreys, p. 22

So impoverished were the people that they began to make urgent appeals for Federal Aid. "By 1861 their case appeared to be in a good position before the select committees of the House and the Senate which had been appointed to consider the problem."[1] All chances of success collapsed when the great Civil War turned the people of this nation to that great catastrophe. This calamity struck the delta section a staggering blow which stopped all work of rebuilding and extending levees. Naturally the riparian owners and their slaves turned their efforts to the service of their states.

Levees must have constant care to keep them from rapid deterioration. The war forced the land owners to abandon them. Four years of neglect caused serious loss to the levees from natural causes. Other destructive forces added to their deterioration. Both armies destroyed the levees whenever there appeared to be any military advantage to do so. The delta people themselves found it necessary to destroy their own construction works, which had cost them enormously in labor, capital and former losses. This must be done for the defense of their homes. The Union army destroyed the great Yazoo and Huspuckena levees in an effort to reach Vicksburg from the rear.[2] These levees

1 Rand-McNally Bankers' Monthly, Feb. 1915, Vol. 33, p. 15
2 Congressional Record--70th--part 6, 1st Sess. 1928, p. 4947

were the finest in the delta. The Yazoo Pass embankment was thirty-eight feet high, and had been constructed at an enormous cost to the people who erected it.

To add to their distress there occurred during the Civil War and the period of reconstruction a series of exceptional floods, the most remarkable ever recorded in our history. Great floods came in 1858, 1859, 1862, 1865 1867, 1874 and 1882.[1] Each flood found every levee in worse condition than the previous one, each flood therefore wrought greater havoc than the preceding one. Crevasse after crevasse occurred and mile after mile of levees fell into the river with caving banks. By 1878 hundreds of miles of the main line had disappeared or had been abandoned.[2] The value of the levees for defense against floods in 1878 was but a small fraction of their value for that purpose in 1858. Then for "two decades their conditions grew worse and worse until great floods went through and over them without restraint."[3]

Destruction, and ravages of war and floods had wrought havoc with the levees, yet as soon as the war ceased, the delta people bravely began to repair and rebuild them. This task was an extremely difficult one. The economic disaster could hardly be estimated. Farm

1 Floods in Lower Mississippi Valley--I. M. Cline, p. 5
2 House Committee--Flood Control--70th Cong.--Comm. Doc. 1 p. 21
3 Mississippi River Improvement--R. S. Taylor, pt. 1, p. 6

lands in Arkansas, Louisiana and Mississippi were valued at almost four times as much in 1860 as they were in 1870.[1] Farm lands had to bear most of the burden of replacing the levees. "The people of the delta in an effort to protect themselves against floods taxed a large part of their lands to such a degree that they passed out of their possession and back into the possession of the States where they yielded no revenue."[2]

By 1870 more than half of the lands of the fertile Yazoo Basin which in 1861 had been valued at $100 per acre for woodlands, had been forfeited by the owners to the States because the taxes could not be paid.[3] This burden was too great for those who retained their lands to bear. Conventions were called by the owners in many localities to discuss this great problem in their efforts to devise a solution; if possible. "They seriously considered the advisability of abandoning the whole fight and permitting the river to run at will over their former productive fields."[4] It appeared they would be compelled to surrender, either to the river on the one hand or to dire poverty on the other. They had never known the time when an enemy had not compelled them to fight for their

1 63rd Congress--House Report No. 300, part 2, 2nd Sess. p. 19
2 Floods and Levees of the Mississippi River-B. G. Humphreys, p. 19
3 Ibid--2
4 House Committee Hearings--Flood Control 1916, p. 12

lives, homes, and property. Yet, they were reluctant to leave what had been their homes and surrender to their great economic disaster.

To add to their plight of distress the Federal Government added a severe blow to the people of the lower Mississippi. Congress levied a tax of three cents per pound on cotton during the years 1868, 1867 and 1868.[1] At this inopportune time such a tax was unbearable for the delta people. Funds for levee construction had to come largely from the cotton lands. At the request of the Secretary of the Treasury, Congress repealed the tax.

The Mississippi Commission

Flood protective works had been constructed by poorly managed organizations. On the very eve of the outbreak of the war, legislative steps had been taken for the organization of Levee Boards. As soon as the war ceased the people developed the organization of these boards to renew their fight.

The State of Louisiana granted a charter to the Louisiana Levee Company and then contracted with that company to build and repair levees. "The law provided for the location of all levees by a Commission of Three

1 B. G. Humphreys--Floods and Levees of Mississippi River, p. 23

Engineers. One member of this Commission was to be selected by Louisiana and one was to be detailed from the Corps of Engineers of the United States army by the President of the United States. The third was an employee of the corporation. That appears to have been the first official participation of a representative of the Federal Government in the actual Construction of Flood Control Works." [1]

Fortunately the movement for Federal Government participation in flood control had developed rapidly during the decade prior to the war. The war had been over only a short time when the Secretary of War, Edwin M. Stanton, showed an active interest in repairing and rebuilding the levees. [2]

On December 1, 1865, Mr. Stanton directed General A. A. Humphreys to investigate and report on the repairs to the levees necessary to prevent great injury to the agriculture in the delta. On June 11, 1866 Congress directed Chief of Engineers to report and furnish an estimate of the amount of money that would be required to repair the breaks. This report was made by General Humphreys in 1866. [3] General Humphreys re-

1 Federal Program of Flood Control on the Mississippi--A. D. Frank, p. 33
2 Riparian Lands of Mississippi River--Tompkins, p. 212
3 Senate Executive Document No. 8--40th Congress, 1st Sess. 1866 Program of Flood Control, A. D. Frank, p. 34

ported that "he found many miles of levee line missing and many more miles in such condition that repairing them would be practically rebuilding of the levees."[1] He strongly urged the necessity of aid by the Federal Government, by stating, "the proper establishment of levees requires some authority entirely beyond the influence of local interests."[2]

President Johnson, in his second annual message urged Congress to pass legislation which seemed necessary for the preservation of the levees of the Mississippi River. He further stated that the maintenance of strong barriers against the floods on the Mississippi River was of the greatest national importance to both production and commerce. He put the emphasis upon the flood control phase of the problem, yet he further emphasized the importance of removing "all obstructions to free and safe navigation" of the Mississippi.[3]

Much activity took place in both houses of Congress during the three years following the war. On July 2, 1866 the Senate Select Committee reported that it believed that the Federal Government would have to aid in rebuilding the levees in order to prevent serious damage to the delta.[4] The Senate Committee on Finance reported

1 Senate Executive Doc., No. 8, Cong. 1st Sess. p. 2
2 Ibid, p. 12
3 J. D. Richardson, Messages and Papers of the Presidents, p. 3652
4 Congressional Record--43rd Congress part 4, 1st Sess. p. 3243

on March 27, 1867 that it was satisfied of the "constitutional power and expediency and good policy" of granting aid in the construction of levees along the banks of the lower Mississippi.[1] This Committee reported the recommendation of the expenditure of $3,000,000 for the construction of levees.[2]

The House of Representatives on July 22, 1868 passed a resolution instructing the Committee on Roads and Canals to inquire into the property of making the levees of the Mississippi a national highway or otherwise so improving them as to protect them at the expense and to the advantage of the public.[3]

Three days later, the Senate resolved to instruct the Committee on Commerce to make inquiry concerning the "expediency of taking measures by the General Government to rebuild the levees upon the lower Mississippi which were destroyed during the late war."[4] A resolution was also passed to instruct the Committee to report by bill or otherwise at the next session of Congress.

Meanwhile many bills were introduced into Congress by those who favored Flood Control. Although many died, yet they created much discussion and favorable comment. The method of financing that received considerable

1 Congressional Record, 43rd Cong. 1st Sess., pt. 4, 1874 p. 3243
2 Ibid.
3 Congressional Globe, 40th Cong. 2nd Sess. 1868, p. 180
4 Congressional Globe, 40th Cong. 2nd Sess., pt. 5, 1868 p. 4335

attention was to have the Federal Government guarantee State bonds, the proceeds from which would be used in building levees.[1]

Then followed the gray days. There came a period of about five years during the reconstruction in which little interest was shown. Few bills were introduced. In 1871 Representative L. A. Sheldon of Louisiana introduced a bill proposing to charter a Corporation of Private Capital to build a levee from Cape Girardeau, Missouri to Fort Jackson, Louisiana.[2] This corporation would also build a telegraph line on the levee and a railway along the side of it. Ownership and management were to remain with the corporation; the supervision of both Construction and Maintenance was to be under the Engineers of the United States Army. The original investment of the United States under that plan would have been a subsidy of $16,000 per mile in all a total of $18,000,000.[3]

In 1870 Congress established an agency which has long ago proved its value as a source of data on floods. This agency was the United States Weather Bureau.

In 1873 Senator James L. Alcorn of Mississippi

1 Congressional Globe--40th Congress part 5, 1868, p. 1670
2 Ibid--2nd session part 1, p. 823
3 Ibid--2nd session part 1, p. 283

introduced a bill which provided for an issue of United States bonds for $36,000,000 to be spent in the construction of levees on the banks of the Mississippi for the reclamation of twenty million acres.

Following the Civil War the people of the delta resorted to the frequent use of right of petition in their efforts to get the question of Flood Control before Congress. From various sections and organizations of the South memorials and petitions were frequently presented before Committees in bulletins and on the floors of Congress.

In the spring of 1874 a serious flood again caused severe losses and widespread suffering. During this flood Congress appropriated $90,000 for the relief of the sufferers. This was one more step toward Federal Control. Serious floods always moved Congress to feel the necessity of an investigation into the causes and remedies. Immediately following the floods of June 1874 President Grant approved an act creating a commission of engineers "to investigate reclamation of the alluvial basin of the Mississippi River subject to inundation."[1] This commission was composed of three engineers from the Corps of Engineers of the United States Army and two eminent Civil Engineers actively

1 Congressional Record 43rd Congress 1st session part 4, p. 317

engaged in the profession. The President soon appointed the commission with General G. K. Warren as chairman, and the sum of $25,000 was appropriated for its use. The report of the Warren Commission, made in 1875, showed considerable study of conditions in the delta and of the problems of floods. It did much to hasten the trend toward Federal Control of Floods. This report proceeded to give reasons why the Federal Government should engage in the control of the Mississippi Floods. General Warren estimated that after the flood of 1874, in some states the gaps in the levees equaled from one-third to one-half the entire length of the levees. He further stated that the Southern States were so impoverished that neither the local riparian proprietors nor the states could do much toward solving the problem unaided by the general government. General Warren's report encouraged members of Congress who favored Federal Control and stimulated the growth of public sentiment. During the period of reconstruction Captain James Eads came into national prominence as an authority on hydraulics.

During this period there were those who favored the improvement of navigation on the Mississippi. While the navigation interests and the flood control interests

had quite different objects in view, they both favored levees in the locations. This made their bond the stronger. Members of Congress had long argued the right and duty of the Federal Government to build levees on the Mississippi to improve navigation, but at the same time denied the right or duty to build the same levees in the same places to protect against floods. Other members of Congress took the position that since levees built for one purpose would serve for the other, they should not be so particular in defining the exact purpose for which the levees should be built.[1]

The recommendation of the engineers for the construction of levees for improving the river to aid navigation was very fortunate for the delta people.

Those interested in navigation had influence of their own. This influence caused Congress to appropriate money for the improvement of the river.

In 1878 the rivers and harbors bill provided one million dollars for aiding navigation of the Mississippi. The money was spent by the Board on the Improvement of the Mississippi River under the supervision of the Corps of Engineers of the United States army. The membership of that board was composed of army engineers who favored

1 Congressional Record--43rd Congress 1st session part 4, p. 3246

levees for improving navigation.[1] In this way, the engineers of the United States army were actually improving the river by favoring levees for the aid of navigation. The opinions of the army engineers were held in high regard by members of Congress.

The creation of the Mississippi River Commission in 1879 which put the United States definitely into flood control work, stands as "the most important piece of flood control legislation in all of our history."[2] This act made it the duty of the Commission "to take into consideration and mature such a plan or plans and estimates as will correct, permanently locate, and deepen the channel and protect the banks of the Mississippi River, improve and give safety and ease to the navigation thereof, prevent destructive floods and promote and facilitate commerce, trade, and the postal service."[3]

The debate on the bill in Congress not only showed that the navigation interests dominated but that the flood control people camouflaged their efforts in behalf of their plans to use the Commission for the purpose of controlling floods.

Some frankly supported or opposed the bill as a

1 Floods and Levees of the Mississippi River-B. G. Humphreys
2 House Committee on Flood Control--1916, Hearings p. 8
3 Ibid, p. 8

flood control measure; some paid attention only to the phase that dealt with navigation; still others like James A. Garfield, supported the bill and encouraged the expenditure of money both for flood control and improvement of navigation.[1]

Those who stressed the navigation phases of the bill presented arguments to show the great need for better transportation as a means of lowering freight rates and breaking monopoly of railroads.

Those who stressed the flood control urged the national interest in the delta. The administration forces favored the bill apparently in behalf of both flood control and navigation. The bill lead to a lengthy and heated debate. It was charged that the Commission created by the bill "would reflect the opinions of the Corps of Engineers of the United States army" which meant that levees would be the only means of flood control with any chance of adoption. Representative John H. Reagon of Texas led a successful fight to secure an amendment that compelled the Commission to consider other means of control.[2] This amendment made it a duty of the Commission to give due consideration to reservoirs, outlets and other means of flood control.

1. Congressional Record 46th Congress 1st session part 2, p. 2282
2. Ibid--45th Congress 3rd session part 3, p. 74

Thus, these two factors seeking different ends by the same means, combined to pass the act that created the Mississippi River Commission, an agency that has carried out the flood control program of the Federal Government to the present time.

Progress of the Mississippi River Commission--1879--1927

By the creation of the Mississippi River Commission in 1879, Congress officially recognized its share in the control of the Mississippi floods.

1879 marked the beginning of systematic efforts on the part of the local governments as well as the part of the nation.

The people of the delta had made renewed efforts about 1875 to rebuild their dilapitated levees; but, they still worked in the old independent and disorganized way. From the Civil War to 1879 they had spent approximately five million dollars.[1] Because of the lack of organization they had little to show for their efforts and expenditures.

Meanwhile, the United States Government had been spending considerable money on the improvement of the Mississippi, yet, it had nothing to do with Federal Control. All Federal funds prior to the creation of the Mississippi River Commission had been under river and harbor control and had been spent wholly for channel and harbor improvement. These two jurisdictions worked independently of each other.

1 Congressional Record 47th Cong. 1st Sess. pt. 4, p. 3215

When the Mississippi River Commission was created, the states responded to the Federal legislation by the creation of Levee Boards. The Mississippi River Commission and the Levee Boards thus took up the work of a century of levee building of the most disorganized manner.[1] Levees then existing had been built by the most crude methods, they had been neglected and wilfully destroyed during the Civil War, and by a series of floods which had followed the war thousands of miles of levees had been practically annihilated.

The organizations had little with which to commence work. The Mississippi River Commission had to establish standards for its work without any accurate data.[2] The first projects were confined to two small reaches of river totaling seventy-two miles in length, and were designed to aid navigation.

The first three years the work of the Commission was limited to repairing the levees. All the needed repairs, and many miles had been destroyed leaving extensive gaps. In 1884, the Commission began its policy to strengthen levees to prevent further breaks.[3] In 1895 the Commission again changed its policy and decided to aid in the construction of new levees. The first Federal aid in the construc-

1 World's Work August, 1927, p. 409
2 House Committee on Flood Control 70th Cong. 1st Sess. 1927, p. 22
3 Mississippi River Commission, Report 1884, p. 287

tion of new flood control works under the Mississippi River Commission was in the St. Francis Basin.[1]

The Mississippi River Commission consists of seven members, three of whom are appointed from the Engineers Corps of the United States Army, three Civilians, and one from the United States Coast and Geodetic Survey.[2] It has power only to initiate plans. The law creating the Mississippi Commission did not provide for actual construction. On August 19, 1879 the first meeting of the Commission was held for the purpose of organizing plans to carry out the provisions of the act of that year.[3] Actual construction had to await appropriations from Congress. Originally, the jurisdiction of the Commission for the construction of works, was limited to the main river from the mouth of the Ohio River to the Head of the Passes; for surveys and investigation it had jurisdiction to the headwaters. Jurisdiction was extended from time to time, until by 1926 the Mississippi River Commission had control over construction on the main river from Rock Island, Illinois to the Head of the Passes, and on tributaries in so far as they influenced floods on the Mississippi River.[4]

1 Engineering and Contracting Vol. 53 Jan. 14, 1929, p. 36
2 Cong. Record 47th Cong. 1st Session pt. 3, 1882, p. 2942
3 Ibid
4 House Com. on Levees and Improvements, Hearings 1906, p. 2

The Commission held three or four meetings annually. Two of the meetings consisted of inspection trips of about ten days.

Administration committees have been created, such as the levee committee or dredging committee. The river itself has been divided into districts as administrative units. The Secretary of War details any required number of engineers to supervise the work of contractors. The Commission does not do the actual construction.

