

# Floods: causes and consequences essay sample



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Within the conceptual framework of this research, I would like to elaborate on causes and consequences of floods. There are always floods somewhere in the world. They threaten big communities with millions of people, their lives and properties. Big floods always draw international attention. In order to support my discussion about floods with concrete examples, I will talk about causes and consequences of flood using Mississippi River basin.

### The flood plain

A river's flood plain is central to any discussion of floods. A broad, nearly flat landform consisting of stream-deposited sediment, the flood plain is inundated by flows in excess of channel capacity (that is, a flood). The flood plain is higher along the edge of the river, built up by deposition of sediment from water overflowing stream banks. As the water leaves the channel, it is abruptly slowed by the reduced gradient and friction of the flood plain. (Ward 1978)

The deposition of sediment along the channel banks produces natural levees which appear as slightly higher ground between the river and its flood plain. The natural levee slopes, often imperceptibly, away from the river so that the lower and less well-drained portion of the flood plain often has standing water, known as a backswamp. The flood plain, including the back-swamp, is extremely important in the natural process of flooding. "If a flood is defined as flow in excess of channel capacity, then the flood plain's role is to store the excess flow until it can be accommodated by the channel." (Wundram 1993) Although some flood water evaporates, most of it flows directly back into the channel or rejoins the channel indirectly by groundwater flow. The

flood plain is instrumental in flood control by storing – and slowing – excess water.

### Mississippi River

In 1993 the Mississippi River and its flood plain differed considerably from what members of DeSoto's expedition saw in 1539. Then the Mississippi meandered freely across its flood plain, uninhibited by levees and dams. The flood plain was largely forested and wetlands were common as were oxbow lakes created by shifting channels. Flood-plain ecosystems, especially wetlands, were home to an especially rich and diverse assemblage of plants and animals. Rich alluvial sediment and an abundance of water provided the basis for this wealth of resources. However, in 1993 the flood plain was intensely utilized for settlement and agriculture. Gone were most of the flood-plain forests and large portions of the backswamp were drained, giving way to extensive corn and soybean fields. (Tobin 1993)

The federal government did not become involved in flood control efforts until the 1850s. " Extensive floods in 1849 and 1850 led Congress to appropriate funds to investigate flood control possibilities on the lower Mississippi."

(Moore 1989) The study, which took more than a decade to complete, recommended a policy of using levees to confine the river, sparing the flood plain from further flooding. Thus a policy was established that, to a remarkable degree, has remained intact until the present.

The Civil War temporarily halted federal flood relief efforts but following the cessation of hostilities, a massive effort to construct levees was begun, the costs borne mostly by local taxpayers. Continued flooding of the Mississippi

River in 1862, 1865, 1869, and 1874 brought renewed public pressure for a comprehensive federal solution to the Mississippi's continued flooding, resulting in Congress establishing the Mississippi River Commission in 1879. The Commission was given authority to survey the Mississippi and its tributaries as well as to plan for navigation and flood control. (Leopold 1974)

Thus 1879 marked a major turning point in federal policy as Congress gradually accepted the idea that the federal government was responsible for promoting the country's development through improving infrastructure. However, until 1917 Congress did not formally acknowledge responsibility for flood control, instead insisting that navigation would be the beneficiary of flood control appropriations. However, continued flooding, especially in the lower Mississippi Valley (which was spared from 1993's floods), led to continued pressure for a much greater federal role in flood control which culminated in the Flood Control Act of 1917. This legislation authorized \$45 million to be spent on flood control, primarily levees. Flood control was now on equal footing with navigation, although there was no basin-wide comprehensive planning. (Wegner 1993)

### Preventing floods

" After 1917 an extensive system of levees, built to federal standards, increasingly prevented the Mississippi from overflowing its banks onto its flood plain." (Ward 1978) Finally, the Mississippi's flood problems seemed to be solved. Or were they? In 1927 a catastrophic flood on the lower Mississippi resulted in a massive failure of the levee system and the flooding of 20, 000 square miles, the first time levees built to the Mississippi River

Commission's standards had failed. Obviously, levees were not the final solution to Mississippi River floods.

The federal government responded with the Flood Control Act of 1928 which provided for the federal government to pay the entire cost of additional flood control measures. The Act authorized expenditure of \$325 million, an enormous amount when compared to what was spent prior to 1927.

Subsequent flood control acts in 1936 and 1938 led to an even greater federal role, not only in the Mississippi Valley but elsewhere. The federal government has spent billions of dollars constructing an elaborate flood-control network along the nation's rivers. A total of 7, 000 miles of levees has been constructed along the Mississippi River and its tributaries, protecting both urban and rural areas. Since 1927, \$25 billion has been spent on the Mississippi River and its tributaries, a majority of it on the Mississippi below Cairo, Illinois.

