5-1-2010

Beyond bigger and better: Gilbert White and America's new approach to floodplain management

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BEYOND BIGGER AND BETTER: GILBERT WHITE AND AMERICA'S NEW APPROACH TO FLOODPLAIN MANAGEMENT

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A Thesis
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Master of Arts
in History
in the Department of History

Mississippi State, Mississippi

May 2010

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Title of Study: BEYOND BIGGER AND BETTER: GILBERT WHITE AND AMERICA'S NEW APPROACH TO FLOODPLAIN MANAGEMENT

Pages in Study: 84

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Until the early twentieth century, Americans generally responded to the risk of floods by building protective levees. By the late 1800s, this approach was firmly entrenched in federal policy. Because of the singular focus on levees, floods actually became more severe, with a prime example occurring in 1927. The floods of 1927 demonstrated that levees-only was an untenable policy, but a new approach to managing flood risk took several decades to fully materialize. The geographer Gilbert Fowler White played a central role in developing the nation's new approach to floods. In his 1945 doctoral dissertation, White laid out a multi-faceted approach to flood risks that promoted the accommodation of nature at times, rather than relying exclusively on ever-greater works of engineering to address the risk of flood. The passage of the National Flood Insurance Act in 1968 demonstrates the acceptance of White's ideas into federal policy.

Key words: floods, flood insurance, Gilbert F. White

ACKNOWLEDGEMENTS

In completing this thesis, I owe many debts to those whose assistance has aided me along the way. My major advisor, Jim Giesen, has been invariably helpful, taking the time to provide me with detailed feedback throughout the process despite many other demands for his time. My other committee members, Alan Marcus and Stephen Brain, have played crucial roles in my development as a historian. Numerous librarians have been vital to my research, including Christine Fletcher at Mississippi State, Mike Brodhead at the U. S. Army Corps of Engineers' history department, and the people associated with Mississippi State's interlibrary loan service, who perform an invaluable service behind the scenes. My parents, Eric and Christine Rumsey, raised me to develop an interest in history and have taken an active interest in my thesis. Chepina Witkowski has been a steadfast source of inspiration and motivation.

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CHAPTER 1

INTRODUCTION

The state of Iowa had been hit by heavy rainfall throughout early June 2008, yet few people saw any reason for concern. On the evening of June 7, a Saturday, the showers relented for a few hours, allowing thousands of people to enjoy an outdoor concert in downtown Iowa City, a few blocks away from the Iowa River. Things changed quickly, though. Within a matter of days, many of those formerly carefree concertgoers were fighting to save their personal possessions, if not their lives. The Iowa River, already high on June 7, continued to rise, much more rapidly than forecasters had predicted. By the 9th and 10th of June, residents were ordered to evacuate certain areas of the city. These generally low-lying locales had been presumed high enough to be at an insignificant risk for flooding. Nonetheless, the waters came to Iowa City, as to many cities throughout the Midwest. By June 13, the Iowa River crested the spillway of the Coralville Reservoir, just upstream from Iowa City, further increasing water levels in town. The University of Iowa shut down, and the city was almost bisected, as nearly every bridge across the river in the metropolitan area was closed. Once the waters receded, losses within the region were estimated to reach well into the billions. With the floodwaters, and the economic losses, came questions. How do people decide which

places are safe for inhabitation, and which places are too likely to be flooded? How should floodplains be defined? Should they be protected?[1]

Water is an important element of the natural world, and it has certainly not gone unnoticed by historians. When people struggle with water, they generally have one of two purposes in mind: providing it when it is in short supply, or keeping it at bay when it is overly abundant. The former objective has inspired a healthy body of work, focused largely on the campaign to irrigate the American West.[2] The latter aim, clearly the one on the minds of Iowa Citians in the summer of 2008, has also received some attention, though its historiography is not as thorough. Historians have scrutinized the way flood control changed over the nineteenth and into the twentieth century.[3] They have investigated specific incidents such as the disastrous floods of 1927.[4] Less examined has

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[1] The author was present during the flooding in Iowa City in June, 2008, and details are drawn from personal experience. Newspapers such as the *Iowa City Press-Citizen*, the *Cedar Rapids Gazette*, and the *Des Moines Register* provided thorough coverage of the flooding and are excellent sources for further information.