In the matter of levee building the Commission's jurisdiction has been in a large measure superseded by the state. At first levee building was purely a local function with Federal authority confined strictly to matters concerning navigation. The people of the delta saw that when the Federal government succeeded in actually aiding in construction, some agency having wide powers must represent the jurisdiction of the state. Therefore, the various states created levee districts, which were governed by commissioners in varying numbers from three to twenty-four, generally appointed by the governors.[1] The states gave the levee districts almost unlimited powers within their spheres. They could levy taxes and issue bonds against the property of the districts. They could

1 House Com. on Flood Control, Hearings 1916, p. 255

condemn property under the power of eminent domain. The title to levees in the districts passed to the levee boards and have remained there.[1]

The Mississippi River Commission and the local boards worked well together. After much study the Commission established a standard grade for levees. Lack of funds, naturally has caused the work to be retarded from time to time. The Commission had to depend on appropriations by Congress and the local boards had to raise funds by taxation and by floating loans. The levee boards resorted to every type of tax possible, general property, acreage, mileage, tax on railways, commodity tax on crops grown, and others.[2]

After the Flood Control Act of 1917 most levee boards obtained special permission from the legislatures to exceed legal bonded indebtedness. Creditors became very liberal with them. At that time the local board had larger amounts of funds available than the Commission, although generally the Commission had more funds than the local boards.

In times of danger from floods the conflict of jurisdiction becomes most noticeable. Fighting floods requires military discipline and precision. Men work twenty-four

1 Cong. Record, 64th Cong. 1st Sess. pt. 11, 1916, p. 8792
2 House Com. on Flood Control Hearings 1916, p. 48

hours if necessary and levee boards spend money.[1] Some strong centralized power has been greatly needed. The Commission has generally assumed rather full authority. During the flood of 1913, the Mississippi River Commission wired all local levee boards, United States employees, and contractors, giving very explicit and detailed instructions concerning the fight. Instructions were enforced.[2]

The vast majority of the people of the delta have been satisfied with the work of fighting flood under the Mississippi River Commission which has progressed smoothly.

Yet, naturally there has been much criticism of the Commission. Federal incorporation of levee boards has been urged. Bills have been introduced to place the powers of the Mississippi River Commission in another commission.

It has been the determination of Congress to carry on the flood control efforts under the name of navigation, although everyone knew that channel improvement had little to do with the problem.

The Rivers and Harbors Bill of 1881 adopted the project of the Mississippi River Commission with the proviso that absolutely no part of the funds provided should be used for building levees to protect lands against overflow and that all funds must be spent for channel improvement.[3]

1 House Com. on Flood Control Hearings 1922, p. 87
2 Mississippi River Commission Report, 1913, p. 3575
3 Floods and Levees of the Mississippi River, B. G. Humphreys

Congress began the construction of levees solely in the aid of navigation.

Various Congressional Committees have held hearings and made reports on flood control and river improvements. At all times they appeared anxious to have the word Navigation before Congress.

The report of the Senate Committee on Commerce in 1904 stated: "the mind of the nation should be constantly advised of the commercial importance of the Mississippi River as a highway of commerce." [1]

Slowly, however, the building of levees came to be accepted as a movement for the purpose of flood control by the Federal Government. The Mississippi River Commission Report of 1912 stated that everyone knew that the main purpose of levees was to "protect the alluvial lands and their owners against overflow." [2]

In 1917 the Federal Government for the first time went into levee building frankly as a measure of flood control. The Flood Control Act of that year stated that the Federal Government would spend money to control floods. [3]

The first task of the Mississippi River Commission after its organization was to determine what its objective would be in building levees. It gave much thought to the question and based its plans on the highest known flood.

1 Senate Doc. No. 245, 58th Cong., 2nd Sess. 1904, p. 5
2 Mississippi River Commission Report 1912, p. 3724
3 House Com. on Flood Control, 70th Cong. 1st Sess. 1927

It based its standard of levees on the great flood of 1897. Meanwhile it had been decided that three feet of levee above this standard would furnish a proper margin of safety.[1] These standards were regarded as only temporary standards which might be changed from time to time as occasion demanded, with knowledge gained by new experiences and continued study and observations.

After the flood of 1897 the Commission stated that the flood had given sufficient proof that levees of sufficient height and strength to control the floods could be built at a reasonable cost and without great difficulty.

Before the flood of 1912, the Commission stated that it was its purpose to require the most possible from "riparian owners with the idea of ultimately turning over the entire burden to them," and that the time was very near for the "realization of that expectation."[2]

These hopes, however, were quickly dispelled when in 1912 and 1913 there came two of the worst floods in history. The entire Commission frankly admitted that these floods demanded an entire revision of their standards. It was estimated that the yardage of levees would have to be doubled. After the floods of 1912 it was estimated that the high waters would never again reach such heights.

1 House Com. on Levees and Improvements, Hearings 1906, p. 9
2 Mississippi River Commission, Report 1911, p. 12

So the Commission revised its standards to meet conditions shown by the results of the floods of 1912, and 1913, believing that the problem had come easily within its grasp through the levee system.[1]

In 1926 the Mississippi River Commission took the position that the levees had reached a stage of construction that offered full protection to the delta. The confidence of the people and the Commission was shown in a statement of New Orleans business men who declared that "New Orleans is as safe from Mississippi River Floods as Boston."[2]

Comparison Cubic Yards in Levees--1882-1926[3]

Date	Cubic Yards in Levees
1882	33,000,000
1913	251,000,000
1926	472,000,000

Height of Levees in Yazoo Basin[3]

Date	Average Height	Cubic Yds per Mile
1882	8 ft.	31,500
1926	22 ft.	421,500

1 Journal of Association of Engineers-Vol. 49, Sept. 1912 p. 63
2 Engineering News Record-Vol. 90, Jan. 4, 1923, p. 27
3 House Com. on Flood Control, 70th Cong. 1st Sess. 1927-28

In 1926 the system contained a total of 1815 miles of levee on the main river averaging eighteen feet high, although some of the levees were below what was then considered standard grade.[1]

Crevasses

The number of crevasses offers a fair estimate of the success of the levee system. In 1882 the number of breaks in the levees reached the total of 284 with a combined length of more than fifty-six miles.[2]

Date	Total Crevasses in Levees	Length in Miles
1882	284	56
1883	224	34
1912-13	8	few thousand feet
1916	1	
1922	2[3]	

Two of the worst floods in the history up to that time, occurred in the years 1912-13.[4] Although the great flood of 1916 extended about 350 miles in the heart of the delta and reached record heights, it left in its ravages but one crevasse. The flood of 1922 which

1 American Railway Engineering Assoc. Bulletin, Vol. 29, July 1927, p. 95
2 Tompkins, Riparian Lands of the Mississippi River, p. 22
3 The Outlook, Vol. 146, June 8, 1927, p. 182
4 Floods in Lower Mississippi Valley, J. M. Cline, p. 17

broke many records in the lower valley, caused only two breaks, one of which occurred below New Orleans.[1] Furthermore, the Mississippi River Commission could rightfully claim that no break had occurred in a levee that had been built up to the Commission's standard grade and section.[2]

1 The Outlook, June 8, 1927, p. 182
2 House Committee on Flood Control Hearings, 1922, p. 34

Cost of Construction of the Levee System

The Mississippi River Commission had utterly miscalculated the cost of the system in its early estimates. The report of 1883 maintained that $11,450,000 would furnish ample protection.[1] By 1926 more than $220,900,000 had been expended and the system had not been completed.[2]

The matter of carrying out any program of public improvement depends upon the security of adequate sums. The Commission had depended entirely on funds appropriated from time to time by Congress. It had often complained of the lack of adequate funds. The Commission had been compelled to do its work piecemeal because Congress had not granted funds enough to carry out such a tremendous problem. Much money had been lost because the physical plant could not expand rapidly enough to enable it to get much ahead of the destructive agents at work, floods, and caving banks. Levee-building should be rapidly carried out, as incomplete levees offer an easy mark for destruction of floods.

Levee construction calls for special machines and specialists to operate them. Idleness means serious loss

1 Mississippi River Commission Report, 1883, p. 28
2 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Document No. 1, p. 28

because no other industry can employ them during the period of construction. In 1921 and 1922 seven huge Tower machines, costing $150,000 each suspended operation for seven months and stood idle by a non-standard levee that could have easily been built up to standard in the meantime. While those machines stood idle, the levee by which they stood was overtopped by a flood, and only a heroic fight and the expenditure of $400,000, which was a complete unnecessary waste, prevented a serious crevasse.[1] In this case Congress must accept much of the responsibility for the vast amount of money that has been wasted through:

1) Idleness of Physical Plant

2) Increased Price paid to Contractors because of Part-Time Work

3) General Increase in Price Levels

4) Vast Amount Lost by Destruction

5) Incomplete and Non-Standard Levees

6) Expenditures of Money to Protect Such Levees in Floods.

7) Huge Amounts that have been Lost in Floods that might have been prevented if the levees had been complete.

1 House Committee on Flood Control, Hearings 1922, p. 38

A well known engineer estimated in 1928 that it would cost one-half as much to complete the levees in five years as it would cost to complete them in fifteen, but he doubted the wisdom of attempting to do the work in less than five years.[1]

The Mississippi River Commission urged a policy of continuing contracts which would permit it to extend the work from year to year. Contractors could not afford to invest in expensive equipment unless they could have assurance that Congress would make sufficient appropriations. The Commission had been definitely committed to the policy of contracting for the work.[2]

Prior to 1917 Congress disregarded the plea for a continuous program. On two occasions, however, Congress did adopt the idea of such a program.

In 1892 the appropriation act provided $2,000,000 and gave the Mississippi River Commission authority to contract for works and materials not to exceed $2,665,000 per year for the next three years.[3]

The act of 1907 provided for another three year program totaling nine million dollars.[4]

1 House Committee on Flood Control, Hearings 1928 p. 61
2 House Report, No. 300, 63rd Cong., 2nd Sess., 1914 Pt. 2, p. 6
3 Mississippi River Improvement, R. S. Taylor
4 Mississippi River Commission Report 1907, p. 2607

The economy of a continuous program afforded one of the strongest arguments for flood control acts of 1917 and 1923. The act of 1917, for the first time, provided money openly for flood control and the act of 1923 set forth its purpose as "controlling the floods of the Mississippi River and continuing its improvements."[1]

The Flood Act of 1917

The flood act of 1917 introduced a new principle of sharing Federal and Local contributions. It had been the practice prior to 1917 of the Commission to meet the funds of the levee boards very much on a fifty-fifty basis although Congressional appropriations had not required any local contributions. The law of 1917 provided that the United States would pay two dollars to one dollar from the local boards for levee construction, but the levee boards had to furnish rights of way and pay maintenance charges in addition to their one-third of the cost of construction, thus making it almost a dollar-for-dollar proposition.[2] The Commission expressed its satisfaction with this arrangement because it felt that the local boards should know definitely how much they

1 House Committee on Flood Control--Bill No. 8219, p. 7
2 House Committee on Flood Control, Hearings, 1916, p. 4

would have to pay when they came to the Commission for aid in construction. The people of the delta also expressed their gratitude. This definite division of funds made a policy of continuing contracts all the more desirable because it became very necessary for the Commission and the levee boards to have funds at the same time. The construction of works had lagged several times since 1917 because one party did not have funds when the other did.[1]

The flood act of 1917 was by far the most liberal act up to that time for the purpose of controlling the Mississippi. It provided for $45,000,000 in five years, $30,000,000 of which was to be spent together with $15,000,000 from the local levee boards in building and repairing levees.[2] It was most unfortunate that this act came the very year the United States entered the World War. Under these conditions Congress reduced the amount of annual appropriations by extending the period of time to seven years instead of five. Under the conditions of inflated prices the money did not go nearly so far as it did under pre-war conditions. The extraordinary expenses spent during the war period and during the flood

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Bill No. 8219, p. 11
2 House Committee on Flood Control, Hearings 1922, p. 216

Photograph by Louis R. Bostwick

UNLESS THE CURRENT SHIFTS OF ITS OWN ACCORD, THIS WHOLE FARM MAY GRADUALLY SLIP INTO THE RIVER

"Trailing History Down the Big Muddy"
The National Geographic, July 1927--p. 104

of 1923 reduced the percentage spent on levees, so that actually, only about $17,000,000 was spent for levee construction.[1]

The flood control act of 1923 provided the liberal amount of $60,000,000 for the protection of the delta.[2] Congress appropriated $10,000,000 as the first annual installment in 1923.

Bank Stabilization

The policy of the Mississippi River Commission was largely the levee policy. Bank stabilization was another very important policy of the Commission. Disintegration of the banks proved a very serious problem. Caving banks ate into the levees and carried them into the river. Near Point Pleasant, Missouri from 1898 to 1922 the levee had to be rebuilt four times due to the caving banks. The last location was three miles back of the first one.[3] The Lower Yazoo District in 1922 had 184 miles of levee. From 1882 to 1922 it had lost 212 miles in a strategic retreat from caving banks.[4] It has been estimated that $100,000,000 spent on construction since 1882 has been lost because of the levees falling into the river.[5]

1 Congressional Record, 70th Congress, 1st Session, Pt. 6 1927-1928, p. 4251
2 Ibid--p. 4251
3 House Committee on Flood Control, Hearings 1922, p. 69
4 Ibid--p. 29
5 Ibid--1, p. 4252

Photographs courtesy U. S. Army Engineers

THE FIRST LINE OF DEFENSE AGAINST THE RIVER

After the protection mattresses have been woven they are maneuvered until they overlap the shore and at the same time extend out into the water a considerable distance. The banks meanwhile have been properly graded with a hydraulic spray.

"Trailing History Down the Big Muddy"
The National Geographic, July, 1928
p. 108

The Mississippi River Commission has strongly favored bank stabilization as a matter of economy and prevention.

Revetment costs much money. Because the works actually belong under the water, this part of the work has been assigned to the Federal Government. The local board has also spent large sums of money for the important work. Up to 1927 the Federal Government had spent $58,000,000 for revetment, and the work had not been more than one-fourth completed.[1] In 1928 revetment cost $240,000 on the average mile whereas the average mile of levee cost only $150,000.[2]

The problem of revetment is to prevent the disintegration of the banks and to stabilize them. The revetments are made of willow saplings woven into huge mattresses twelve to eighteen inches thick, 250-300 feet wide and sometimes a thousand feet long. These bank saplings are from three to six inches in diameter, forty to fifty feet long and are held together by wire cables. They are made on the surface of the stream on large flat barges. At low water they are fastened into the river by means of placing tons of huge stones upon them. The willow

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Document No. 1, p. 29
2 House Committee on Flood Control, Hearings 1928, p. 65

will not decay under water and its flexibility renders it suitable for weaving. This type of revetment has proved most successful in preventing "scouring and sloughing" and because of its flexibility it conforms to the irregularities of the banks.[1]

The St. Francis District of Missouri had had some success with the Woodburry System of revetment. This system is called "retards." These retards consist of large trees strung along very powerful cables and anchored at the head of the "retard" to concrete at the bottom of the river. When the river attempts to undermine the trees they sink deeper into the river and protect its banks. This system has not offered the same degree of protection as the revetments. The policy of the Mississippi River Commission still provides for bank revetment as a very necessary part of the flood control program.

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Document No. 1, p. 24

Chapter III

Proposed Plans for the Control of the Mississippi Floods

Proposed Plans for the Control of the Mississippi Floods

The greatest natural enemy of the people of the United States has been the floods of the Mississippi River. From the early colonial days the alluvial lands of the Mississippi Valley have drawn the attention of the American people to the possibilities which they presented as the real garden spot of the continent. This interest has been greatest during the times of floods. The people of the United States, blessed with the world's great garden have paid vast sums of money for its conquest by seeking a way to control the floods of the Mississippi River.

Thousands of plans have been presented by men from all walks of life. Congressional Committees, Presidents, Army Engineers, and many organizations have given prolonged and deep study to the problem.

Such a huge problem naturally would create a wide difference of opinion even among those men best qualified to solve it.

The following methods proposed by technical men who have applied much knowledge and study to the problem are the most worthy of consideration:

1) To strengthen the river by cutting across the numerous bends so as to hasten the discharge of the water.

2) To construct reservoirs either on the headwaters of the various tributaries or along the main stream to impound and hold back the water.

3) To reforest and afforest large areas to increase the sink-in and percolation.

4) To construct outlets or spillways to divert the water through them to the Gulf of Mexico.

5) To build levees sufficiently high and strong to confine the water to the main stream.

6) To combine several or all of the above methods into one comprehensive scheme that would include the whole river system.

All these methods had been tested in European, Asiastic or African countries long before the Mississippi problem received attention.[1] The Mississippi River, however, presents a distinct problem of its own, which must be studied with much allowance for its own peculiarities.