“ Considerable attention, especially by the media, has been given to the role of levees in the Great Flood of 1993, especially their failure.” (Tobin 1993)

First, it should be pointed out that there are two types of levees: those built or financed by the federal government, most of which are designed to withstand a 100-500 year flood, and smaller non-federal levees built to protect agricultural lands and frequently designed for flood recurrence intervals of 50 years or less. That 78 percent of the non-federal levees failed or were overtopped should come as no surprise. Even with the valiant and often heroic efforts to save levees, most non-federal levees simply were not designed to withstand the tremendous pressure exerted by the raging rivers.

Only 18 percent of the federal levees failed a figure that is not surprising given their design to withstand greater floods.

“ Still, over 2, 100 levees extending approximately 6, 000 miles failed, leading to the inundation of more than 20 million acres.” (Mairson 1994) Indeed, many Americans will remember the flood by the massive effort to prevent levees from failing. In addition to the levees that were destroyed, many others were damaged and must be repaired before they can offer any degree of protection from future floods. The question of whether damaged or destroyed levees should be rebuilt is perhaps the most hotly debated issue emanating from the Great Flood of 1993. (Tobin 1993)

#### Causes of floods and possible prevention

When a levee is built to prevent the river from spreading out horizontally over the flood plain, the river is constricted. This causes three problems: with its flow constricted by the levees, the river rises higher and flows faster; this higher and faster flow adds to the threat of downstream flooding since the water is constricted rather than being released on the flood plain; and forced by levees into a narrow channel, the river backs up, much like a clogged drain, increasing pressure upstream. (Dunne 1978)

These problems are further exacerbated by dredging and straightening the Mississippi's channel to improve navigation, as well as erosion control structures which contribute towards the narrowing of the channel. The water in a river channel has to go somewhere - either it spreads out onto the flood plain or, if constricted, it rises higher and flows faster, seeking relief downstream. Combined with flood-plain development and the dramatic loss

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of wetlands, the replacement of a natural flood-control system with an artificial one based on levees is viewed by many as a guarantee that floods of even greater magnitude will occur in the future. Yet levees have their defenders.

The U. S. Army Corps of Engineers, who obviously have a vested interest in levees, point out that flood-control structures have prevented more than \$200 billion in damage over the years and in 1993 prevented an additional \$1.5 billion in damage. (Mairson 1994) As with the situation at Three Mile Island, evidence exists to argue that the system works while evidence also exists to argue that the system does not work. However, two facts cannot be denied: the loss of wetlands to agriculture and development made the flooding worse; and, sometime in the future, the Mississippi River will reclaim its flood plain. Eventually, the Mississippi River will have its way; its use of the flood plain cannot be permanently denied. If we do not give the flood plain back to the river, it is probably only a matter of time until the river takes it back.

### Consequences of flood

Although significant attempts have been made to control flooding of the Mississippi River, continued development and modification of flood plains result in increased damages. Again, and at the risk of being redundant, the Mississippi River and its tributaries will not - and cannot - be denied the use of their flood plains. The Great Flood of 1993 raised major questions as to how flood plains should be managed, the role of flood control structures, government flood plain and crop insurance programs, and whether land use

in flood plains should be managed to minimize flood loss, to include the effects of upstream development. These questions have yet to be resolved.

The question of whether or not to rebuild levees is hotly debated. Certainly it is appropriate to protect existing cities from flooding. Hannibal, Missouri's new \$8 million floodwall showed how effective such structures can be in protecting urban areas, and Davenport, Iowa's lack of such a structure led to the city's inundation by the Mississippi's murky and muddy waters. The loss of Des Moines' water treatment plant illustrated how vulnerable a major metropolitan area is to flooding, even if most of the city stays dry.

The question of rebuilding levees that protect agricultural land needs to take into consideration the suitability of land for agricultural use and the question of who assumes the risk and COST of farming highly productive land that is subject to flooding. Whether or not to rebuild levees is made even more difficult by two factors: politicians demand that flood control structures be built or rebuilt in order to prove to their constituents that they are doing something to protect them from flooding and there is a real difficulty in striking a balance between short-term fixes and the need for long-term flood protection which may include returning portions of the flood plain to the river.