[2] Pioneering works in the historiography of western irrigation include Samuel Hays' *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement* (Cambridge: Harvard University Press, 1959) and Donald Worster's *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Pantheon Books, 1985). Other important books in the field include Marc Reisner's *Cadillac Desert: The American West and Its Disappearing Water* (New York: Viking, 1986), Donald Pisani's *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935* (Berkeley: University of California Press, 2002), and Mark Fiege's *Irrigated Eden: The Making of an Agricultural Landscape in the American West* (Seattle: University of Washington Press, 1999).

[3] For examples, see Jamie W. Moore and Dorothy P. Moore, *The Army Corps of Engineers and the Evolution of Federal Flood Plain Management Policy* (Boulder, Colo: Institute of Behavioral Science, University of Colorado, 1989) and Martin Reuss, *Designing the Bayous: The Control of Water in the Atchafalaya Basin 1800-1995* (Alexandria, VA: U.S. Army Corps of Engineers, 1998)

[4] Leading works on the Mississippi floods of 1927 include John M. Barry, *Rising Tide: The Great Mississippi Flood of 1927 and How it Changed America* (New York: Simon &

been the way that the mentality behind flood control in the United States has changed. "Disasters and serious accidents are always evidence of bad engineering," hydrological innovator James Eads stated in 1874, implying by his statement that with perfectly executed engineering, losses caused by wayward waters could be fully eliminated.[5] Today, such a statement seems dubious at best, if not downright naïve. Knowledgeable observers no longer accept the idea that bodies of water can be fully subdued by the efforts of humans. Sometimes, we now know, people must accommodate the ebbs and flows of the natural world. This shift in thinking was catalyzed by the federal government's entry into floodplain management, and by its decision to place its faith in levees, perhaps the most brazenly domineering tool humans bring to the table in their efforts to negotiate relationships with Earth's bodies of water.

An important transformation in the way Americans relate to the risk of floods has taken place in the past century. In earlier years, the dominant view equated rivers with wild beasts that must be tamed to further human progress. The wilder the beast, the greater the renown one could earn by taming it. Nature, however, has a way of belittling mankind's hubris. In 1912, the "unsinkable" *Titanic* met her match when she tangled with an iceberg on her maiden voyage. Fifteen years later, an analogous event ripped through the hull of confidence that characterized the American belief that flooding could be conquered, if humans could but summon the requisite collective willpower. For nearly half a century, the federal government had dictated that levees—embankments meant to

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Schuster, 1997) and Pete Daniel, *Deep'n As It Come: The 1927 Mississippi River Flood* (New York: Oxford University Press, 1977).

[5] Barry 75

constrain streams within their courses—were the only tool necessary to keep raging floodwaters at bay. The Mississippi River Commission, the governmental agency charged with fortifying the banks of America's rivers, imposed building standards for levees that would contain deluges greater than any in the historical record. By the mid-1920s, the MRC had finally declared that the levee systems on major American rivers were up to its standards. Like the unsinkable *Titanic*, the bulwarks were impregnable. In 1927, however, an inundation like none previously known afflicted the Mississippi valley. Waters rose to unprecedented heights, and just as the iceberg had sliced through the hull of the *Titanic*, the Mississippi River ripped gaping holes in its artificial constraints. In one blow, the raging currents had washed away the idea that the Mississippi's levees were impermeable, and the magnitude of the flooding was such that it would have been foolish to suggest that the MRC simply needed to adjust its standards to require sturdier construction.

Americans had been fortifying their riverbanks well before 1927. Their efforts were not always successful, but the MRC's high standards were meant to change that. The MRC did not fully account, however, for the effects of constricting the flow of many of the nation's major rivers. In earlier days, levees had been haphazardly built and maintained by individuals, local and state governments, and commercial interests. These disparate factions had never managed to fully link their protective works. Because of the sporadic nature of this older levee system, excess waters were always able to find places to escape their banks reducing the volume of water in the main channels. The federal government, however, had the resources and the authority to create a gapless system.

Once the full levee system was in place, no exit valves remained. The floodwaters of 1927, unable to spread lazily onto surrounding bottomlands, rose and rose, finally building up so much pressure that they pulverized mankind's stoutest efforts to contain them.