A. E. Morgan, who has made an extensive life study of floods stated, "No similar problem of similar size has ever been mastered by man. The treatment of this

1 Floods and Levees of the Mississippi River, B. G. Humphreys, p. 32

mighty stream must be considered from the standpoint of its peculiar and sometimes almost mysterious vagaries."[1]

Vast Amount of Water

The vast amount of water which the Mississippi carries to the Gulf of Mexico and the remarkable variability is one of the outstanding peculiarities of the "Father of Waters." The low water discharge reaches the small amount of about 70,000 second-feet or 70,000 cubic feet per second.[2] On the other hand, the Mississippi River Commission estimated the maximum discharge of the flood of 1927 at 2,800,000 second-feet which represents the greatest volume of water the power of man ever attempted to control.[3] The difference in gauge readings between high and low water varies at different points but reaches as much as fifty feet at points about the middle of the length of the delta.[4]

Geological Formation of Lower Basin

Formerly the delta was a shallow arm of the ocean extending far into the continent. This shallow area of

1 Annals of American Academy of Political and Social Science, January 1928, p. 56
2 Ibid. p. 11
3 House Com. on Flood Control, 70th Cong. 1st Sess. 1927-1928, Document No. 24 p. 103
4 House Doc., No. 35, 17 Cong., 2nd Sess., p. 13

water became filled with sediment brought down by the great river.[1] The entire delta has been built up through ages to its present form by its present worst enemy. The bed of the lower Mississippi lies wholly within the alluvial deposit of the river. In 1908-1909 the Mississippi River Commission made borings which established the depth of the undoubtedly alluvial deposits beneath the bed of the river between Cairo and New Orleans at 131 feet.[2] Logs have been found in many places at depths ranging from 100-300 feet. The velocity of the river decreased as it rose and flowed out over the surrounding country and deposited much sediment. The coarsest sediment was deposited nearest the river. In this way, banks were built up of these new coarse materials until they became higher than the surrounding country. This process continued until the plane of the delta adjacent to the river slopes off at right angles to the river with the interior for five or six miles at the rate of three or four feet per mile.[3] The slope of the delta to the Gulf of Mexico is only eight inches per mile. Thus, it is true, that

1 Mississippi River Commission Report, 1882, p. 315
2 House Committee on Flood Control, 70th Congress, 1st Session, 1927, 1928, Document No. 1, p. 6
3 Ibid--Document No. 17, p. 30

the river banks occupy the highest part of the delta and the lands slope away from the stream far more rapidly than they slope toward the Gulf. This peculiar situation accounts for the fact that the first settlers generally occupied the banks, while land further from the river remained unoccupied. It also explains why front riparian proprietors have suffered less from floods than those who lived several miles from the river.[1]

The territory through which the Mississippi River flows from Cairo to the Gulf forms one of the flattest surfaces in America. This great fan-shaped, gently sloping plane has been formed by the river and in turn makes a bed, through which the river flows. This alluvial plane is extremely flat. The actual distance from the mouth of the Ohio to the Gulf coast is approximately five hundred miles. The length of the river from Cairo to the Gulf totals more than twice the air-line distance.[2] The added distance has been created by the numerous "ox-bow" bends which the river has made in its fragile banks. These banks have been built from loose and unconsolidated materials which crumble and erode very easily. The enormous pressure of the water has cut away the earth and

1 House Report, No. 44, 42nd Congress, 2nd Session, 1872 p. 6
2 House Committee on Flood Control, 70th Congress, 1st Session, 1927, Document No. 17, p. 29

sought a grade that it could maintain. At length, the river established a course, rather permanent, with a fall of 3¼ inches per mile. Many of these "ox-bow" bends, as they are termed, are only a few hundred feet across the necks, while they are several miles around. The river constantly works on these bends and often cuts across the narrow necks. Because the water continuously cuts away the soil from its banks, the river is said to "eat" its banks. "Eating" its banks has produced most of the vast amount of sediment that has furnished a major problem for hydraulic engineers.[1]

At flood the river has an increased velocity which gives the vast flood waters a force of about 60,000,000 horse power. This force is consumed in eating away the banks of the river, stirring up the bed and getting the water into the gulf.[2] The eroded material from the banks, most of which goes into the stream at flood time, has been estimated by the Mississippi River Commission at approximately 1,000,000 cubic yards per mile per year.[3] Added to this vast amount of sediment are the great additions from the river's many tributaries, especially from

1 Speeches on Levees of Mississippi River, Barbour Lewis, June 6, 1874, p. 6
2 House Committee on Flood Control, 70th Congress, 1st Session, 1927, Document No. 24, p. 102
3 Mississippi River Commission Report 1892, p. 3110

the Missouri, Arkansas and Red Rivers. The total amount of soil that the Mississippi has to transport and dispose of annually has been authoritatively placed at more than a billion cubic yards. The sediment moves down the river for indefinite distances, most of it rolls along the bottom of the river. The currents of the river produce scouring at some places, deposits at others, so that the bed of the river is composed of alternating bars and pools which move down the river in so called "waves." These"waves" create a condition whereby the shallow places of one week may be the deep ones of the next and vice-versa.

A large number of channels lead from the Mississippi, some to lakes or swamps and others to the Gulf. These peculiarities of the Mississippi have caused some consideration by experts and laymen as well. To an unskilled layman it would appear to be an easy matter to divert the waters of the Mississippi through some of those channels. Many people, therefore, have opposed plans that would confine the floods to the river. They believe that flood heights could be lowered by diverting the waters with much less effort and at a much less cost.

The vast area from the Rocky Mts. to the Allegheny Appalachian Ridge on the East, drained by the Mississippi and its branches and the complicated causes of floods

have created a wide difference of opinions as to the proper methods of control. Topography, climate, precipitation and other phases of the wide drainage areas have certainly furnished ample material for discussion, study and disagreement. The floods of the Mississippi are complicated by many combinations of waters from many tributaries. The Ohio has always been an important factor in all great floods. Other tributaries vary greatly in the amounts of their contributions.

"Cut-Offs"

The official reports made by United States Engineers have universally condemned cut-offs. Expert opinion agrees that cut-offs only pile up the flood waters below them.[1] If the river could be straightened and so held, it might be of some help to straighten. But if a cut-off occurs, the river immediately proceeds to establish a new maintainable course by immediately creating other curves to take the place of the one it has lost. Various countries of Europe have tried cut-offs as a means of reducing floods. This method has been universally abandoned. They have not only failed to work, but they have made conditions worse. In the

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Document No. 17, p. 55

earlier development of flood control, the interests of navigation and those of flood control were in constant conflict. Navigation interests have been very active in reducing the length of the channel.

Reservoirs

The Chicago Tribune states that the damage from floods is "felt down stream but the responsibility is up stream."[1] Thus, the only sensible way to control floods in the lower valley is to construct reservoirs on the tributaries that will enable the people to control the waters before they reach the main river. The great floods are caused by minor floods from the smaller flood areas combining their waters by a concentration in the lower river.[2] The Inland Waterways Commission reported that the only "logical way to control a river is to control the head waters of its tributaries" and the only way to prevent floods "is to use these reservoirs to catch and temporarily hold the flood waters to prevent them from descending upon the lower valleys in such large volumes."[3] Undoubtedly, the floods of any

1 Chicago Tribune, April 18, 1927, p. 10
2 Congressional Record, 70th Congress, 1st Session, Pt. 11 1927-1928, p. 11008
3 Senate Document No. 325, 60th Congress, 1st Sess. 1908, p. 451

stream could be controlled by the construction of an adequate number of reservoirs of sufficient size and favorable location. It has long been a question of controversy between the large groups of students of drainage and flood control, whether such control could be secured at any reasonable cost by comparison with other systems.

Reservoirs have been built for the purpose of flood control in the United States. The Miami Conservancy District has five reservoirs to prevent the destructive floods of the Miami River.[1] They were designed to affect only the larger floods and to remain empty at other times. These works have, thus far, proved very successful in affording the designed protection to the Miami Valley.[2] The success of the Miami Conservancy has convinced friends of reservoirs to maintain that floods on the Mississippi could be controlled by reservoirs. The United States constructed six large reservoirs in the State of Minnesota for the purpose of aiding low water navigation on the upper Mississippi.[3] The Pittsburg Flood Commission resolved to construct a

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Document No. 2, p. 4
2 Ibid--p. 4
3 Ibid--p. 4

system of reservoirs, although to date, this work has not been done. The reclamation service has built a number of large reservoirs on the headwaters of the western tributaries.[1] These successful examples of actual reservoirs in operation, together with exhaustive study of highly competent men, have formed the basis for most of the support of reservoirs. It has been estimated that enough flood waters of the Ohio could be controlled feasibly to reduce the flood heights on the Mississippi seven feet at Memphis and eight at Vicksburg; by construction of enough reservoirs on the headwaters of the tributaries of the Mississippi the flood heights would be reduced at Cairo 5.7 feet, and 5.4 feet at the mouth of the Red River, at an approximate cost of $1,292,000,000.[2] But such an estimate made the project utterly impractical. Another section of this report, however, stated that reservoirs could be built for $242,000,000 on the Arkansas and White Rivers that would reduce the stage at Arkansas City 8 feet, and at Red River, 5 feet. Those who have urged reservoirs, have urged them as an aid to flood control rather than the means by which floods could be controlled. They

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Document No. 2, p. 4
2 Ibid--p. 1

have demanded reservoirs as an additional safeguard instead of a substitute for levees.

Much consideration has been given to the possibility of selling electricity that could be generated by the water held by these reservoirs. This idea has been rejected by the best engineers. Reservoirs have the possibility of combining both functions to a limited extent only, for the two purposes are opposite by nature.[1] For flood control the reservoirs would need to be empty, and for power generation they would need to be full. Thus, as they were used more for one purpose they would reduce the utility for the other.

Arguments of Opponents of Reservoir System

The opponents of reservoirs have rejected the proposition because they feel that reservoirs are impracticable because of the prohibitive cost as compared with other flood control works.

The Mississippi River Commission has severely criticized the reservoir system. Col. C. M. Townsend of the commission asserted that a reservoir at the junction of the Mississippi and Ohio, "large enough to have held the flood waters of 1912 would have been 7000 square miles in

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-8, Document No. 2, p. 18

area and fifteen feet deep, requiring excavation that would furnish dirt for 7000 miles of levee 150 feet high." [1]

Colonel C. L. Potter while President of Mississippi River Commission stated that "flood control for the Ohio Valley alone at the same rate of cost for the Miami Valley, which is the only real example of flood control in the United States by reservoirs, would cost $1,718,000,000." [2]

The Pittsburg Flood Commission found that by building seventeen dams at the estimated cost of $1,672,100, a flood of 35.5 feet on the Pittsburg gauge would be lowered to 27 feet, and that further protection would cost much more in proportion. [3] Engineers have frequently stated that to cut the Ohio River absolutely at St. Paul would have no appreciable effect on the river at Cairo, only 35,000 second feet in 1913 out of a total of 2,000,000 second feet. [4] The Mississippi, above St. Paul has the largest system of reservoirs in the world with 93,000,000,000 cubic feet capacity." [5] The board of United States Engineers in 1927 estimated that this system "reduced flood heights

1 Flood Control of Mississippi River--C. M. Townsend--p. 8
2 Engineering News--Record, April 2, 1925, p. 557
3 Journal of Association of Engineers, September 12, p. 57
4 Engineering and Contracting, March 1914, p. 340
5 Ibid--4

one-fifth of an inch in 1912 and slightly increased flood at Cairo.[1]

The Engineers of the United States Army and Mississippi River Commission have even gone so far as to suggest that the danger from probable breaks among the scores of gigantic dams would be "as much as the danger from present flood conditions."[2]

Forestation and Deforestation

During recent years the relation of forestation and deforestation to floods and stream control has been a much discussed topic. Many believe that devastating floods of late years have been caused by the destruction of forests. Forested areas do hold back a portion of the water that falls upon them. It is, therefore, essential that forests receive consideration in any plan that would have a definite place in permanent control of the Mississippi and its tributaries.

The opponents of flood control by re-forestation contend that de-forestation has not caused floods, that forests could not aid materially in the control of floods, that floods occurred when the forests stood. They point

1 House Committee on Flood Control, 70th Congress, 1927-1928, Document No. 2, p. 7
2 Journal of Association of Engineers, September 1912, p. 59

out that a most remarkable series of floods occurred in the period of 1857-1867. No one could even hope to restore the forests to the conditions of that period. Gen. Harry Taylor, an engineer member of the Mississippi River Commission estimated that "it would take 533,000 square miles of forest reserve to reduce as much as one foot a great flood at Memphis."[1]

Colonel Edward Burr of the Corps of Engineers of the United States Army made a careful study of the Merrimac River in New Hampshire and Massachusetts. This basin offered a splendid experimental case because complete records were available for the period of de-forestation and then of re-forestation. This study showed little or no relation of de-forestation to stream flow.[2] Raphael Zon stated that forests can store a quantity of water equal to a .16 of an inch, and in very favorable conditions .24 of an inch. This amount represents but an insignificant fraction of the great quantities of precipitation that cause floods.[3]

Foresters claim that an extensive program of re-forestation could be felt in five years, and maximum results

1 Scientific Monthly, April 1923, p. 346
2 National Waterways Commission, Report 1912, p. 29
3 American Forests and Forest Life--Raphael Zon, July 1927, p. 38

could be obtained in twenty years. "It should be borne in mind that of the technical foresters not one of any authority has even suggested that forests would control floods." [1]

They maintain that in stream control upper watersheds tributary to the river form an important factor, that forests only supplement engineering works. Nor would they plant agricultural lands in trees; it is only the vast areas of waste lands that they recommend be planted in forests.

There does seem to be an unanimous agreement that forests do aid to some extent in flood control. The Mississippi River Commission did not study that type of area but it did suggest the value of forests in preventing erosion. The sediment in the Mississippi River at flood time has been always a serious problem. The prevention of erosion would perhaps be the most important benefit of forests to stream control. Forests would prevent much erosion that takes place on vast areas of waste lands at present.

Diversion Channels

In its natural state the Mississippi River flowed to the Gulf at flood times through many mouths. Long

1 Journal of Forestry, May 1927, p. 508

bayous, natural outlets, took the water from the main channel. The construction of levees has closed these former outlets. "On the lower Mississippi River the pressing problem has not been to let out the surplus waters but to keep the river from breaking through its old outlets."[1] The apparent ease with which the flood waters could be taken away by diversion channels or waste weirs has caused this method of flood control to receive universal recommendation among laymen. In 1850 De Bow's Review published a plan to take the floods to the Gulf through a vast diversion channel from the Arkansas over very much the same route that was accepted as a part of the 1927 plan. The Ellet report of 1852 gave arguments both for and against diversion channels but concluded that the advantages outweighed the disadvantages.[2]

The place of residence has had much influence upon the attitude of those interested in flood-control methods. Upper-river men favored reservoirs, middle-river men have wanted levees and lower-river men have demanded diversion channels in a large number of cases. The most active agent working for diversion of flood waters since 1922

1 House Committee on Flood Control, 70th Cong., 1st Sess. 1927-1928, No. 70, p. 80
2 Plans for the Protection of the Delta from Inundation, Charles Ellet, p. 18

has been the Safe River Commission of One Hundred of New Orleans. This committee consisted of prominent engineers and students whose purpose was to secure safety from floods for New Orleans.

The argument of these "Outletters" is that the flood water can admittedly be taken away very easily by diversion channels below the mouth of the Arkansas to such an extent to remove serious floods below that point. The river naturally has sought its former outlets that have been closed by levees. Many crevasses in past floods have poured water into these natural outlets. New Orleans has frequently been benefited by the crevasses that ruined the people of nearby communities. "The wealth of New Orleans has enabled it to maintain a margin of safety over its less wealthy neighbors by a competitive system of levee building."[1] The crevasse at Poydras in 1922 gave New Orleans 2.7 feet relief and it had some influence for a distance of 160 miles up and down the river.[2] The supporters of the outlet system have pointed out the fact that levees have been built higher and higher after each great flood with apparently no way of telling what the ultimate height will be, and that withdrawal of water from the river offers the only real

1 House Committee on Flood Control, Hearings 1916, p. 105
2 Ibid--p. 159

hope of control.[1]

New Orleans has made a special plea for definite control height because of its port facilities. These port facilities have been built on the levees and must be kept above flood heights. It will cost many millions to raise the wharves and other facilities which New Orleans has built with public funds. The citizens of New Orleans for several years have urged that levees have not and cannot give absolute protection.[2] The remarkable series of floods from 1912-1922-1927 shook the faith of the people of the lower part of the delta in the levee system and demonstrated to them the value of crevasses in reducing flood heights.[3]

These "Outletters" have met with determined and stubborn resistance. Prior to 1927 practically every report by an United States Official Board of engineers severely condemned the outlet theory of control. Until after the great floods of 1927, practically all the commercial bodies and all the leading newspapers opposed diversion.

The Mississippi River Commission which was created in 1879, and which has dominated the flood control policy,

1 Chicago Tribune, April 25, 1879, p. 32
2 House Committee on Flood Control, Hearings 1916, p. 113
3 Ibid--p. 113

strongly opposed anything but levees prior to the floods of 1927. It felt that New Orleans desired protection of her wharves, which had been built on levees below standards set by the Commission.

In 1893, however, three members of the Commission filed a minority report which agreed with the majority, that a diversion channel that took off water at all stages of the river would be inadvisable. It suggested that a waste weir that would take off the tops of the floods might be beneficial. Members of the Commission have frequently admitted that flood heights would certainly be reduced by spillways. Until 1927, the Commission maintained one very important outlet.

When the water in the Mississippi is higher than the water in the Red River, it flows through Old River which connects the Mississippi and the Red, into the Red and the Atchafalaya, then through the Atchafalaya to the Gulf. The outlet was the subject of a very detailed study in 1914 by a special board of engineers. This board favored keeping open the Atchafalaya Outlet in spite of strong pressure in favor of closing it.[1] Until 1927 the Commission was hostile to diversion because it clung to its policy of levees only.

The main argument of the Commission against diverting

1 House Document, No. 841, 63rd Congress, 2nd Session, p. 2

flood waters has been based on the supposed effects of diversion on the main stream of the river. The action of an outlet means increased velocity above it, and decreased velocity below it. Such a condition would cause large deposits of sediment in the bed of the main stream below, this would in turn cause a piling up of water and give only temporary relief. Silt-bearing streams have complex engineering problems in handling silt as well as in handling the flood waters. The opinion that sediment would deposit below such outlets and so disturb and limit its carrying capacity has not been universally held, although it has met with the sanction of many engineers.