Federal crop insurance programs were first authorized in 1938 and federal flood insurance dates to 1968. (Moore 1989) In both cases Congress's goal was to transfer the cost of flood-plain occupancy from the taxpayer to the individual who occupies or otherwise uses the flood plain. Yet this is not what has happened. Less than ten percent of the insurable properties in the



counties and communities affected by the 1993 flooding had any form of flood insurance. With such a staggering loss of property from the 1993 floods the extremely low percent of insured property begs the question " why?".

The question of who should pay the cost of damage in flood-prone areas still begs an answer. Certainly some type of mandatory insurance for buildings and crops within the 100-year flood plain, if not the 500-year flood plain, would go a long way towards mitigating this problem and would be a good beginning towards reduction of what could be called " hydrological welfare." (McPhee 1989) However, sound policy towards, and wise use of, flood plains will require much more than an insurance policy.

Specifically, all incentives to flood-plain occupancy need to be removed so that the individual assumes both the risk and responsibility for his/her activities in flood-prone areas. The federal government should not be the equivalent of a " national 911," bailing out, or assuming the risk for, individuals. Instead of financial assistance in the name of disaster relief such as grants, low interest loans, and repair of infrastructure, perhaps the nation's flood plains should be marked with signs that read " Flood Plain - Use at Own Risk." The following analogy is crude but if my kitchen sink leaks, I fix it or pay a plumber to fix it. If torrential rains cause my basement to leak, as they occasionally do, I don't call the mayor, governor, or my Congressional representative. I - and my insurance company - are responsible for any damage from extreme weather or other " Acts of God."

Effects on Americans

Although many Americans had not realized that there was a problem with the nation's flood plains, a search for a viable program to foster wise use of flood plains began long before 1993's floods. Perhaps in retrospect the Great Flood of 1993 will be remembered as the event which spurred the country into action. Certainly flood-plain management has greatly improved, at all levels of government, during the past twenty-five years. Flood-plain management involves several different disciplines and the evolution of flood-plain policy required a gradual merging of intellectual traditions which has not had sufficient time to completely jell.

Also, no single federal agency has the sole responsibility to deal with floods and flood-plain management. Indeed, one needs a directory to sort out the maze-like web of laws, regulations, executive orders and directives, which authorize flood-control efforts. While an excellent foundation has been established, legislative action is needed to consolidate and build upon recent efforts, and to firmly establish and implement policy. Politics needs to be removed from disaster relief. In spite of current policy, feckless politicians secure as much federal funds as they can in order to rebuild communities as fast as possible. This, of course, intensifies land use on flood plains, setting the stage for the next flood. Bailing out flooded constituents produces such enormous political benefits that it may be too sweet a political apple for Congress to refuse. Long-term vision has never been Congress's strong suit.

In order to be truly successful in mitigating the flood threat, not only on the Mississippi River, but on all of the nation's rivers, we must reduce the emphasis on flood-control structures. It is human nature to respond to flooding by building larger and stronger dams and levees. Indeed, there is a <https://assignbuster.com/floods-causes-and-consequences-essay-sample/>

tendency for the media to portray the flood as drama; that is, a continuing saga of humans against nature, man against river. The Mississippi becomes Goliath, a flood-plain community, David. While not nearly as dramatic, the creation of greenways, flood-plain parks and golf courses will, when combined with removal of buildings to locations above flood levels, largely eliminate the need for this recurring drama. (Moore 1989)

Linked with this is the need to address the entire watershed rather than just one particular area or administrative jurisdiction. The causative factors for floods are well known. We now need detailed, analytical and site specific studies of individual watersheds to provide the basis for effective planning and management. These studies should be done by those who know the land and river the best, using existing expertise close at hand. The infrastructure for studies of this type already exists; the funding does not (perhaps funding can be tied to flood insurance programs). The more local the research programs are, the more practical and viable the solutions. Model programs at the state and local levels already exist and there is supervisory expertise at the federal level, although it is often spread through too many agencies. (Wundram 1993)

## Conclusion

To conclude, the Great Flood of 1993 was the latest chapter in a long saga of Mississippi River floods. While much has been done to reduce flood risk along the Mississippi River during the past 150 years, much remains to be done, especially in a holistic framework. Response to natural disasters in the United States tends to be event driven; that is, policy develops in response

to individual disasters. The Great Flood of 1993 would seem to be a case in point. The river tries to teach us but we have been slow learners. Let us learn what the river teaches about flood plains, flood-plain occupancy and levees. Those that fought the flood and manned the levees learned the river's lesson, the same lesson DeSoto's expedition learned in 1539: the Mississippi River will not be denied its flood plain. It is a lesson not to be forgotten when it comes to causes and consequences of floods.

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