With federal support, America's riparian fortifications were built up to such an extent that sooner or later, a catastrophe such as that of 1927 was inevitable. In the wake of the overrun banks and inundated bottomlands, planners were left to ponder a new way forward. After nearly half a century of remaining relatively static, flood control policy in the United States began to undergo a transformation that would take nearly as long. No single individual had a greater influence on this transformation than geographer Gilbert Fowler White. Born in 1911, White was a mere teenager during the calamities of 1927, not yet involved in the debate over floodplain management. He entered the arena when he joined the New Deal bureaucracy in 1933, interrupting his graduate studies at the University of Chicago. White spent the next nine years working on issues of flooding and water control. In 1942 he completed his doctoral dissertation, a work that analyzed numerous ways to adjust to floods, and that would become deeply influential as it became better known. The essence of White's dissertation is his assertion that a multi-faceted approach will produce the greatest reduction in flood damages, and that in their dealings with water, people must look beyond modifying the environment. In many instances, White argued, optimal results will be achieved when people adapt their behaviors in relation to flood risks, rather than relying only on their ability to manipulate their surroundings. Though White is well known in the field of geography, his renown among

historians is not nearly as great. Robert Hinshaw's *Living with Nature's Extremes* is a general biography of White, and geographer Rutherford Platt has effectively surveyed White's contributions to floodplain management.[6] Neither Hinshaw nor Platt has fully analyzed White in relation to the historical currents that surrounded him—which is not to be taken as a criticism of either scholar, as neither is a trained historian.

Perhaps no event better illustrates the adoption of White's ideas by federal policymakers than the 1968 passage of the National Flood Insurance Act. In his dissertation, White identified flood insurance as a means of adjusting to the unpredictability of riparian landscapes. At the time of his writing, however, financial protection from inundations was not widely available in the United States. Private insurers had reached the conclusion that floods were uninsurable, a situation that White was aware of. Because only certain areas are prone to high waters, only those people who own property in those areas are likely to purchase flood insurance, preventing the risk from being spread across a large pool. That might not be a fatal problem if insurance claims were small, but unexpected torrents can cause immense damages. For an insurance program to be self-sustaining, the premiums of many policyholders must cover the losses of a few victims, but in the case of floods, only a small portion of the potential risk pool is likely to purchase coverage, and among those who would purchase it, the likelihood of major losses is high.

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[6] Robert Hinshaw, *Living with Nature's Extremes: The Life of Gilbert Fowler White* (Boulder, Colo: Johnson Books, 2006), Rutherford Platt, "Floods and Man: A Geographer's Agenda," in Robert Kates and Ian Burton (eds.), *Geography, Resources, and Environment, Volume II: Themes from the Work of Gilbert F. White* (Chicago: The University of Chicago Press, 1986).

White's vision of flood insurance was not simply the creation of a federal subsidy for those who choose to live in low-lying areas. Rather, he envisioned a program that would include incentives to encourage wiser usage of areas near to bodies of water. This idea came to fruition in the National Flood Insurance Act. Among the stipulations of the act were that no policies were to be written for buildings that were in violation of local or state floodplain zoning ordinances, and after an adjustment period of two years, no insurance was to be offered at all in communities that had not enacted measures to restrict building in places where water damage was likely.

This study is divided into three parts. The second chapter surveys the development of flood control systems from the colonial era through the New Deal era. The third chapter introduces Gilbert White and his ideas, and charts the broadening acceptance of those ideas among his professional colleagues. Chapter four details the acceptance of White's ideas into federal policy, focusing especially on the creation of the National Flood Insurance Program.

CHAPTER 2

FLOOD CONTROL POLICY THROUGH THE NEW DEAL

In order to fully appreciate the changes in American flood policies that took place in the mid twentieth century, described in the following chapters, it is necessary to have some understanding of the developments that took place in earlier years. This chapter traces the shift of flood control efforts in the United States from a responsibility of individuals, corporations, local, and state governments to a function of the federal government. When flood control was a non-federal responsibility, it was largely self-regulating—these smaller entities worked independently on relatively small projects and would not undertake efforts that exceeded their narrow self-interest. The dominant mindset ordained conquering nature, and when restricted by the limits of individual ability, this often worked as a means of keeping rising waters at bay. Even as the federal government gradually took a more active role in floodplain management, a mentality of conquest prevailed. The size of federal flood projects grew bigger and bigger from the 1890s through the 1920s, however, and this theory of land manipulation proved increasingly problematic. The government undertook projects exponentially larger than any on record, which meant both positive and negative outcomes were magnified. Many of these federal flood control projects proved to be costly and dangerous flops. In the

aftermath of the catastrophic inundations of 1927, it became painfully clear that bigger and better flood control projects did not always provide bigger and better results.