The danger that the flood water might break through the Gulf of Mexico and cause the river to leave its present channel has been the cause of much opposition to diversion.

The soil of the lower delta erodes very easily. The distance to the Gulf of Mexico by some of the natural channels is only half as far as it is by the main river. "The total difference in elevation being the same, the velocity of the currents would be much greater than that of main stream."[1] When the slope of the territory adjacent to the river is taken into consideration the

1 Journal of Association of Engineers, March 1911, p. 188

situation becomes more alarming. The natural fall of the Mississippi in the vicinity of New Orleans is about one-tenth of a foot per mile. The slope of the land from the river to Lake Borgne two miles away totals eight feet. It has been the fear of most hydraulic engineers and the people of the lower part of the valley, that the river might break through and make a new mouth. The record of the Atchafalaya River furnishes a good basis for this contention. In our early history the Atchafalaya was only a very small stream. Flood waters from the Mississippi had enlarged it, until at flood tide it approached the size of the main stream. Government engineers became concerned with the possibility that the Mississippi River would turn entirely through it and built engineering works to stop the enlargement. The engineers believed that without these works the Mississippi would have gone through the Atchafalaya.

Another point against the outlet theory has been that it would prove expensive and impracticable in comparison with the cost and practicability of control by levees. If diversion channels are used they must either be controlled by levees or permitted to run wild and perhaps flood large areas. In the opinion of the Mississippi River, these diversion channels would not lessen the cost of control but would increase it.

If waste weirs should be constructed proper foundations and regulation of flow would be difficult and expensive to obtain. If a diversion channel protected by levees should be used, the channel would have to be maintained and the flow would have to be carefully regulated. Too great a velocity would be disastrous and too slow a one would cause it to fill with sediment.[1] In 1923 the Chief of Engineers said at New Orleans, that it would be cheaper to blow up the country levee when the city was menaced than it would be to pay the interest on the big investment of five or six million dollars to build a spillway.[2] The Mississippi River Commission in 1922 concluded that a spillway with a capacity of 230,000 second feet would be very hazardous and too expensive and that both the hazard and the expense would increase rapidly as the danger of floods on the main stream was reduced.[3]

The people of New Orleans represented by the Safe River Committee of One Hundred, and the Mississippi River could not agree on the method of control. The policy of the Federal government, through 1926 adhered strictly to the theory of confining the water to the main stream by

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Document No. 17, p. 30
2 Ibid--No. 10, p. 7
3 New Orleans Time, May 23, 1922

levees. "One Congressional Committee after another almost unanimously affirmed the most absolute confidence in the sufficiency of levees."[1]

The Mississippi River Commissioners from the beginning and for nearly fifty years almost unanimously agreed that confinement of the waters was the only way.

Legislatures of delta states contributed their support to levees, by resolutions and memorials that demonstrated their confidence in the proposals of the Mississippi River Commission. The great convention of the Mississippi River Improvement and Levee Association which consisted of over one thousand delegates from twenty-seven states and one hundred sixty-six cities, at New Orleans in 1900 expressed absolute confidence in levees and condemned all methods for reducing flood heights. This convention claimed to have presented the "unalterable sentiment of millions of American citizens."[2]

People who reasoned for levees only asserted that confinement presented not only the best way to control floods on the Mississippi, but the only practicable way.[3] They further stated that all other plans had been tried in Europe and had failed. In their opinion, no other

1 Senate Document No. 245, 58th Congress, 2nd Session, 1904, p. 1
2 Senate Committee on Commerce, Hearings 1904, p. 44
3 Scientific American, February 15, 1913, p. 13

workable plan could be devised but to build levees sufficiently high and strong enough to hold.[1]

They pointed with pride to the decreasing number of crevasses and the decreasing amount of lands inundated by each great flood. If crevasses occurred, it was not the fault of the plan, but because the plan had not been completed.

The construction of a levee system called for the determination of standard heights and dimensions. The Mississippi River Commission undertook to determine a basis of standard as shown from information about past floods. Flood after flood occurred. Each time the Commission changed its standards of grade and section to meet new conditions.[2] Many of the levees never caught up with the ever increasing standards. The weaker levees naturally broke first. Prior to the flood of 1927, the supporters of levees always steadfastly maintained that no standard levee had ever failed to offer protection, and that a complete system of standard levees would offer ample protection for the whole delta. The vast majority of people believed that at last the Commission had been able to ascertain very definitely just how strong to

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-1928, Document No. 2, p. 4
2 Ibid--Document No. 1, p. 25

make the levees to withstand the highest flood that in all probability would ever come down the river.

Two Schools of Engineers

At the time of the formation of the Mississippi River Commission two schools of engineers in the United States held opposite views on the effect of levees on the river.

One school held that levees would increase the velocity and scour out the channel so that no increase in flood heights would occur.

The other group contended that levees would not enlarge the river section and that greatly increased heights would occur. The Mississippi River Commission contended that floods confined between embankments would scour out the bed and low-flood heights.[1]

The first real shock came when the public discovered the fact that levees actually caused floods to go higher. They caused floods at Memphis to rise more than eight feet above their former levels; at several places increases were still greater. In 1914 it was estimated by an official board of engineers that the flood of 1912 would have been increased four feet at most lower river points if the levees had been completed and had held. But the same re-

1 Mississippi River Committee Report, 1881, p. 17

port contended that the increase would have been temporary because the waters would have finally enlarged the channel.[1]

From the early beginnings there has been opposition to levees only. The real fight in an organized way began in 1912. Many engineers and laymen had become convinced that "some supplemental aids had to be adopted."[2] Congressional Committees began to hear much testimony from all parts of the country. The opponents of the levee system proclaimed that the Mississippi River Commission was the "most colossal blunder in engineering history."[3]

Nature of Delta Soil

The major contention of the opponents grew out of the increasing height of floods from year to year and the corresponding increasing height of levees. As the floods rose higher and higher from time to time the Mississippi River Commission simply raised the grade and increased the section of the standard levee. This greatly complicated the whole problem. The nature of the delta soil suggests that it forms a very poor foundation for any structure of great weight. Recent years have brought

1 House Document No. 841, 63rd Congress, 2nd Session, p. 3
2 House Committee on Flood Control, Hearings 1928, p. 36
3 Manufacturers' Record, June 9, 1927, p. 55

numerous levee breaks from collapse due to poor foundations.[1] The mouths of small tributary streams and outlets for swamps to drain into the Mississippi River form very poor foundations. The land is spongy and unstable. Just at those very places the levees must be highest. Engineers now feel that levees of greater grade and section cannot be supported.

The worst feature of weak foundations is that they sometimes do not show until the flood reaches great heights and exerts great pressure. The Ferriday levee in 1922 showed no weakness at 53.3 feet on the Natchez gauge but failed completely at 55 feet. Hymelia levee appeared secure at 20.3 feet on the Canal Strect gauge but went out at 21.5 feet.[2]

Many weaknesses show from the beginning. The contractors cannot be held for they secure the finest materials and the best possible foundation. Sinking levees to contractors mean that they pile up more earth until the sinking stops and the embankments reach the required standards. This problem becomes more serious when the levees cave into the river with ever-caving banks, because the land nearest the river offers the best side for levees. The

1 Problem of Mississippi River, B. E. Moses, p. 7
2 Report of Engineering Committee to Safe River Committee of 100, 1922, p. 7

land there is not only higher, but also has a thicker deposit of alluvial soil of more substantial materials over the quick sand foundation.[1] This is a most serious defect of the system. Crevasses cannot be eliminated under such conditions. Crevasses become much more dangerous as the size of the levees increases and as the population behind them grows.

Opponents of levees have asserted that the bed of the Mississippi was rising and getting higher than the surrounding territory. Even some of our leading men rather closely related to flood control as late as 1927 still maintained that silt constantly raised the bed of the river. Some of our leading magazines also still clung to that erroneous idea. The fact that the banks of the river rise higher than the adjoining lands may be responsible for that belief. The Mississippi River is a very deep river with very high banks.

The Mississippi River Commission early established a very scientific system of bench marks and soundings so that as long as the bench marks remained the cross sections of the river could be reproduced scientifically.[2] Minute surveys were made in 1882, 1894 and 1904 which showed conclusively that the bed of the river had not

1 House Committee on Flood Control, Hearings 1916, p. 3-4
2 Senate Committee on Commerce, Hearings 1904, p. 53

risen. The cross section had increased very slightly which may be due to a probable error. The evidence seems indisputable that the bed of the river has not risen.

After each flood the opposition to levees has grown stronger. The Mississippi River Commission's report asserted after each flood that the results had shown more clearly than ever that a system of standard levees would control floods; any failure of the system was due to the fact that it had not been completed. Naturally, as the floods grew higher and the damages grew heavier, and the Commission still clung to its theory of levees, severe criticism of the Mississippi River Commission developed. The members of the Mississippi River Commission had been dominated by the Corps of Engineers of the United States Army. The Commission felt that its duty was to uphold the policy of levees only because the Corps of Engineers upheld that policy. Even the big flood of 1922 failed to cause any change, until the great calamity of the 1927 floods. Governor Pinchot quotes Theodore Roosevelt as saying it was the army engineers who kept the plan of the Inland Waterways Commission from being adopted.[1]

1 The Survey, July 1, 1927, p. 367

Comprehensive Plan

The final plan which has been adopted is termed the Comprehensive Plan for flood control. This plan, proposes a combination of all the plans already discussed. People who favor the comprehensive plan insist that the final correct way will be a combination of all methods. They admit that levees will go far toward solving the flood problem but maintain that other aids must be added to insure success.[1] The supporters of the comprehensive plan favor forests, reservoirs or any other plan for flood control in addition to levees.

Prior to 1927, the Ellet report of 1852 was the only important official United States Engineering report that suggested any idea of a comprehensive plan. Ellet's report suggested levees, spillways and reservoirs. President Roosevelt by appointing the Inland Waterways Commission which urged a "scientific study of all rivers as units from their sources to their mouths, gave great impetus to the movement."[2] The National Waterways Commission which Congress created in 1909 has served to further the idea. The Pittsburg Flood Commission and the Ohio Conservancy District have been strong

1 Speech on Levees of the Mississippi, House, June 6, 1874 Barbour Lewis
2 Senate Committee on Commerce, Hearings, 1917, p. 8

influences for an elaborate plan of control.

For several years, Senator Francis G. Newlands introduced a flood control bill into every session of Congress which provided for large expenditures to control rivers from their sources to their mouths.[1] In 1917 Senator Broussard joined him in introducing the Newlands-Broussard Bill. This provided for an elaborate plan of co-ordination of agencies and a comprehensive plan of control.[2] He never succeeded.

The death of Senator Newlands in 1919 relieved the Mississippi River Commission of his opposition. The only tangible result of his long and determined fight was section 18 of the Rivers and Harbors Bill of 1917; by which the levees-only people were compelled to accept a compromise that allotted $250,000 for investigations and reports concerning various plans of stream regulation.[3] But the fight did not end with Senator Newland's death. Governor Pinchot and many others have continued to argue that no one point of view could control, that plans should be co-ordinated into a united single plan.

J. Russell Smith has recommended a most comprehensive plan that ranges all the way from a new type hill-

1 Journal of Association of Engineers, October 1912, p. 115
2 Senate Committee on Commerce, Hearings 1917, p. 15
3 The Nation, May 11, 1927, p. 521

farming to a utilization of the silt from the Mississippi River as a fertilizer. He would retain levees, but he would supplant these with forests, reservoirs, spillways and other methods. "Judged in this light the economic idea that flood control may be regarded as a by-product of the effective use of land does not seem at all far-fetched."[1]

1 American Forests and Forest Life, July 1927, p. 447

Chapter IV

The Mississippi Flood of 1927 and the Proposed Plans for its Control by Legislation of 1928

The Mississippi Flood of 1927 and the Proposed Plans for its Control by Legislation of 1928

The people of the Mississippi Valley have suffered as few other peoples of the world from inundations.

They furnish one of the world's finest illustrations of man's struggle with nature for the possession of her natural resources. The Outlook states, "many prominent engineers and many laymen feel that these people will continue to live in jeopardy of inundation every few years, even after all possible means of protection have been adopted." [1]

The people of the United States have known that inundations were inevitable in the lower Mississippi Valley yet the Great Flood of 1927 so impressed them that it took a most prominent place in our national life during that year.

President Hoover, who was then Secretary Hoover, quoted: "It is the greatest peace-time disaster in our history. We are humble before such an outburst of the forces of Nature and the futility of man in their control." [2]

Heavy rains had been experienced for months through-

1 Outlook, June 8, 1927
2 Ibid

Official Photograph, U. S. Army Air Corps

"AND THE WATERS PREVAILED EXCEEDINGLY UPON THE EARTH"

"The Great Mississippi Flood of 1927"
The National Geographic, September 1927
p. 253

out the Mississippi Valley during the fall of 1926 and the winter and spring months of 1926-1927. The heavy rains fell over thirty-one states and two Canadian provinces drained by the Great River, comprising an area of 1, 240,000 square miles. This rainfall would amount to "nearly a foot of water spread over that vast area--that is nearly 250 cubic miles of water. Much of this evaporated or soaked deep into the earth, but more than 60 cubic miles of it had to reach the gulf."[1]

The Mississippi Basin is like a giant funnel. Its wide top stretches from New York to Montana, its sides slope toward the gulf, getting narrower and narrower until it forces all its great waters through a spout into the Gulf.

As the floods rose higher and higher and as the rains continued to fall in various sections of the valley the forecasts began to predict a record super-flood.

A super-flood signifies the largest possible deluge that every tributary river, creek and rivulet can pour simultaneously into the Mississippi River. It means we have cloudbursts in Montana, a swollen Ohio River, the Oklahoma and Texas Rivers are flooded, the Missouri, Cumberland, Tennessee, Arkansas and Red Rivers all go

1 Great Mississippi Flood of 1927--Frederick Simpich National Geographic, September 1927, p. 245

TONS AND TONS OF DIRT SHOT HIGH INTO THE AIR

Fighting against the warring waters, men dynamited the levees to relieve pressure at points upstream. In this shot 1,500 pounds of dynamite were discharged by using the hand-magneto

"The Great Mississippi Flood of 1927"
The National Geographic, September 1927--p. 251

raging along with their swollen torrents to reach the Mississippi at once. Yet the upper Mississippi, Missouri, Arkansas, White and Red Rivers may pour into the Mississippi, the "Great Father of All Rivers" will discharge all its waters, provided, the easterly rivers, the Ohio, Cumberland, and Tennessee keep comparatively quiet no flood will occur.

Levees had been constructed to cope with the greatest flood prior to 1927, but they had never been planned to withstand a flood of such magnitude. It is probable that such a maximum flood happens about every two hundred years. The levee line had been constructed to provide safety from a flood slightly higher than those of 1912 and 1913, but it was hardly finished to that standard. If the floods of 1927 could have been confined they would have been "four feet higher than any former flood." [1]

By April 15, 1927 the inundation had become a national disaster when 25,000 people were already forced to leave their homes and lands. The Red Cross began its work immediately. As the crest of the flood moved down the river and as heavy rainstorms on the lower tributaries made record heights certain, general conditions grew more and more unfavorable, the flooded area rapidly widened. By April 22, the number of flood refugees had

1 American Railway Engineering Association Bulletin Vol. 29 July 1927, p. 91

Official Photograph, U. S. Army Air Corps

IN MANY FLOODED RIVER TOWNS PRACTICALLY THE ENTIRE POPULATION FLED TO THE LEVEES

"The Great Mississippi Flood of 1927"
The National Geographic, September 1927--p. 246

reached 75,000 and was increasing very rapidly with unfavorable forecasts and bad conditions continuing for fighting floods.

Dismal Flooded Areas--1927

"Now, from Arkansas to Louisiana a foul and swirling sea, bearing on its yellow tide everything from the offal, animals, trees, trash, fences, houses, barns, chicken-coups, to bridges scoured down by fifty-four flooded tributaries."[1]

From Cairo, from Little Rock, from Memphis, far down through the lowlands, the waters persistently broke loose.

Levees tumbled, vast areas were flooded. Swollen bodies of mules, hogs, horses and cows glutted the bayous. Buzzards came, on the levees the wolves preyed on the deer tired from swimming.

Far and wide rescue steamers churned the yellow tide, hauling bargeloads of silent, stupefied people, coaxed and forced from their homes and perilous retreats. Overhead the scout planes roared, seeking out groups marooned on levees or housetops. Then they flew back to report, that these might be rescued by the relief boats. On levees, ridges, ancient Indian mounds, wet, sick, miserable, men, women and children huddled with

1 The Great Mississippi Flood of 1927--Frederick Simpich National Geographic, September 1927, p. 248

their domestic animals. Foxes, rabbits, quail, deer, muskrats, wild turkeys tired and exhausted from floods crawled upon the levees, over man's piled-up furniture, bedding and bundles, unmindful of men or dogs.

Steamboats cruised over wide devastated areas. Some of the steamboats cruised fifteen feet above favorite parks. Railroads were torn up, steel bridges floated. Saw mills and sugar refineries, cotton gins and box cars floated. Houses of light construction were swept away. Large plantation houses were submerged in water to their upper stories.