Among American rivers that have wreaked havoc by overflowing their banks, none loom larger than the Mississippi. The second longest river in the United States (only the Missouri, a tributary of the Mississippi, is longer), and the largest by discharge, the Mississippi has occupied a unique spot in the nation's consciousness since the early nineteenth century. Its navigational utility led to its classification as a resource of national importance by the middle of that century, which entitled the waterway to federal attention that other rivers would not receive until decades later. Due to this status, the Mississippi was the location of many of the earliest significant flood protection measures undertaken in the United States.

Prone to flooding vast regions over much of its course, the Mississippi developed, over many millennia, rich, deep-soiled floodplains that attracted Euro-American settlers since the early years of European contact. In its lower reaches, the Mississippi deposited alluvium from upstream, creating the fertile soils of the Great River's bottomlands. That silt was also responsible for the river's natural levees. The flow creates low natural banks over much of its course, most prominently along the lower portions of the river in the present-day Deep South. One may think of levees as man-made embankments meant to prevent rivers from overflowing their banks, but they also form without human intervention. Natural levees are formed when rivers repeatedly overflow their channels. When a river overflows its banks, its channel becomes much wider, and thus it flows more slowly. Water that is flowing slowly cannot carry as much sediment as water that is

flowing rapidly, and therefore sediment settles to the ground, eventually forming a natural levee. Finer silt travels farther before settling, forming the fertile alluvial soils that floodplains are known for.[7]

Even before American independence, settlers and trading companies had started to bolster the natural levees in New Orleans and rural Louisiana, near the mouth of the river. As a French colonial possession, New Orleans had levees four feet higher than the natural ones by 1727. The construction and maintenance of these levees were the responsibilities of the Company of the Indies, a trading company that was the sponsor of New Orleans.[8] When Louisiana transitioned to Spanish rule, levees in New Orleans became publically supported, and remained that way when the territory was purchased by the United States.[9] In rural areas of Louisiana, however, levees were legally required, but not publically financed. French colonial authorities required owners of land adjacent to the Mississippi to fortify the river's banks, a costly undertaking that excluded those of lesser means from owning property along the river.[10] Spanish officials maintained this law. Upon its admission to the United States, Louisiana's state government delegated responsibility for rural levees to its parishes, or counties, which in turn followed the established precedent by requiring landowners to build and maintain them.[11] Private citizens and companies continued to augment the banks of the Mississippi River

[7] Paul Hudson, "Natural Levees," in Stanley Trimble (ed.), *Encyclopedia of Water Science,* Boca Raton, FL: CRC Press, 2008. Pp. 763-767.
[8] Craig Colten, *An Unnatural Metropolis: Wresting New Orleans from Nature* (Baton Rouge: Louisiana State University Press, 2005). 19.
[9] Colten 20-21
[10] Colten 20
[11] Colten 21

throughout the early and mid 1800s.[12] Scholarship on early riparian fortifications on the Mississippi side of the river is very limited in comparison to that dealing with Louisiana. Presumably, this is due to the fact that early settlement centered around New Orleans, and the Mississippi River is surrounded by Louisiana on both sides for over 100 miles north beyond the Crescent City.

Those early levees were rarely masterpieces of engineering. Historian Jeffrey Owens emphasizes that their builders in the colonial and early national eras were merely "practical people doing practical things."[13] As Owens points out, the Indians who inhabited North America prior to European arrival did not view flood protection as a necessity. His analysis is an extension of the argument articulated by William Cronon in his landmark work of environmental history, *Changes in the Land*.[14] Since Indian societies in eastern North America were largely mobile and did not employ the concept of private property, levees would have served little purpose to them. The Indians would have simply left for high ground when floodwaters arrived. Such was not the approach of the French who settled New Orleans. The European mindset was one of permanently inhabiting and improving the land, and the region's new arrivals saw levees as a logical way to improve land near rivers. An early European settler might have thought of

[12] For early flood control activity in New Orleans and surrounding areas, see Colten 16-46, and Jeffrey Alan Owens, *Holding Back the Waters: Land Development and the Origins of Levees on the Mississippi, 1720-1845* (Ph.D. dissertation, Louisiana State University, 1999).
[13] Owens 7.
[14] William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983).

building a levee on his land in the same way that he would have thought of clearing a field or building a fence.[15]

As it had been in the colonial era, during the early national period, the effort to control flooding in the Lower Mississippi River Valley was largely a community effort. Local officials had the authority to order people to work on emergency levee reinforcements if the fortifications appeared to be in danger, and though citizens were not reimbursed for their services, they could be subject to prosecution if they declined to help. The first major federal appropriations for navigational improvements on the nation's rivers came in 1824, but those were not intended to address inundations. Flood control interests lobbied the federal government for support starting in the early 1800s, with their movement becoming stronger and more organized by the 1840s. Nothing was to happen on that front until 1850, however.[16]

Although the federal government would not become openly involved in the funding of flood control measures until the twentieth century, it took a significant step in that direction in 1850. The previous year, severe floods had hit the lower Mississippi, and in 1850, due in part to cries for help from state-level engineers, Congress authorized a study of the Mississippi River with the intent of gaining knowledge that would be useful in flood protection. Although federal lawmakers had no intent of funding the protections that might be suggested by the study, they had granted the federal government an increased role in fighting floods by positioning it as a source of knowledge. Prior surveys

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[15] Owens 14-20

[16] Cynthia Poe, *Reconstructing the Levees: The Politics of Flooding in Nineteenth-Century Louisiana* (Ph.D. dissertation, University of Wisconsin-Madison, 2006). 71-85.

of the river, conducted in the 1820s, had been administered with navigation in mind, rather than addressing losses caused by water.[17]

Ultimately, Congress authorized not one, but two surveys. Charles Ellet Jr., an engineer who had trained in France and had served as the chief engineer of multiple American canals, directed one of them. The Corps of Topographical Engineers, an arm of the War Department responsible for civil works projects, conducted the other. Authorized as an independent entity by Congress in 1838, the Corps of Topographical Engineers eventually merged with the Army Corps of Engineers in 1863. Andrew Humphreys, a West Point graduate who had served in the Seminole War as a young man and had been with the Corps of Topographical Engineers since its creation in 1838, led the Corps of Topographical Engineers survey. Upon its 1861 publication, critics hailed Humphreys' *Report Upon the Physics and Hydraulics of the Mississippi River*, as a scientific masterpiece.[18] The work garnered Humphreys honorary memberships in various European scientific societies, and by 1866, helped propel him to the position of Chief of Engineers within the Army Corps of Engineers.[19]

Despite their well-regarded efforts, events beyond the control of either Ellet or Humphreys would keep their works from having an immediate impact. With the outbreak of the Civil War, flood control was pushed to the back burner. Even after the conclusion

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[17] George S. Pabis, "Delaying the Deluge: The Engineering Debate over Flood Control on the Lower Mississippi River, 1846-1861," *The Journal of Southern History* 64:3 (August 1998) 421-454.
[18] Andrew Humphreys and Henry L. Abbot, *Report Upon the Physics and Hydraulics of the Mississippi River; Upon the Protection of the Alluvial Region against Overflow; and Upon the Deepening of the Mouths ... Submitted to the Bureau of Topographical Engineers, War Department, 1861* (Philadelphia: J.B. Lippincott & Co, 1861).
[19] Barry 21-22

of hostilities, Congress had more pressing concerns in the states of the former Confederacy than dealing with the threat of floods.[20]

Today, the Army Corps of Engineers is almost synonymous with flood control efforts. The connection between the military and civil engineering is not self-evident, however, and merits some discussion. The Army Corps of Engineers became the federal agency most directly involved with flooding issues upon its merger with the Corps of Topographical Engineers. Its previous work with rivers had consisted mainly of navigational improvements. The Corps of Engineers traces its origins to the Revolutionary War. When the Second Continental Congress authorized the creation of the Continental Army in 1775, it provided for six engineers—two chief engineers, working independently of each other, and two assistants to each chief. The original role of these engineers included responsibilities such as supervising the construction of fortifications, surveying potential battlefields, planning sieges, and assisting with the army's transportation requirements.[21] After the conclusion of the Revolutionary War, the federal legislature did not retain any engineers in the permanent service of the United States, but by 1794, when war threatened to break out with Britain, Congress re-authorized the employment of engineers by the Army. Eight years later, on March 16, 1802, lawmakers established the US Army Corps of Engineers in its modern form.