Mississippi River Commission and Work of Relief Organizations

"Sensing the enormity of the growing disasters President Coolidge decided to take strong measures to meet the needs of the situation."[1]

On April 22, 1927, he appointed a committee of five Cabinet Members under the name of the Mississippi Flood Committee to cooperate with, and to coordinate the work of the various flood-fighting and relief organizations. The members of that committee were the Secretaries of Treasury, War, Navy, Agriculture and Commerce. President Hoover, who was then, Secretary

1 The Congressional Digest, February 1928, p. 42

of Commerce, acted as Chairman of the Commission and left immediately for the flood torn districts to take active direction of the work. He remained constantly on the job while other members of the committee joined him from time to time. The Red Cross rescue fleet sprang into existence over night. Here went the key men of the Red Cross staff from all over the Union, to work in cooperation with officers of the Army, Navy, Public Health Service, Coast Guard, Department of Agriculture, Veterans' Bureau and the railroads which served the flooded area. With radios, telephones, airplanes, trains, boats and motor cars, where roads were open, all grouped and guided the imperiled populations in cities, counties and whole sections of river states were saved from drowning. Aided by Weather Bureau predictions of the flood's advance, there was time to warn towns, cities and even whole counties of impending peril. Tens and tens of thousands saved by such warnings fled from the lowlands.

Frederick Simpich writes "they fled as the Children of Israel fled through the Red Sea, driving their livestock with them, carrying children, food, and hastily gathered household goods. But for these warnings, made possible by modern invention more lives must have been lost in this flood than America gave to the

MOURNFUL BAWLING HINTED THAT EVEN COWS FEARED THE FLOODS

Too tired to frisk or "high-tail" it, sadly lowing in bovine perplexity, thousands of cattle were rescued from the lowlands. This herd is being landed at Natchez. Many cattle marooned on levees became so hungry that they ate empty jute bags and old newspapers.

"The Great Mississippi Flood of 1927"
The National Geographic, September 1927--p. 254

battlefields of Europe. Yet efficient as the big intelligent machine was, and diabolical as the great waters were, pushing down the great broad valley, many bewildered people either failed to get warning or did not heed it."[1]

"To find and save this helpless, hungry humanity the huge rescue force of the Red Cross, ranging from Navy tugs and Coast Guard cutters to commandeered steamers, barges and fishing craft, was busy from dawn till dark and even through the night many bigger boats cruised on, crashing over tops of submerged trees, steaming boldly among floating houses or up village streets where no steamer ever cruised before, flashing huge search-lights into the night seeking men huddled here or perched there, above the evil yellow sea."[2] Within reach of Natchez, Red Cross workers said about 15,000 head of livestock were marooned on levees, mounds and ridges.

The chairman of the Mississippi Flood Committee divided the work of fighting the flood into four states:

1) The rescue of the people from their flooded homes.

2) The care of the people while in the refugee camps.

3) The reconstruction of the inundated areas,

4) Flood Prevention.[3]

1 The Great Mississippi Flood of 1927, National Geographic, September 1927, F. Simpich p. 250
2 Ibid
3 The Survey, July 1927, p. 357

The first part of the fight naturally received first consideration. Secretary Hoover and his associates collected the greatest rescue fleet this nation has ever known, more than one thousand power boats, thousands of auxiliary craft of every description.[1]

Economic Effects of Mississippi Flood

The vastness of this task is shown by the fact that more than 700,000 people were driven from their homes and had to be assembled in refugee camps or in places where they could be cared for by the Red Cross and other agencies.[2]

The efficiency of this work is shown by the fact that 330,000 people were actually rescued from levee tops, trees, house tops, and other points of temporary safety. More than 607,000 were carried to Red Cross refugee camps.[3] The actual loss in life will never be known because of the large area inundated and the transient nature of much of the negro population of the delta. Many human bodies were found in some sections after the waters receded. The official reports show

1 Congressional Digest, February 1928, p. 42
2 Flood Control, Report to House, No. 8219, 70th Congress 1st Session, p. 10
3 Editorial Research Reports--Mississippi Flood, p. 10

a total loss of life less than 250.[1] That so many people could have been rescued from such dangerous places with such little loss of life is remarkable proof of the efficiency of management.

When the officials began to check up the damages from this inundation, their records of damages surpassed all those of previous ones.

The nation became aware of the meaning of Secretary Hoover's statement, "this flood has been the greatest disaster of peace times in history."

The Mississippi River Flood Control Association collected data from the various counties and parishes of the delta and published the compilation.[2]

The report placed the Direct Property at $236,334,416.06. Loss of Lives 183.[3]

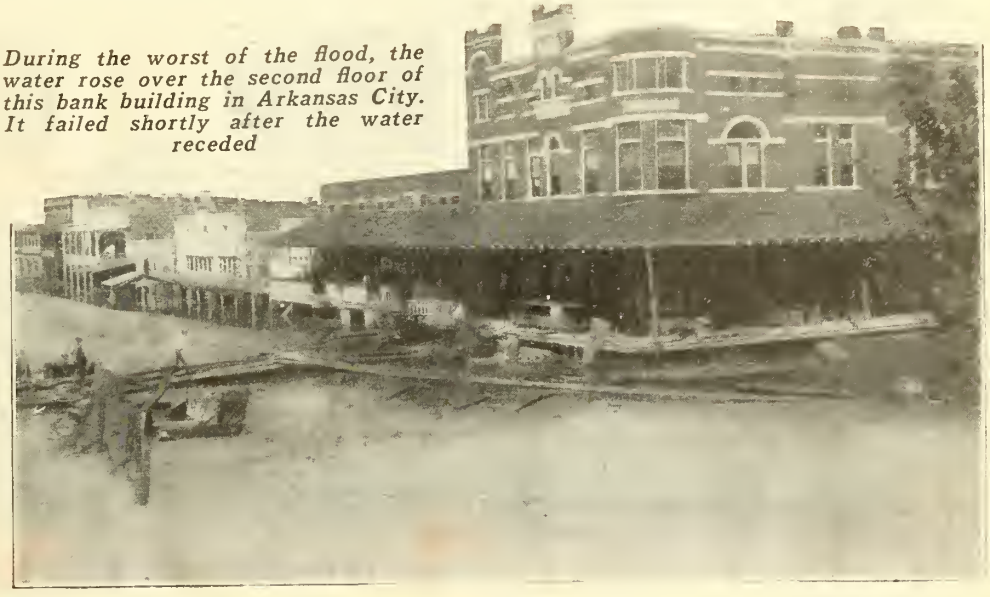
The United States Weather Bureau estimated the Direct Property Loss at $383,533,154.[3]

This gigantic sum far surpassed the $78,188,000 for the flood of 1912 and $17,088,000 for 1922, which were the most destructive floods prior to 1927.[3]

Farmers, business men, and people of all walks of life suffered severe losses. It affected far and near, rural

1 House Committee on Flood Control--House Bill No. 8219 70th Congress, p. 3
2 Mississippi River Flood Control Association--Losses and Damages Resulting from Flood of 1927
3 Mississippi River Flood Control Association--Losses and Damages--Flood 1927

During the worst of the flood, the water rose over the second floor of this bank building in Arkansas City. It failed shortly after the water receded



"Starting Business After the Flood"
Nation's Business Sept. 1927--p. 36, Grahar

districts, villages, and cities. The owners of land suffered most in property damages; the negro tenants most in loss of lives. In most cases the negroes owned little except meagre household furnishings but they lost whatever they possessed.

Yet, this huge sum as estimated does not include many losses, direct or indirect. The Mississippi Flood Control Association points out in just one illustration how far the direct losses extended. The lower delta of the Mississippi had become one of the leading fur selling sections of the United States. Muskrats alone, in the state of Louisiana, yielded 6,750,000 pelts annually prior to the flood of 1927. It will be many years, if ever, before this industry can reach its former position. The wild life of the entire lower valley suffered tremendous losses. It has been estimated that at least 50% of the animals of this inundated area perished in the flood of 1927.[1]

It is certain that the indirect losses totaled an enormous sum. Perhaps they surpassed the direct losses. Secretary Hoover estimated them at $200,000,000. Indirect losses extended to everyone who was in any way affected by the influence of the flood, business men, land owners, farmers, and laborers. Investors in securities of industries in the area, in industries closely connected

1 The Grest Mississippi Flood of 1927, Frederick Simpich National Geographic, September 1927, p. 264

Photograph by Stanley Clisby Arthur

A TIRED MUSKRAT RESTING IN A HALF-SUBMERGED BUSH

FLOODS TAKE HEAVY TOLL OF WILD LIFE

Caught by the rising waters, wild creatures of the lowlands, such as deer, rabbits, turkey, and quail, fled to the levees and unafraid mingled with domestic animals. Men protected them.

"The Great Mississippi Flood of 1927"
The National Geographic Sept. 1927--p. 284, 269

with the lower valley, in securities in levee boards, in farm lands, suffered heavily in direct and indirect losses. The divergence of the dairy industry is likewise an illustration of indirect losses. Dairying had begun to gain a foothold in the inundated area. The flood seriously delayed its development. The injury to an infant industry can not be estimated at the actual value of property destroyed.

Another serious indirect loss that can not be measured or estimated was the loss of negro labor. Many megroes never returned to their former homes. Some sections lost as many as one third of their negroes. This section was already feeling the increasing shortage of farm labor. This was a serious blow to the delta people. Judged on the basis of losses and damages it was the super-flood of our history. It took as toll something less than 250 lives and approximately one half billion dollars of property value.

The Mississippi River Commission assumed charge of the government funds to be spent in this emergency.

Federal Funds reached	$6,806,574
Local Funds	1,323,070
Total	$8,129,644 [1]

"Just how this huge sum for emergency expenditures

1 House Committee on Flood Control--70th Congress 1st Session, 1927-8, Committee Document No. 1, p. 87

became available forms an interesting example of an illegal act that met the approval of all governmental agencies, and apparently of practically all the people."[1]

In the spring of 1927 the Mississippi River Commission had $5,000,000 on hand, legally it could spend only 60% of it because the locals could not raise their quotas. The Commission needed to spend all the money to repair crevasses. The President and other government officials desired to raise still additional money from other funds in the hands of the government. The Comptroller General was asked for a ruling concerning the use of funds. He ruled, "that the expenditure of the money in the hands of the Mississippi River Commission without local contribution and the diversion of other funds for purposes of flood relief would be illegal."[2] Then Chairman Martin B. Madden of the House Appropriation Committee publicy agreed with the Mississippi River Commission, President Coolidge and others, that the funds ought to be illegally spent.[3] "At the suggestion of President Coolidge, Mr. Madden and General H. M. Loid, Director of the Budget, conferred on what should be done under the existing conditions. Mr. Madden then

1 Development of The Federal Program of Flood Control
A. D. Frank
2 Congressional Digest, February 1928
3 Congressional Record, 70th Congress--1st Session, Pt. 1
1927-8, p. 212

wrote to the President expressing his willingness to share the responsibility for using funds in a manner that the Comptroller General had declared would be a violation of the law. He also offered to assume full responsibility for replacing these funds when Congress met. With that understanding, the President authorized the Secretary of War to divert $8,000,000 that had been appropriated for river and harbor work. The Mississippi River Commission spent $7,000,000 of Federal funds, about $4,000,000 illegally in the emergency work caused by the flood of 1927." [1] True to his promise, Mr. Madden succeeded in securing an emergency appropriation on December 22, 1927 of $7,000,000 to replace the money spent in the great emergency.

The Work of the Red Cross

No account of the Mississippi Flood of 1927 would be complete without a report on the work of the Red Cross.

No other peace-time task of similar size had ever been undertaken. To care for more than 600,000 people by voluntary subscription seemed an impossible task. The efficiency of the Red Cross and the generosity of the American people was shown by the collection and wise

1 Congressional Digest, February 1928, p. 41

"HOLD STILL, SISTER! IT WON'T HURT YOU!"

To prevent the outbreak of disease, all refugees arriving at Red Cross camps were required to be immunized. Those submitting here to vaccination are "Cajuns," as Acadians of the Evangeline country of Louisiana are sometimes called.

"The Great Mississippi Flood of 1927"
The National Geographic, September 1927--p. 254

expenditure of more than $17,250,000.

The Red Cross rescue fleet, with its 1,000 power boats, and hundreds of small boats, launches and craft took part in the rescue work. From the army, navy, coast guard, Bureau of Lighthouses, Mississippi River Commission, private corporations and individuals came boats of all descriptions. From the Great Lakes to the Gulf of Mexico and to the Atlantic Seaboard coast guard boats poured into the cities of Memphis, Vicksburg, Baton Rouge, New Orleans and other river ports. One Memphis factory built and donated fifty medium-sized craft in a single night and had them ready for duty with small motors and on the river next day.[1] Federal Government, State Government and private owners furnished a large fleet of airplanes. Twice daily, thirty United States planes inspected the flooded areas, flying a total of 75,000 miles. This fleet carried many thousands of refugees to the Red Cross Camps, which were kept under a semi-military discipline. Homeless people were cared for in 149 refugee camps and in many public buildings.

"While the flood inundated the lands the maintenance of the refugees and their livestock furnished the most expensive and most important item. For this purpose

1 House Committee on Flood Control 70th Congress, 1st Session, No. 8219, Report, p. 233

RESCUE BOATS WERE RUN LIKE AN ARMY TRANSPORT FLEET

Pushing their big barges, light-draft stern-wheelers moved from town to town in the yellow sea, or from one marooned group to another, loading and hauling people, furniture, and livestock to safety.

"The Great Mississippi Flood of 1927"
The National Geographic, September 1927--p. 271

the Red Cross spent about $6,500,000 and utilized the services of thousands of volunteer workers under the supervision of Red Cross workers of local authorities. More than 200,000 head of livestock were rescued, taken to refugee camps and cared for by the Red Cross."[1]

While the problem of maintenance required more money and more work, it soon became evident that the danger of disease was the greater menace to the loss of life. So long as the Red Cross workers had the refugees under their supervision in the camps, where contagious diseases could be isolated, pure water furnished and sanitary measures could be carried out, they could control this problem. But, on returning home the refugees became susceptible to various diseases, arising from the germs acquired in camp, or were in the water or the unsanitary environment caused by the flood.

The Red Cross regarded the health work as supplementary and left the main responsibility on the United States Public Health Service and the State Boards of Health, yet its own work cost more than $600,000. It included the inoculation of more than 410,000 against typhoid fever, the vaccination of 141,229 persons against small pox and the distribution of 25,000,000 grains of

1 Congressional Digest, February 1928, p. 43

quinine to combat malaria.[1] The preventive work of the Red Cross even went so far as to screen the houses of the returned refugees.

The Red Cross furnished food for people, feed for livestock, poultry, clothing, household furnishings, buildings, repairs, farm implements, livestock seed, and whatever might be needed greatly by 600,000 people for varying lengths of time at the expense of more than $6,500,000.[1]

1 Congressional Digest, February 1928

Reconstruction Problem

As the floods receded the third type of the work as outlined by Secretary Hoover became imminent--that of Reconstruction. Reconstruction meant to thousands of the delta people, as the refugees returned to their homes, that they must be sheltered, fed, cared for until they could earn their own living. The destruction of levees, crops, loss of homes, implements, livestock and in many cases the loss of all property made some plan of reconstruction absolutely necessary.

Creation of Agricultural Finance Corporations

The creation of Agricultural Finance Corporations for the purpose of furnishing credit to the farmers of the inundated area was an important phase of the work.

In addition to the destitute, Secretary Hoover and other leaders realized that thousands of farmers would sorely need credit, which they could not obtain through the ordinary channels, due to the failures and crop shortage caused by the floods. In the states of Louisiana, Mississippi, and Arkansas, Agricultural Finance Corporations were formed by the bankers and business men of the South. These business corporations

would rediscount securities of the farmers to the extent of $7.50 per acre.[1] It soon became evident that the three state corporations did not have sufficient capital to meet the urgent needs of the farmers. The situation was presented to President Coolidge by Secretary Hoover. President Coolidge requested Lewis E. Pierson a New York banker, who had been selected by the Chamber of Commerce of the United States, to lead in the flood rehabilitation work, to call a conference of business men to urge them to give their assistance in this emergency. The bankers met in Washington with Secretary Hoover in assistance.[2]

Within one hour the bankers had formed a large holding company called the Flood Credits Corporation with a capital of $?,000,000. Its subscribers received debentures against the Agricultural Finance Corporations of Louisiana, Mississippi and Arkansas. The purpose of the corporation was solely to strengthen the stock of the corporations of the delta states. The additional two million dollars in capital enabled the combination of credit corporation to secure twelve to fifteen million dollars.[3]

1 Commercial and Financial Chronicle, June 4, 1927, p. 3301
2 The Nation's Business Vol. 15, July 1927, p. 52
3 Ibid--p. 52

The fact that big business men of other parts of the country voluntarily risked $2,000,000 in this enterprise showed that they had faith in the success of the plan and they felt that the problem influenced the business conditions of the entire country.

"The immensity of the 1927 disaster was that touch of nature which established the kinship of the whole nation."[1] Out of this terrible calamity there grew a widespread feeling that it should be the last destructive flood. The people of the country, and especially the people of the delta, freely expressed the hope and the opinion that the Federal Government would take ample steps to see that the world's greatest delta would not suffer again from an inundation.[2] Probably no public question in peace time ever had a more uniform demand for quick action. No peace time disaster ever received such widespread publicity. The very best reporters and writers wrote reports of the flood. Many of the writers spent much time in the inundated delta.[3] The nation wide discussion of the gravity of such a great flood aroused a sympathetic feeling for Federal Control. Secretary Hoover stated: "One bright ray which comes out

1 The Survey Vol. 58 July 1, 1927, p. 277
2 Survey, July 1, 1927, p. 277
3 Literary Digest, April 14, 1928, p. 10

of the gloomy situation confronting the Mississippi Valley was the realization that 125,000,000 people of the United States had been awakened to the fact that this valley must be protected from future catastrophe."[1] The press gave wide publicity to the results of the survey of American Business that the United States Chamber of Commerce conducted to determine what business men considered the main problems confronting Congress. The survey ranked flood control first, with taxation and agricultural relief following.[2] This was apparently the consensus of opinion of American Business men."