After the War of 1812, the responsibilities of the Corps of Engineers began to expand beyond purely military obligations. A series of studies conducted by the Corps in

[20] Pabis
[21] United States, *The U.S. Army Corps of Engineers: A History* (Alexandria, VA: Headquarters, U.S. Army Corps of Engineers, Office of History, 2008). 1-4.

1816 suggested that British successes during the War of 1812 could be attributed in large part to the United States' poor transportation system.[22] The studies called for, among other things, a highly mobile army and improved rivers, harbors, and roads. Congress responded in 1824 by passing the General Survey Act, which authorized the Army Corps of Engineers to survey road and canal routes deemed of national importance, for either military or commercial reasons. The Topographical Bureau, established in 1818, was the predecessor of the briefly independent Corps of Topographical Engineers, and served as surveyors and explorers of the frontier.

Over the course of its history, many have seen the Army Corps of Engineers as a symbol for national planning in the United States, in both positive and negative lights, although that image is brought into question by some episodes of the Corps' involvement in flood control projects. In the early 1800s, treasury secretary Albert Gallatin envisioned the Corps playing a leading role in the development of vast internal improvements. By the Jacksonian era, the tide had turned. Andrew Jackson viewed infrastructure projects as the domain of state governments, and believed federal involvement was unconstitutional.[23] As described by historian Todd Shallat, the national planners employed by Louis XIV of France, who helped modernize that country by means of waterworks, highways, and other projects, provided the model for the Army Corps of Engineers. In its early years, as the Corps developed its identity, a struggle developed between the "self-made, builder-mechanic" ethic of British engineering, and the French

[22] *The US Army Corps of Engineers: A History* 41
[23] Todd Shallat, *Structures in the Stream: Water, Science, and the Rise of the U.S. Army Corps of Engineers* (Austin: University of Texas Press, 1994). 121-153.

model, in which "the army guided construction, and science was the methodical tool of a rational, centralized state." Shallat argues that the Corps' advocacy of centralized expertise and decision-making often put it at odds with the sentiments of the country as a whole, as the United States is more culturally similar to Great Britain than France.[24]

Though the Corps has seen its fair share of attacks from those who see it as a tool of an elite technocracy who wish to advance central planning, it has conversely been characterized as dysfunctional due to its being beholden to powerful politicians and local interests. Such were the charges leveled by Arthur Maass in his 1951 book *Muddy Waters*.[25] Shallat, whose book *Structures in the Stream* is one of the authoritative histories of the formative years of the Corps and especially its relationship with water, hesitates to call either perception entirely accurate. "In the end there is no simple way to characterize Corps engineering," Shallat writes. "Corps planning promotes system and order. Corps field operations, locally implemented, serve a divided Congress rooted in community power."[26]

Two dominant personalities, Andrew Humphreys and James Buchanan Eads, played large parts in determining the fate of human modifications along the Mississippi in the late 1800s and into the 1900s. Eads, a self-taught man who became a world-renowned engineer, gained intimate familiarity with the Mississippi as the founder of a salvage company. His credibility in issues relating to the river was due to numerous achievements, the most significant being his construction of the first bridge to cross the

[24] Shallat 2
[25] Arthur Maass, *Muddy Waters: The Army Engineers and the Nation's Rivers* (Cambridge, Mass.: Harvard University Press, 1951).
[26] Shallat 207

Mississippi at St. Louis. The two pushed different ideas for how to clear the Mississippi for navigation—Humphreys favored canals to bypass troublesome areas, while Eads pushed for the use of jetties, which are structures that constrict the flow of a river. Jetties create in-river channels that cause scouring and thereby deepen the river. Eads successfully demonstrated the workability of his ideas south of New Orleans, and his success gave levees a boost. By constricting the channel of a river, they were assumed to deepen its channel.[27]

Along with the channelization of the river, some of those with interests in it desired to see its rich, alluvial soils made more useful for human occupation. For that to happen, flooding would have to be reduced. Eads and Humphreys both had ideas about how this should happen, too. Eads believed that by creating cutaways, places where extra water could escape, along the river, flooding could be reduced to a few areas. Humphreys favored reservoirs to store excess floodwater.

Ultimately, however, neither Eads nor Humphreys carried the debate. In order to regulate further development along the Mississippi, Congress created the Mississippi River Commission (MRC) in 1879, vesting it with authority that had previously been held by the Army Corps of Engineers. The MRC, a seven-member panel consisting of three civilians, three representatives of the Army Corps of Engineers, and one representative of the Coast and Geodetic Survey, was tasked with gathering information and making recommendations about any future navigational and flood control

[27] Matthew Todd Pearcy, *A History of the Mississippi River Commission, 1879-1928: From Levees-only to a Comprehensive Program of Flood Control for the Lower Mississippi Valley* (Ph.D. dissertation, University of North Texas, 1996). 40-41.

developments to be built along the Mississippi. The MRC eschewed the ideas of Eads, Humphreys, and Ellet, embracing instead an idea that all three had rejected as simplistic at best and foolhardy at worst. The policy that came to be known as 'levees-only' dictated that the man-made embankments alone could provide the necessary protection to transform the Mississippi River floodplains into habitable landscapes immune to the perils of raging waters. The attractiveness of levees stemmed in part, no doubt, from the perception that they were effective at both reducing flooding and improving the river channel. Matthew Pearcy, a historian who has written extensively on the MRC, argues that levees-only resulted from the narrow interests of certain powerful politicians, rather than from any scientific consensus.[28]

That levees would theoretically help improve the Mississippi's channel was not a trivial matter. Throughout the nineteenth into the twentieth centuries, the federal government did not see flood control as its domain. Channel improvement, however, was fair game, aiding defense, commerce, and transportation throughout the country. Those interested in promoting federally supported flood mitigation improvements had to market their projects as navigational improvements rather than flood reduction measures.[29] The federal focus on navigational improvements makes sense when one considers the importance of waterways to inland transportation in the days before the spread of trains and trucks. The Mississippi River and its tributaries comprised one of the world's greatest transportation networks prior to the advent of the railroad, with over fifteen thousand

[28] Pearcy 56-77
[29] Pearcy and Barry both contain good discussions of the Mississippi River Commission's formation. Pearcy's is somewhat more in-depth.

miles of navigable streams.[30] The Army Corps of Engineers was charged with improving and expanding this transportation network, upgrading the navigability of some rivers while working to open others to boats. Just as the interstate highway system of the twentieth century was justified in terms of national defense, navigational improvements were also seen as a move to improve national security and military preparedness, so it makes sense that responsibility for their upkeep would be delegated to the Army Corps of Engineers. Stephen Long, an Army officer and explorer of the American West, had a philosophy that is representative of the Army's nineteenth century approach to rivers: "if a waterway was navigable it was important and worth defending; once fortified, the channel was worth improving to facilitate defense."[31]

Due to political gridlock, the Mississippi River Commission was sorely underfunded for the first ten years of its existence, and was able to make little progress toward its goals of improved navigation and reduced flood losses. That would change after the severe floods of 1890, which spurred lawmakers to allocate generous funds to the engineering of the Mississippi. Over the next few years, levee building took off, and by 1896, the members of the MRC were in general agreement that the levee system was in good shape. That consensus was quickly challenged, as 1897 saw the highest flood levels recorded along some parts of the lower Mississippi. The river breached its restraints in various places, and a Senate committee conducted an investigation of the flood control methods in use at the time. The members of the committee lacked intimate

[30] Ari Kelman, *A River and Its City: The Nature of Landscape in New Orleans* (Berkeley: University of California Press, 2003). 5.
[31] Shallat 4

knowledge of the issue at hand, however, and relied heavily on the testimony of outside experts—many from the MRC. The committee produced a report known as the Nelson Report, after committee member Knute Nelson of Minnesota. The report concluded that, despite recent evidence suggesting otherwise, levees were the best way to keep the Mississippi River from flooding. Given the committee's reliance upon MRC personnel in forming its opinions, its finding in favor of levees becomes somewhat more understandable, if not justifiable.[32]

The levees-only policy would remain in place for nearly half a century, but it did have vocal critics even before its eventual downfall. George Maxwell, a lawyer from California who had been involved in efforts to bring water to the arid American West, was one. Maxwell's interests extended beyond irrigation to developing a national water policy, and he was convinced that earthen fortifications alone were not sufficient to protect communities along the Mississippi River from severe overflows. Maxwell allied with New Orleans businessmen in the 1910s to push for a more diversified approach to flood protection. Maxwell's plan called for a combination of spillways, floodways, and storage reservoirs in addition to the levee system. In the words of historian Martin Reuss, "(i)t was a remarkable document. Designed by a lawyer with no professional engineering training, it resemble(d) the flood control plan later adopted by the Corps of Engineers for the Atchafalaya basin."[33] Maxwell's enthusiasm and credible plan, however, were no