The campaign for Federal Control began with great enthusiasm and determination while the rescue work continued as the flood waters receded. Every agency that had played any part in securing Federal Control contributed something to the great campaign of 1927. The Mississippi River Flood Control Association obtained the services of nationally known organizations to estimate the industrial losses. Red Cross chairmen, county and local officials, collected a vast amount of data. The data collected by experts and by local people were published and given a wide distribution. After the flood of 1927 Congress was deluged by resolutions from various types of

1 Congressional Record, 70th Congress, Pt. 6, p. 4568
2 Manufacturers Record May 12, 1927, p. 63

organizations. "As early as May 22, 1927 while the flood still covered large areas, forty organizations, practically all of them national in scope, expressed a definite demand for federal control." [1] Such organizations as the American Farm Bureau Federation, the American Legion, the United States Chamber of Commerce, the American Federation of Labor, the American Investment Bankers Association, the American Bankers Association, the Mississippi River Flood Control Association and others sent strong representations to Washington to work in behalf of legislation. [2] Special trains carrying men urging Federal Control again travelled to Washington.

Two notable examples of the creation of public sentiment by organized effort that should receive special attention occurred in the work of the United States Chamber of Commerce and in the activities of the Chicago Flood Control Conference.

Proposals of United States Chamber of Commerce

During the period of the flood the Board of Directors of the Chamber of Commerce of the United States appointed a special committee to study all phases of

1 New Orleans-Times, May 22, 1927, p. 9
2 Congress Record--70th Congress 1st Session, Pt. 7 1928, p. 5547

the problem that the committee considered appropriate for Chamber action. This committee was composed of fifteen well-known men of high rank in their various professions and business.[1] This committee made a thorough study of the floods over a long period of years. The committee submitted a short and painstaking report. The Chamber of Commerce then submitted on October 31, 1927 the following four recommendations:

1. That the Federal Government should pay the entire cost of building and maintaining adequate flood-control works on the lower Mississippi River.

(The vote on that proposition was 2131 in favor of and 512 against it.)

2. That the United States should assume full responsibility for locating, constructing and maintaining flood-control works.

(The vote of that proposition was even more one sided, 2581 for and 240 against it.)

3. That there be three adequate appropriations, "to insure efficient continuous, and economic work, the funds to be available as needed."[2]

1 American Academy of Political and Social Science--Annals, January 1928
2 Chamber of Commerce--Special Bulletin, January 6, 1928 p. 1 Referendum No. 51

(The vote on that proposition stood 2657½ for and 156½ against.)

4. The final recommendation stated that the Mississippi River should be separated from all other projects or undertakings and dealt with by legislation wholly on its own merits.

(The vote on this proposition was 2629½ for and 231½ against.)

By this overwhelming vote the Chamber of Commerce of the United States very forcibly impressed Congress and the public by its stand in favor of the control of the Mississippi Floods at the Federal Expense.

Frederick Delano, Chairman of the Committee, and other prominent members of the Committee stressed before the House Committee on Flood Control "the urgent demand and the great necessity for the United States government to finance control on the lower Mississippi in its entirety, and for the immediate beginning of the work of construction."[1]

1 Congressional Record, 70th Congress Pt. 6, 1st Session p. 4567

The Chicago Flood Control Conference

Another notable event that deserves mention was the Chicago Flood Control Conference. While the 1927 flood was raging, William Hale Thompson termed the famous, "Big Bill of Chicago," went down to New Orleans on what he called, a "Victory Pilgrimage."[1] His purpose in going was to declaim to New Orleans and to all people of the valley and to the world that Chicago was ready to join hands in a determined effort to secure immediate and adequate flood control at the expense of the Federal Government. On May 6 and 7, 1927, Mayor Thompson secured the meeting of a large number of the Members of Congress at Peoria, Illinois. Martin B. Madden, Chairman of the Appropriations Committee of the House, gave his cooperation in this movement. Meanwhile Mayor O'Reefe of New Orleans, and Mayor Miller of St. Louis joined their forces with Mayor Thompson. A general Flood Conference was held at Chicago on June 2, 3 and 4, 1927.

To this conference came more than two thousand people, governors, mayors, members of the House, Senators, Cabinet Members, politicians, engineers, representatives of business organizations and other powerful organizations.[2]

1 House Committee on Flood Control, 70th Congress, 1st Session No. 1, p. 250
2 Ibid

At the opening "shot" of the conference Mayor Thompson severely indicted the United States Government for permitting the great disaster of 1927.[1] The speakers at this Conference consisted of many prominent men in all lines of business and of various professions. President Coolidge sent Dwight Davis, Secretary of War, as his representative. The sentiment of the entire group was unanimously in favor of Federal Control of the Mississippi Floods.

Secretary Davis argued that flood control was a national problem but that the nation should first get a workable plan that was sound in both engineering and economic aspects. As was to be expected, there appeared differences as to the nature of the plan and some criticism of the work of the Mississippi River Commission and of Congress.

Mayor Thompson's program was carried out as he had planned. He had the finest reporters from all the important news gathering agencies present in readiness to give the public all proceeding of the Conference in favor of Federal Control. One may justly state that the Chicago Conference represented Mayor Thompson's greatest triumph. Representative J. J. Cochran of Missouri stated that it

1 New York Times, June 3, 1927, p. 9 Pt. I

was "a meeting of a mutual admiration society."[1]

No one can actually say how much influence the Chicago Conference had, but it was doubtless an important factor in formulating public opinion. Several members of Congress established themselves as strong supporters of Federal Control. Through the speech of Secretary Davis, President Coolidge went on record also in favor of control by the United States Government. Much education came from the conference. Most of the country had remained "marvelously ignorant" on the subject in spite of the efforts of the valley people to get their problem before the public.[2]

The Chicago Conference requested President Coolidge to call a nation wide conference of army engineers, civil engineers, conservationists, geologists, financiers and other experts to "formulate a policy of flood prevention in a broad and comprehensive way."[1] They stated that it was the nation's duty to "attack the flood problem." They declared it was the responsibility of the Federal Government to Control the Mississippi as no other agency could adequately solve the problem. That additional means besides levees would have to be instigated.[3]

1 Manufacturers Record, July 21, 1927, p. 83
2 Ibid--June 9, 1927, p. 59
3 House Committee on Flood Control, 70th Congress, 1st Session, Bill 8219--p. 5

The resolutions submitted no definite plan of control but a comprehensive plan was suggested.

These proposals coming from a diverse group of eminent men were submitted to President Coolidge on June 10, 1927 and apparently were received favorably by him. The great campaign continued until it seemed that Congress had never received a more universal demand on any question than it had in the demand for immediate and adequate action to control floods of the Mississippi.[1]

Secretary Hoover stated: "I believe the whole of the United States is unanimous in that we must undertake such engineering works as will give security not only now but for the future."[2]

Controversy over a Special Session of Congress

The question of a special session of Congress to enact flood control legislation became one of great controversy as the campaign for federal control continued. Public interest in preventing flood control always decreased as the space of time continued after every disas-

1 House Committee on Flood Control--70th Congress 1st Session Bill No. 8219--p. 5
2 Annals of American Academy--Political and Social Science January 1928, p. 16

ter. Because of this decreased public interest, many friends of flood control desired a special session so that they could present the question to Congress while public enthusiasm was at its height.

Many people felt that this problem justified a special session. Accordingly they followed the usual procedure and began to besiege their representatives in Congress. Senator Reed of Missouri proved to be a hard fighter. He sent a telegram to every member of Congress urging the special session. Senator K. D. McKellar of Tennessee also urged a special session and several other senators joined him.[1]

"To those who wanted the special session, it seemed that President Coolidge had determined to have Congress in session as little as possible and that he would not heed the demand of a large majority of American people."[2]

President Coolidge continued, however, to call the special session. Several members of Congress defended him, others attacked him for his stand. Much of the press of the country defended him.[3]

Even the press of the delta region defended his position. According to the New York Times, a majority

1 United States Daily, May 17, 1927, p. 1
2 Manufacturers Record, August 4, 1927, p. 79
3 New Orleans Times, May 19, 1927

of the bankers, security owners, scientists and engineers of the delta region opposed a special session.[1] They claimed that a special session for flood control would cause wrangling and controversies on many subjects, the results of which would be of doubtful advantage even to flood control legislation. They further maintained that another flood in 1928 was very unlikely, and that even if one should come a special session could do little to control it. This was in rebuttal to the main argument of those who favored the special session. This argument was that the work of rebuilding the levees should be done before or during the winter of 1927-1928 to meet the possible danger of another great flood in the spring of 1928.[2]

Then, the strongest argument against the special session maintained that the 1927 flood had made new engineering plans an absolute necessity. This situation meant that the engineers would have to have several months in which to study the problem before they could spend any money which Congress might appropriate.

The result came finally to a compromise. Senator Joseph Robinson of Arkansas and Senator Charles Curtis of Kansas agreed that perhaps the wise thing to do was

1 United States Daily, May 5, 1927 p. 1
2 Commerce and Finance, May 11, 1927, p. 938

to call a Congressional Committee together for an extensive investigation before the time for the regular session of Congress, so that when Congress met at the fixed time the committee would have a definite project to present, which would enable an early action by Congress.

Investigations by the Congressional Committee on Flood Control

While the flood was still raging President Coolidge called on the Mississippi River Commission for a report on the special problems that would need to be solved as a part of the comprehensive plan for Control of the Mississippi Floods. He also called for a similar report from the Chief of Engineers of the United States Army. The Secretary of War directed the Mississippi River Commission to hold public hearings at New Orleans, Vicksburg, Memphis, and St. Louis.[1]

Many leaders of all classes of the South appeared as witnesses.

The Flood Control Committee of the House of Representatives with Frank R. Reid as chairman, met on November 7, 1927 for hearings on the problem. This was one of the most extensive investigations ever held by a

1 House Committee on Flood Control--70th Congress, 1st Session 1927-1928, No. I, p. 1

Congressional Committee. The Committee was in session sixty-three days. More than three hundred witnesses appeared before it, and more than five thousand pages of testimony were taken.[1] Chairman Reid soon indicated that he thoroughly understood the immensity of the problem before the committee in planning for the greatest piece of internal improvement in all our history. Chairman Reid stated that it was doubtful whether so many prominent men had ever attended hearings or given testimony on a single national problem.

As a result of that extensive investigation by the House Flood Committee, the work of the Mississippi River Commission and the Corps of Engineers, Congress had an abundance of official reports and materials at its disposal. Public opinion and the official statements from the President down left little doubt about the Enactment of Flood Control by Congress.

1 Congressional Record, 70th Congress, 1st Session Pt. 6 1928, p. 4026

Nature of Plans for Flood Control

The next great step to be taken was the decision as to the nature of the plan for Flood Control.

More than three hundred plans were presented to the committee.[1] The advocates of spillways, reservoirs, levees, comprehensive including the Mississippi, the Pittsburg, the Ohio and various tributaries, the combination plans of control all had their arguments.

The Mississippi River Commission took a definite stand for protection against a super-flood; the greatest probable flood that might occur; a flood 25% greater than that of 1927. The feeling generally prevailed among the governmental officials that no one could solve the problem without prolonged study under actual conditions. Since only the Mississippi River Commission and the Army Engineers had had such experience, the plans for the new project could be expected to come from them.[2] Although more than three hundred plans were submitted only two received serious consideration. One of them came from the Mississippi River Commission; the other from the Chief of Engineers of the United States Army. The plan submitted by the Mississippi River Commission

1 Congressional Record, 70th Congress, 1st Session Pt. 8, 1928--p. 5853
2 Saturday Evening Post, July 9, 1927 p. 108

is called the Commission Plan, that submitted by the Chief of Engineers of the United States Army is termed the Jadwin Plan.

The Mississippi River Commission Plan

The Mississippi River Commission Plan discarded the policy of levees only and drew up a comprehensive plan. Levees still provided the major means of protection. The Commission based its plan on the culmination of maximum discharges of the various tributaries of the Mississippi. It estimated that such a super-flood would be approximately twenty-five percent greater than the flood of 1927.[1] This estimate suggested a possible flood of 2,250,000 second-feet at Cairo and 2,850,000 second-feet at Arkansas City. This plan submitted by the Commission was comprehensive and provided for complete protection against a super-flood. The following are the lines of defense recommended:

1 A Levee System

This levee system should provide a free-board safety margin of five feet above the estimated greatest flood possible. This would be approximately twelve feet above the flood of 1927, with a greatly increased

1 House Committee on Flood Control--70th Congress, 1st Session 1927-8, No. 1 p. 48

cross section of "1 on 4 on river side and 1 on 4 to 1 on 6½ on land side with a crown of twelve feet."[1]

2 Diversion Channels

a) This plan of protection for a diversion channel at Cypress Creek to carry 600,000 second feet of water.

b) A diversion channel through the Atchafalaya River to carry 1,000,000 second feet.

c) Spillways at Bonne Carre and Caernavon to carry 250,000 second feet each:

These outlets were expected to reduce the flow past New Orleans to 1,400,000 second feet and to reduce flood heights at New Orleans to a maximum of 20 feet.[2]

3 Safety-Valve Spillways

These safety-valve spillways were recommended to prevent the overtopping or breaking of levees, possibly by diversion through the St. Francis Basin, and possibly by reservoirs in the White and Arkansas River Basins.[3]

These features should require intensive study and should await a thorough economic survey that should pre-

1 House Committee on Flood Control--70th Congress, 1st Session, 1927-8, December No. II p. 1
2 Ibid
3 Congressional Digest, February 1928, p. 49

LIKE A CATARACT, FLOODS RACE THROUGH CRUMBLING LEVEES

"The Great Mississippi Flood of 1927"
The National Geographic, September 1927--p. 257

cede an undertaking of such magnitude.

4 Stabilization of Channels

This plan of protection provided for the stabilization of the channel and the protection of the levees. It necessitated extensive dredging operation and revetment of the banks at a cost of $172,000,000.[1] This plan was divided into two parts. The first part was designated as the essential feature. It included the increase in levee height and section, the spillway at Bonne Carre above New Orleans and the channel stabilization works. This part of the plan was recommended for immediate adoption. The cost was estimated at $407,500,000.[2] The Committee recommended that the other features wait, as it required long and patient study and an economic survey. If adopted it would raise the total cost of production to $775,000,00.

The Commission plan provided for the payment of all damages and the purchase of rights of ways and flowage rights for floodways. It provided for ample levees to confine the waters to the proposed diversion channels and to tributaries affected by the Mississippi Floods.[3]

1 Congressional Digest, February 1928, p. 49
2 House Committee on Flood Control, 70th Congress, 1st Session, 1927-8, Bill No. 8219, p. 74
3 Ibid--2

This plan called for the expenditure of $25,000,000 the first year and $40,000,000 annually thereafter.[1]

Local interests would pay one third of the cost of raising the levees to the 1914 Mississippi River Commission grade. This part of the cost was estimated at $15,440,367.

The Federal Government would bear the remaining expense, which included two thirds of the cost up to the 1914 grade, all the levee cost above the 1914 grade, all the cost of dredging and revetment, and all diversion channel and spillway costs and damages.[2]

1 Congressional Digest, February 1928, p. 70
2 House Committee on Flood Control--Document No. II p. 2

The Jadwin Plan

The Jadwin plan presented much of the fundamental principles of the Commission Plan. It likewise, was drawn to provide against the greatest estimated super-flood.

It provided for:

1 Levees

The raising of levees slightly above the grade of the estimated super-flood, instead of the five feet proposed by the Mississippi River Commission.

2 Diversion Channels

a) Diversion of 900,000 second feet through Cypress Creek, and b) diversion of 1,500,000 second feet through the Atchafalaya as compared to 600,000 and 1,000,000 respectively by the Mississippi River Commission.

3 Spillway at Bonne Carre

Spillway of 250,000 second feet at Bonne Carre, but not one at Caernarvon.

Here the similarity of the two plans in engineering features ended.

The Jadwin Plan further provided:

4 Riverside Floodway

This riverside floodway seventy miles long should extend from Bird's Point, Missouri to New Madrid, Missouri. This floodway was very largely for the protection of Cairo, Illinois. The present river bank levee would be lowered five feet between these points.

Then, five miles back a higher and stronger levee would be built to protect against the great floods that would overtop the river bank levee. This area between the two levees would be built so as to form a huge storage basin, or create a riverside floodway. [1]

5 Fuse Plug Sections in Levees

This Jadwin plan further proposed to build fuse-plug sections in the levees just above New Madrid, Missouri in the vicinity of Arkansas City and on both sides of the Atchafalaya at its head.

This meant purposely weakened sections designed to break, at a point three feet below the top of the new grade proposed by the plan, before the levee in general was threatened. [2]

Thus, the Jadwin plan provided to send diverted water through uncontrolled outlets into virtually un-

1 House Document, No. 90, 70th Congress, 1st Session 1927-8, p. 28
2 Ibid--p. 29

controlled diversion channels, whereas the Commission plan provided controlled concrete spillways to send water into protected diversion channels. [1]

The cost of the Jadwin plan of control was estimated at $296,400,000. [2] The Jadwin plan contained no provision for the payment of damages, flowage rights or for building levees in and along the floodways. This fact accounts for the striking difference in the estimate of the costs of the Cypress Creek diversion channel.

The Jadwin plan placed the cost of this protection at $7,700,000 while the Mississippi River Commission placed it at $107,000,000. [3] The Jadwin plan argued for not paying damage for floodway rights that the floodways were the natural outlets that had been appropriated by man, who must suffer the damages imposed on him when the flood waters turned against him.

This plan recommended the expenditure of $25,000,000 the first year, and $30,000,000 annually for nine years thereafter. [4]

The Federal Government would pay all cost of revet-

1 House Committee on Flood Control, 70th Congress, 1st Session, Bill No. 8219, p. 82
2 House Document, No. 90, 70th Congress, 1st Session 1927-8, p. 32
3 Ibid--1 No. 8, p. 2
4 Ibid--3 No. 11, p. 36

ment and four fifths of the cost of flood control works, with the exception of special levees which would be built on a fifty-fifty basis. All other costs and damages would be borne by the local interests. Special levees were provided for the purpose of protecting populous centres by enclosing them wholly or partially by encircling embankments. The Jadwin plan did not provide alternatives in the way of other diversions and reservoirs as the Mississippi River Commission plan did.

Development of Friction in Presentation of Plans

In the presentation of these plans friction developed between the Mississippi River Commission and the Chief of the Engineers. The Commission felt that its dignity had been offended by the Chief of the Engineers when he failed to present its plan to the Flood Control Committee of the House. All official reports had to pass through the hands of the Chief of Engineers. General Jadwin simply withheld the report containing the Commission Plan until he received a request for it from the House Committee. The Commission thought General Jadwin had usurped its power by submitting his plan.

The Committee on Flood Control had nothing to do but to consider the Jadwin plan because it had been submitted directly by President Coolidge after it had re-

ceived the approval of Secretary of War, Davis.

Differences Concerning the Two Plans

Naturally, serious differences of opinion arose concerning these two plans and the proper legislation. These differences were of three classes:

1) Concerning the Engineering Features of the Plan

2) Administrative Features of the Proposed Legislation

3) Economic Phases of the Problem

Engineering Features

There was little doubt but that the engineers could draw up a plan and agree upon it more readily than would Congress and the public accept it, after it had been formulated. The differences in opinion generally concerned the objections to the Jadwin Plan. These objections were:

1) The uncontrolled waterways was the engineering feature most severely criticized.

J. E. Kemper, Civil Engineer, stating the case for New Orleans claimed that "the Jadwin plan would inundate one million acres of land, 250 miles of railway, 400 miles of highway and several towns,

and would completely cut New Orleans off from the West."[1]

2) The second point of criticism of the engineering phases of the plan was the matter of fuse-plug levees. Great fear was expressed of serious difficulties arising from an uncontrolled mass of water flowing through a crevasse made in a chosen place. Crevasses in the past, have dug out great lakes, new channels and deposited large quantities of sand. No one could predict how much water might flow through crevasses.

3) The third objection advanced was concerning the river-side floodway between Bird's Point and New Madrid, Missouri for the protection of Cairo, Illinois.

It was claimed that the return of the water at New Madrid would cause a piling up which would reduce the slope and velocity of the river and therefore the carrying power. This reduction in volume of discharge would fail to relieve Cairo, although 144,000 acres of fine land would have been inundated by the new floodway.[2] The fact that this floodway afforded protection was offset by the argument that it was inadequate to insure protection.

Naturally, other criticisms were made including the

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-8, December, No. 10, p. 1
2 Ibid--No. 22, p. 7

general one that the whole plan was based on insufficient data. Hearings of the engineers proved that approximately ninety-five percent of the witnesses had some criticism of the Jadwin Plan as an engineering project.

Administrative Features

Two phases of the administrative problem caused discussion and disagreement.

Conflict between State and Federal Authority

1) The question of a conflict between state and federal authority received some attention. The Jadwin report suggested that "the states should be required to enact appropriate legislation for accepting the conditions and responsibilities of the act before any money should be spent within their borders, unless the absence of such legislation would delay the initiation of work of far reaching benefit, specially where another state was concerned."[1]

"Senator William Lorimer wondered how Missouri would feel about paying heavy damages for protecting Cairo in Illinois, when the Governor, the Attorney General, and members of Congress asserted Missouri would

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-8, Document 13, p. 9

not pay for Cairo's protection." [1]

This topic never received much attention as the states of the delta had concluded that they were ready to cooperate heartily in any reasonable plan.

Constitution of an Agency

2) Another administrative problem of great importance was the formation of an agency that would be able to carry out the problem to be adopted.

The Mississippi River Commission had been the agency that had carried out the former programs for flood control. But the Commission had been severely criticized during the flood of 1927 and since then. The Commission Plan said nothing about the Agency of Administration, which of course, meant that the Commission expected to continue to administer.

The Jadwin plan foresaw great evils and inefficiency in the administration by a board. It was suggested that the program should be administered by the Chief of Engineers with the Mississippi River Commission serving in an advisory capacity, maintaining that the "United States Government and Corporations were efficiently managed because they had one-man governments." [2]

1 Flood Control on Mississippi River--A. D. Frank, p. 230
2 Congressional Record, 70th Congress, 1st Session, Pt. 5 1928, p. 3571

The domination by the Corps of Engineers brought forth much criticism of the Commission.

Magazine writers and newspaper correspondents urged reform of the agency of administration. Members of Congress took up the criticism. The opponents of the Mississippi River Commission and of the Corps of Engineers could not agree on any type of agency or commission. Some suggested an independent agency similar to the Interstate Commerce Commission. Others favored a board composed of various Members of the Cabinet. Still others wanted a commission that would contain experts on all methods of flood control and that would be dominated by civilians. Representative G. E. Campbell of Pennsylvania proposed a commission of thirteen. Three from Corps of Engineers, Six Civilian Engineers, and Four Business Men.

The Reid Bill

The Reid Bill then was brought before the House.

1) The Reid Bill sponsored the Commission Plan.

2) It provided for the abolishment of the Mississippi River Commission.

3) Substitution of the Mississippi River Commission by the Mississippi Valley Flood Control Commission. Its members should be seven in number, four

of whom should be engineers, either army or civilian.[1]

Economics Aspects of the Problem

The activities of Congress had not gone very far until it became apparent that the main fight over the proposed legislation would centre around the economic aspects of the problem, and not on the engineering or administrative phases of the problem.

Two bills had appeared concerning which the factions centered their arguments:

House of Representatives Bill No. 8219, known as the Reid Bill, had come from the Flood Control Committee with a strong favorable majority report.

Senate Bill No. 3740, called the Jones Bill, had come from the Senate Committee on Commerce.

The House Bill represented the views very largely on the Mississippi River Commission plan, the Senate Bill accepted most of the Jadwin plan. Both bills, however, failed to follow either plan on some important economic points.

The first controversy in considering the economic phase of the problem arose in trying to decide how much money must be provided for the project.

The Jadwin plan had proposed the least, with an

1 Congressional Record, 70th Congress, 1st Session, p. 8
1928, p. 5854

estimate of $296,400,000.[1]

The Mississippi River Commission plan had proposed the expenditure of $407,500,000 for the immediate project and $775,000,000 for the comprehensive project.[2]

The Jones Bill provided for the expenditure by the United States of $325,000,000.

The Reid Bill called for the expenditure of $473,000,000.[3]

The Jones bill provided for surveys which might lead to great additional costs. After much debate Senator Wesley L. Jones of Washington, author of the Senate Bill seemed to "hit the nail on the head" when he stated that Congress would be compelled from time to time to appropriate the amounts necessary to carry out this program for no group of engineers, or Congressmen, could work out a plan for a solution of such a colossal problem extending over a period of ten years so that the estimates of the ultimate cost would approximate correctness.

1 House Document, No. 90, 70th Congress, 1st Session 1927-8, p. 32
2 House Committee on Flood Control, 70th Congress, 1st Session, 1927-8, Bill No. 8219--p. 74
3 Ibid--p. 128

Damages, the Second Controversial Point on an Economic Phase

The second controversial point on an economic phase appeared in the consideration of damages that would result from the floodways that would carry the waters diverted from the main river. The areas in the proposed floodways contained more than 100,000 people and approximately 3,000,000 acres of land.[1] These floodways would inundate large areas of agricultural lands, much railway trackage, several towns and whole communities. Furthermore, the Jadwin plan proposed no payment for damages to these areas, on the ground that the floodways were originally natural overflow channels that had been appropriated by man, who in turn had always been subjected to river floods.[2]

The Commission Plan, on the other hand, proposed to pay damages in full. The Commission argued that the floodways offered more benefits to other states than to the territory adjacent to them. Therefore, Louisiana should not bear the burden of protecting Mississippi and other states. Then there arose the question of confiscation of private property. General Jadwin's proposal

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927, Bill No. 8219, p. 82
2 Congressional Record, 70th Congress, 1st Session, Pt. 8 1928, p. 3688

to let the states meet the bill did not satisfy the opinions of many Congressmen and laymen.

One point that caused very bitter strife arose in connection with regard to paying the railways for raising tracks and relocating. The Commission plan provided for paying the railways for changes made necessary by the proposed programs.[1]

The Jadwin plan which had the support of the administration, did not provide for paying any such damages.

The railways estimated their damages of the expense which was being forced upon them, as $71,835,000.[2] Other private property interests for whom no damages were provided rushed to the aid of the railways and the fight became heated.

Discussion arose over the method of paying for the protective works. Those active in politics desired bonds, even the Mississippi River Flood Control Association supported a bond issue. Those who favored payment out of current revenues stood firmly against bonds.[3]

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-8, No. 11, p. 24
2 Ibid--p. 8 No. 23
3 House Committee on Flood Control, Hearings 1927, p. 443

The greatest point of controversy developed in considering what part of the expense of the program should be paid by the Federal Government. Those who favored entire payment from the federal funds far surpassed in numbers those who favored local participation. With the exception of the army engineers, practically all three hundred witnesses urged that the United States should pay the whole cost.[1]

Strongest Argument for Federal Control

Many of the problems, were interstate. The weak local districts could not furnish their quotas of funds. The strongest argument for the Federal Government bearing all the cost was based on the poor financial condition of the various levee boards and the heavy sacrifices which they had already made to protect themselves. The total indebtedness of the levee districts on January 1, 1928 was $819,642,576.[2] This vast amount far exceeded the assessed valuation of the districts. Some districts had outstanding public bonds and real-estate mortgages for more than two hundred percent of their

1 Congressional Record, 70th Congress, 1st Session, Pt. 8, 1928, p. 6159
2 House Committee on Flood Control, 70th Congress, 1st Session, 1927-8, Bill No. 8219, p. 27

assessed valuation.[1] Of this large total only about $44,000,000 had been spent fighting floods. The larger part of the vast debts had been accumulated through drainage and general improvements. The flood of 1927 dealt the levee boards a staggering blow. They had burdened themselves with all kinds of taxes and it was an impossibility for the people to pay more.

Abundance of expert opinion stated that the majority of the land owners could not secure loans from any source. The very districts that needed the protection were those unable to procure loans. Investment bankers who handled the levee-board bonds stated that heavy defaults in these securities had depressed the market until they could not be sold.[2]

Secretary Hoover joined those who believed that the locals could pay no more and urged the Federal Government to pay all.[3]

Such facts led most Congressmen to believe that it was an absolute impossibility for the local levee boards to bear further expense, than their expenses of rehabilitation.

1 Mississippi River Flood Control Association, Losses and Damages from Flood of 1927, p. 195
2 Memphis Commercial Appeal, November 30, 1928
3 Commerce and Finance, July 27, 1927, p. 1495

The delta people were greatly disappointed in the two plans which Congress was seriously considering. The Jadwin plan suggested that the Federal government pay all cost of channel stabilization and eighty percent of the cost of construction of protective works and that the locals furnish the rights of way, pay damages from floodways and twenty percent of the cost of construction of protective works.[1]

The Commission plan provided for the locals to furnish rights of way and to pay one third of the cost of raising the levees to 1914 standard.[2] The Commission plan, therefore left much less of the burden to local interests.

Those who supported local contribution argued that if the Federal Government paid the whole cost it might tend to cause it to have "to pay for every project such as reclamation."[3] The Mississippi River Commission insisted on local control for the reason that it held that locals received special benefits, and secondly, of the belief that without a local sharing in the costs,

1 Congressional Record, 70th Congress, 1st Session, 1927, 1928, Pt. 8, p. 5848
2 House Committee on Flood Control, Document No. 1 70th Congress, 1st Session, P. 81
3 New York Times, January 24, 1928, p. 29

the Commission as an agent of the Federal Government, disbursing Federal Funds, would "be confronted by inordinate demands for flood control work not needed nor justified."[1]

Attitude of President Coolidge

President Coolidge threw a bomb of consternation into the camp of the delta people when he stood for the Jadwin plan, with local contributions and all. The president maintained in submitting the Jadwin plan to Congress, that the people of the delta would receive special benefits and that the states should share the expense.[2] He strongly opposed paying damages caused by the construction of flood control works. It soon became evident that a large majority of both houses of Congress stood in favor of the Federal Government bearing the entire expense, while President Coolidge, the army engineers and a few administration leaders demanded local contribution.

The House bill sponsored the Commission plan in general, the Senate bill sponsored the Jadwin plan, but neither bill pleased the administration.[3] The Jones bill

1 House Committee on Flood Control, 70th Congress, 1st Session, 1927-8,--Document No. I, p. 81
2 House Document, No. 90, 70th Congress, 1st Sess. 1927-8, p. 2
3 Congressional Record, 70th Cong. 1st Sess. Pt. 8 p. 6162

suited the President far better than the Reid bill, but the President criticized it because it provided for no local contribution.

As time went on it became evident that so comprehensive a plan as that proposed by the Mississippi River Commission would not meet with the President's approval.

Meanwhile the delta became alarmed with the possibility of a political issue. They wanted flood control to be considered wholly on its own merits.[1]

Republican members of Congress demanded that the Democrats cease to play politics with the revenue bill by demanding big cuts, and to insinuate that retaliations might arise. The matter became even more serious when members of Congress showed resentment against the President's interference in legislation by a threat of veto.[2]

The delta people feared that the President's veto might kill any measure that had been proposed. They then began to desert the Reid Bill and support the Jones Bill, which very largely carried out the Jadwin plan.

In March 1928, the Tri-State Flood Control Committee, consisting of powerful representatives from Louisiana,

1 New York Times, November 27, 1927
2 Congressional Record, 70th Congress, 1st Session, Pt. 10 1928, p. 7319

Mississippi and Arkansas urged the immediate passage of the Jones Bill.

The Committee accepted the bill in principle but suggested some amendments to provide for controlled spillways, so that the bill would clearly provide for compensation for property damages from protective works and to state clearly that "jurisdiction of the Mississippi River Commission on tributaries would not be curtailed." [1]

When the leaders for Federal Control began to show a tendency to accept most of the Jadwin plan, compromise became evident.

The President won his point against:

1) Paying compensation to the railways for damage in the floodways. [2]

2) Provision for the furnishing of the local rights-of-way on the main river.

3) To a certain extent he won the adoption of the Jadwin plan as opposed to the Commission plan.

The Jones bill adopted the engineering features of the Jadwin plan.

The supporters of the Commission received some consolation in the creation of a board consisting of the

1 Memphis Commercial Appeal, March 16, 1928
2 Congressional Record, 70th Congress, 1st Session, Pt. 10 1928, p. 7295

Chief of Engineers, the President of the Mississippi River Commission and one civil engineer to be appointed by the President, to consider the engineering features of the Commission plan and of the Jadwin plan with the authority to adopt the best features of both plans.[1]

President Coolidge yielded his point in regard to an estimate of the final cost and allowed the bill to go through with provisions that opened the way for huge projects. President Coolidge held out in regard to local contributions. The bill was drawn up to declare that the principle of local contribution was sound and that it had not been abandoned. But in view of the fact that the local interests had already paid $292,000,000 for flood protection, whereas the Federal Government had paid only $71,000,000 the United States would comply with the principle of bearing its just share by bearing the whole expense of the new project.[2]

The army engineers were satisfied because it left the Mississippi River Commission in charge and left the Corps still in a position to dominate.

Thus the Jones-Reid bill, as the amended bill was known speedily passed the Senate and the House by overwhelming votes.

President Coolidge approved it on May 15, 1928.

1 Congressional Record, 70th Congress, 1st Sess. Pt. 10 p. 7316
2 Congress of United States, Pub. Doc. No. 391, 70th Congress, 1st Session, 1928

Chapter V

Results of the Jones-Reid Act

Results of the Jones-Reid Act

The people of the delta showed great enthusiasm over the enactment of the Jones-Reid Act. The New Orleans Times-Picayune stated, "that in time the accomplishment of the flood control program would be accounted by history as almost as epochal as the Louisiana Purchase." [1]

The Memphis Commercial Appeal printed an article painted by Robert Ellis, Vice President of the Chamber of Commerce of the United States declaring that the flood control legislation would have a far reaching effect. "The Great Father of Waters has at last found its master." [2]

Real estate men considered the Jones-Reid Bill the greatest piece of legislation that ever came before a peace time Congress, that the enactment of this bill would carry the delta area on a long period of prosperity and that the valuation of delta lands would be greatly increased. All along the valley the people showed a revived spirit as they felt they would never be called upon to make such sacrifices as they had made during the great disaster of 1927.

1 New Orleans-Times-Picayune, May 16, 1928, p. 10
2 Memphis Commercial Appeal, May 17, 1928

Two appropriations had been made that bore directly on flood control before the passage of the Jones-Reid bill. On December 22, 1927 a deficiency appropriation measure was enacted to restore the $7,000,000 that the Mississippi River Commission had spent in emergency work during and following the flood of 1927.[1]

Two million dollars reverted to the War Department to replace funds diverted from allotments for works on rivers and harbors, and the remainder became available for the rise of the Mississippi River Commission for the construction of protective works. January 16, 1928 another law was enacted that dealt with the rehabitation program. The county agricultural extension agents were paid principally by the various counties in which they were employed. The county treasuries were so depleted by the flood of 1927 that they could not meet their shares of expenses. The Federal government appropriated $500,000 to carry on the work because it felt that the activities of these agents formed a valuable part of the program of reconstruction.

1 Congressional Digest, February 1928, p. 41
2 Ibid

The funds necessary to meet the provisions of the Jones-Reid Act for the year 1928-1929 were provided by an appropriation of $24,000,000 of which Secretary of War, Davis allotted $21,228,000 for immediate use.[1] The Mississippi River Commission then had sufficient funds for the rapid construction of levees and the carrying out of the other provision of the act.

An important change occurred in the personnel of the Mississippi River Commission in June 1928. During the hearings preceding the enactment of the Jones-Reid bill Colonel Charles L. Potter as President of the Commission had presented a much more comprehensive plan of control than General Edgar Jadwin, the Chief of the United States Army engineers had submitted. Both men had criticized the other's plan. Naturally, it was not a surprise to have Colonel Potter succeeded by Colonel T. H. Jackson as President of the Mississippi River Commission. The people of the delta seemed pleased with this change as Colonel Jackson was regarded very highly by them. Reorganization of the Commission took place to meet the new conditions. Formerly the Commission had designated certain members as officers in charge of work in given districts. In November 1928 the direction of the program was turned over to one man

1 Congressional Digest, February 1928, p. 41

as Director of the Flood Control Project. Major Paul S. Reinecke became the first director.[1] This change left the work under the Commission but placed one man in charge of the entire program instead of several individuals, each in his own district as formerly.

The supporters of the Commission's plan forced through a clause in the Jones-Reid Act providing that the Flood Control Board should adjust the engineering differences between the two plans by adopting or rejecting features of either plan.[2]

The composition of the board received considerable criticism. The board consisted of General Edgar Jadwin, the Chief of the United States Army Engineers, Colonel T. H. Jackson, the President of the Mississippi River Commission and C. W. Sturtevant of New York, a civilian engineer appointed by President Coolidge. The Board formulated its plan and prepared its report in August 1928. President Coolidge approved it and it was made public by the Department of War, August 16, 1928. The Jadwin plan had been unanimously adopted in practically all its details.

The following sketch as portrayed by Harris Dickson

1 World Almanac, 1929, p. 160
2 Memphis, Commercial Appeal, April 25, 1928

gives an idea of the work to be accomplished under the act of August 16, 1928.[1]

The Jadwin Plan

Beginning at the northern limit of our alluvial valley from Cape Guardeau, Missouri, the levees will be gradually raised to two feet at Bird's Point, the head of a floodway that will be provided immediately below Cairo, Illinois to protect that city and its 15,000 inhabitants. It is in this stretch of river that existing levees seem to choke the channel and have a tendency to make the waters pile up.

Cairo will be inclosed by a levee rising sixty feet on the gauge. Portions of that city now lie twenty feet below this level. A maximum flood may climb to 65.5 feet if confined, but the water will not be confined, for when the stage reaches fifty-five feet it spills into this floodway and is carried off.

For that purpose a new set back levee is to be constructed from Bird's Point to New Madrid, Missouri at an average distance of five miles from the river. This space between the new line and the old forms the floodway, seventy miles long as the river runs. The front levees remain, but are cut down five feet lower

1 Keeping the Father of Waters in the Straight and Narrow Path, Saturday Evening Post, November 3, 1928, p. 52

than those at the rear. So this weaker front must break while that at Cairo still holds, and the basin will restrict a super-flood to fifty-nine feet on the Cairo gauge. In 1927 the most phenomenal overflow for 200 years produced a crest at Cairo of 56.4 without mishap. Under present handling an equal inundation would cause a stage of 55.5 for a short time only.

In addition to saving Cairo, this work at New Madrid renders the whole St. Francis Basin less liable to accidental crevasse. Even such lands as lie within the floodway can be cultivated through every season, except when water rises higher than the crest of 1922.

South of New Madrid the levees will be raised one foot above the super-flood, except opposite the backwater areas of the St. Francis and White Rivers.

Now we come to the middle river from the Arkansas to the Red River. The Arkansas was the terror of 1927. Into the Mississippi already gorged with waters, the Arkansas emptied another load of more than three times as heavy as Niagara Falls.

Just above the Arkansas, the White River had previously donated one Niagara and a half.

These resistless reenforcements burst through our defense on the east side at Mound, Mississippi and caused what proved to be the most disastrous crevasse in river

history.

A prodigious mass of water must be taken care of at that point. Four and a half Niagaras can not be abolished. They must go somewhere and Nature has provided the path.

The Mississippi River empties by three separate mouths into the Gulf of Mexico, extending a mud bank at the rate of one mile for each twenty-one years. Centuries ago the same process was going on at what is now the southeast corner of Arkansas. There the Mississippi possibly discharged a portion of its waters westward, then encroached farther south and abandoned that channel. Whether this be true or not, an irregular basin still exists, known as the Boeuf River Basin, the Tensas Basin, and the Atchafalaya.

Below the Red River this runs into a chain of lakes, and the well defined Atchafalaya River, which debouches into the Gulf, about ninety miles west of New Orleans. This depression is continuous from the mouth of the Arkansas and once a drop of water escapes from the Mississippi it never gets back again.

Near the mouth of the Arkansas are the highest floods and here is the natural outlet. It has always been the natural outlet. Prior to 1921, whenever the Mississippi River swelled beyond fifty-one feet on the Arkansas City

gauge it automatically relieved the pressure by discharging at this point through Cypress Creek. This surplus went into a small stream called the Boeuf River, which parallels the main stream at from five to fifty miles.

Up to seven years ago this was the routine of every overflow--fifty-one feet at Arkansas City, down the Boeuf, out by the mouth of the Atchafalaya. The Boeuf River Basin necessarily was inundated because that territory is part of the high water bed of the Mississippi.

All this was before 1921 when Cypress Creek was closed by a levee which diverted the water from the Boeuf River and added to the excessive load already carried by the main channel. Engineers are practically unanimous that Cypress Creek must be reopened but not as it was before. Without drawing off the surplus our levees will surely break in times of super-flood. Crevasses will come at unexpected points, perhaps in front of thickly populated communities and because of higher levees, a higher head of water, the losses must be far, far greater.

If the levees will not hold a super-flood the waters must get out, it then seems the part of wisdom to discharge a part of them where the overflow does the least harm, into a prepared basin from which those waters never return to the Mississippi.

To secure a timely discharge of the Mississippi through Cypress Creek, that levee will remain at its present height of 60.5 feet, while those that flank it on either side are raised three feet. This is the "Fuse Plug" levee, so named because its relatively weaker section is supposed to blow out like a safety valve and let off excess waters which the leveed channel below will not carry. The protection now enjoyed by lands that lie within the floodway itself is not reduced. But no flood can overtop this fuse plug until it becomes so high that the main channel must find an outlet. The high water of 1927 if confined, would have overwhelmed the fuse plug by 8.5 feet and gone down the Boeuf River.

There was much argument against the height of this fuse plug, 60.5 feet as against the proposed masonry spillway with a fixed level of 54.5, six feet below the height of the fuse plug. It is insisted that at 60.5 feet unless the fuse plug blows out with a rush, the Vicksburg sea wall will be endangered; 60.5 feet at Arkansas City means 58 on the Vicksburg gauge, about a foot below what our wall successfully withstood in 1927.

If a masonry spillway were used, over which waters pour at 54.5, then the Boeuf River Basin must be frequently submerged during seasons when it would be kept dry by a fuse plug at 60.5.

On the other hand, over a lower spillway the water flows sooner, but it also stops flowing when the river falls below 54.5. Though the fuse plug protects the Boeuf River up to 60.5, once that plug should break it carries down much more water, which remains for a longer time, for the fuse plug will not cease flowing until the Mississippi returns to its banks, somewhere around forty-two feet.

But a monstrous wall of water will not come rolling down the floodway. Crevasses never act like that. "At first there is a terrific inrush, which soon strikes the flat lands, loses velocity and spreads." [1]

Inhabitants will have plenty of time to move. During the flood of 1927 the United States Weather Bureau did extremely valuable service.

On April 2, Pittsburg, Pa. was warned that it would get the flood crest about May 1, a month ahead of the flood.

New Orleans was warned a month ahead of the flood crest. It was possible to warn all people all up and down the Mississippi. Nobody need be caught. When the river reaches the 51 foot mark at Cairo, Illinois it is a signal to people to get ready to fight the flood. It takes about 6 days from Cairo, Illinois for the flood to

1 Keeping the Father of Waters in the Straight and Narrow Path, Saturday Evening Post, November 3, 1928, p. 52

reach Memphis, Tennessee, 21 days from Memphis to the Red River, and 30 days to reach New Orleans.

The Mississippi overflows do not occur like mountain stream freshets, or when a huge dam bursts. Inundations are more or less expected for months. The riparian people know that the fuse plug will break at 60.5. Suppose that Arkansas City gauge now stands at 40, there is no cause for alarm. The next week, however, it has reached 50. The people are still safe. The Ohio is rising, and the Missouri waters continue to pile up, big waters are reported at Cairo. When the barometer has reached 59 it is time for all to be ready to move. The waters reach 60 at Arkansas City, when, if ever, the super-flood shall reach 60.5 the fuse plug has blown out. Thousands of telephones, telegraphs, radios, newspapers will have given warnings for days. Even after Cypress Creek has gone out, farmers will have, some of them as much as two weeks to prepare for the floods.

New Orleans Wall

In the tangled Atchafalaya-Red section, Morgan City, Melville and Simmesport will be inclosed wholly or partly by levees.

New Orleans, the second seaport of the United States

must be made secure. A crevasse here would cost human lives and many millions of property.

According to expert opinion the safety of New Orleans can be accomplished. The first step is by an outlet at Cypress Creek.

Next, twenty-five miles above the city, more surplus water will be shifted through Bonne Carre spillway into Lake Pontchartrain, which communicates with the Gulf.

The Bonne Carre outlet is designed so as to afford perfect control of the discharge. "Whenever a flood reaches twenty feet at New Orleans, these sluices will be opened, taking off sufficient water to prevent the crest from mounting above twenty as it passes the city."[1]

Past records indicate that about once in five years it may be necessary to open the spillway. By this frequency of use, the deposit of silt in Lake Pontchartrain may average one thirty-second of an inch per annum.

Local taxation has built magnificent levees on the New Orleans front, so high, so wide, with such flat slopes that there can be no danger except from superfloods actually running over them and causing the banks to cave, or erosions from underneath.

As a further precaution the emergency spillway into

1 Keeping the Father of Waters in the Straight and Narrow Path, Dickson, Saturday Evening Post, Nov. 3, 1928, p. 52

Lake Borgne, at Caernarvon will be kept closed. Caernarvon lies about eleven miles below, to draw off excess water at that point speeds the current at New Orleans and adds to the perils of caving banks.

From a point some seventy-five miles south of New Orleans to the head of the alluvial valley, every embankment will be strengthened beyond the possibility of saturation. In 1927 water stood against these ridges for 156 days. They became soaked, sobby, trembled beneath the tread of a man. Now, while being moderately raised, the levees will also be thickened, so that seepage can not trickle through.

"Part of the embankment must remain dry and firm."[1] The man who owns land in the narrow strip of backwater area between Cairo and Memphis, or a similar strip between Vicksburg and Baton Rouge will be injured by the system of levees. These acres crouch at the foot of the hills, and are insufficient in extent to justify the cost of protection. Formerly they were overflowed every season, but as a rule the water went off in time to produce a crop. Levees now raise the flood levels and these lands are greatly damaged.

This same hardship applies to large areas at the mouths of the tributary rivers, the St. Francis, White,

1 Keeping the Father of Waters in the Straight and Narrow Path, Harris Dickson, Saturday Evening Post, November 3, 1928, p. 56

Yazoo, and Red. These areas are always flooded, but not to so great a depth nor for so long a period. Many of these plantations have been abandoned.

"The act of Congress authorizing flood control emphasizes the fact that no liability for damage shall rest upon the United States, yet if it be found impracticable at any point along the Mississippi, to construct levees, and lands are subjected to overflow and damage, which are not, now overflowed or damaged, then the Government may acquire either absolute ownership of land or floodage rights."[1]

Again in Section 4: "The United States shall provide flowage rights for additional destructive flood waters that will pass by reason of diversions from the main channel of the Mississippi River: Provided, that in all cases where the execution of the flood control plan results in benefits to property, such benefits, shall be taken into consideration by way of reducing the amount of compensation to be paid."[2]

A statement of the plans can give one no idea of the magnitude of this great project. It has involved an incredible amount of labor and study by the foremost engineers of the world. Of the best engineers, many of

1 Keeping the Father of Waters in the Straight and Narrow Path, Harris Dickson, Saturday Evening Post, November 3, 1928, p. 56
2 Ibid

them go into the army and only the best have been chosen for this great task. Associated with them are dozens of civilian engineers, especially trained by a life-time fighting of high waters, they are able, honest men. They have no local interests to serve, no pecuniary profit to expect.

The acquisition of rights of way and the condemnation of property for floodways and the spillway above New Orleans (Bonne Carre) formed a part of the work of the program for the year 1929-1930. The rapid execution of the levee building and the general process in carrying out the project have met with general approval despite strenuous local protests. The completion of this program will give the delta the protection which prior to 1927 was thought wholly unnecessary and which according to all available data seems sufficiently adequate.

From a National view-point representing, the people of the entire valley, we must consider the plan as a whole, balance the unavoidable disadvantages of certain communities against the greatest good of the greatest number and defend the most people with the least damage to the few.

Official Photograph, U. S. Army Air Corps

SEVENTY-FIVE YEARS AGO THIS PLAIN BELONGED TO THE INDIANS

Not until 1854 was a treaty concluded with the Omaha Indians which gave to white settlers title to what is now the city of Omaha.

"Trailing History Down the Big Muddy"
The National Geographic, July 1928--p. 105

Looking into the Future

The influence of the Panama Canal on American shipping has been profound. The best of our privately owned ships are engaged in the protected trade between the Atlantic and the Pacific Coast. Foreign ships are forbidden to enter into our coastal trade.

During the World War the United States Council's Committee on Inland Waterway Transportation recommended full utilization of our inland waterway facilities.

The principle of joint rail and inland water rates was established at that time. Without the arrangements for interchange of cargo between rail and rivers, inland waterway carriers might still be limited to cargo originating within a few miles of the waterway.

Much of the recently renewed interest in inland waterways is due to President Hoover who was Secretary of Commerce during the World War. He recommended that "our inland water transportation activities should be directed toward a unified and interchangeable system of 9,000 miles in the Mississippi and tributary valleys and to a deep channel outlet from the Great Lakes to the Atlantic."[1]

The business men of the Middle West have been greatly

1 Recent Economic Changes--Vol. I p. 317
Report of President Hoover's Committee on Recent Economic Changes

interested in this program because of the shift of traffic due to the opening of the Panama Canal. Those affected by this shift of trade are seeking cheaper transportation outlets and inlets and are eager to support the development of the Mississippi River system including a Great Lakes connection and the Great Lakes to the Atlantic Waterway.

The Mississippi River inland waterway traffic has received more attention than all other rivers. The government is attempting to create conditions required to stimulate private ownership on these waterways.

The following table illustrates the growth of traffic carried by the Mississippi and Warrior River Barge Lines 1918-1927. [1]

Year	Mississippi Service	Warrior Service
1918	23,378	10,350
1919	104,769	130,502
1920	160,702	200,017
1921	443,267	228,844
1922	599,669	260,344
1923	710,431	269,341
1924	849,503	222,345
1925	910,755	231,464
1926	1,044,649	296,929
1927	1,237,452	398,694

When the deepening of the Mississippi and its tributaries is completed so that cargo can be carried

1 Recent Economic Changes--Vol. I p. 318
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Recent Economic Changes

MODERN MISSISSIPPI BARGES OFTEN CARRY AS MUCH CARGO AS 100 OLD-TIME PACKET BOATS

To aid navigation, the channel of the Mississippi, especially below Cairo, has in recent years been much improved by dredging and revetting. Already this change has resulted in a great revival of river-borne commerce. Twice as much cargo is carried now as in the days of the romantic old steam packets. This barge tow of new automobiles is on its way downstream from Memphis (see, also, text, page 277).

"The Great Mississippi Flood of 1927"
The National Geographic, September 1927--p. 259

continuously in large modern barges over the greater part of the 9,000 miles of inland channels, the effectiveness of this method of transport, may be more apparent.

The government has borne the expense of the experimental stages of development, but if the Inland Waterways experiment by the government proves a success private capital and private operation will doubtlessly enter this field of transportation.

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Development of the federal flood control of the Mississippi River.

DATE	ISSUED TO
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2:15	J. W[illegible]

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