[32] Pearcy 78-131
[33] Reuss 98-99

match for the entrenched system. The lawyer could do nothing but watch in helpless anger when the Mississippi churned over its banks in the disastrous flood of 1927.[34]

At the same time that the Mississippi River Commission was pushing levees as the best way to contain floods and improve navigation, others were casting an eye on the potential uses of floodwaters. Historian Samuel Hays, author of the 1959 book *Conservation and the Gospel of Efficiency*, identified the effort to store excess water for future use as the spark that ignited the conservation movement of the early twentieth century. This movement is known largely for its attempts to perpetuate natural resources for use by humans in the future, as opposed to the preservation movement, which encouraged the protection of pristine, wilderness areas from humans. The endeavor to safeguard natural capital for future use is also known for its reliance on scientific and technical expertise, an argument first articulated by Hays.[35]

Hays describes federal politicians' dreams of bringing the arid West to life by conserving floodwaters for irrigation use during dry conditions. In 1902, Congress passed the Newlands Reclamation Act, named after Representative Francis Newlands of Nevada. The Newlands Act set up a system under which the federal government would sell land it owned, and use the proceeds to build irrigation projects. Then, the newly irrigated land would be sold, with those proceeds funding even more irrigation projects, forming a cycle that would repeat itself until nearly all federally owned irrigable land was receiving water. To administer the program, the act created the United States Reclamation Service,

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[34] Reuss 98-104

[35] Samuel Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920* (Cambridge, Mass.: Harvard University Press, 1959).

which later became the Bureau of Reclamation, under the jurisdiction of the Department of the Interior. Thus, by the early 1900s, the federal government had become deeply involved with the regulation of floodwaters, at least in certain parts of the country. Clearly, however, the primary intent of the Reclamation Bureau was not to protect people from floods, but to make use of floodwaters.[36] As environmental historian Mikko Saikku has observed, the roles were reversed in the West compared with the East. Western landowners hoped to figure out better ways to keep water *on* their lands, while in the East, people struggled to determine how best to keep water *off* their lands.[37] The western interests, clearly, were the first to gain unequivocal federal support for their exploits.

Despite its lack of support from various experts, levees-only remained the cornerstone of federal floodplain policy for nearly half a century, in regions dealing with a surplus rather than a shortage of water. It was finally washed away by the severe Mississippi River flooding of 1927, one of the most destructive floods to ever hit the United States. The floods of that year were foreshadowed in the fall of 1926, when heavy rains caused the Mississippi River and several of its tributaries to rise, in some places, to record levels. This was a particularly unusual occurrence to happen in the fall, usually a time of low waters. However, the levees along the Mississippi held the waters in check, and the only significant flooding that occurred during the fall of 1926 took place on tributaries such as the Illinois and Neosho Rivers.[38]

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[36] Hays 5-26.
[37] Mikko Saikku, *This Delta, This Land; An Environmental History of the Yazoo-Mississippi Floodplain* (Athens, Georgia: University of Georgia Press, 2005).
[38] Barry 173-175

By November, the rains had abated, and river levels dropped from their record heights. Even so, the water remained high, increasing the potential for devastation caused by future rains. A river that is already high cannot accommodate as much incoming water as a river that is low. Come January, the heavy precipitation returned, in the form of rain in the south and snow farther north. Between January and April of 1927, the city of New Orleans endured five storms that each brought more rain than any other storm in the previous ten years.[39] Levees along various Mississippi River tributaries failed in the early months of 1927, and the first breach of a levee on the Mississippi itself happened at Dorena, Missouri, on April 16. Four days later, the Mississippi breached its levee at Mounds Landing, Mississippi, flooding much of the Mississippi Delta and causing catastrophic losses of life and property.[40]

The 1927 levee breaches along the Mississippi struck a devastating blow to the Mississippi River Commission's levees-only policy. When floods in previous years had breached the levees, the MRC was able to offer up the explanation that the breached levees had not been built up to government-approved specifications.[41] By 1927, however, the entire system of levees along the Mississippi (though not all of its tributaries) had been strengthened to meet or exceed the standards enacted by the MRC. The failure of the levee system to hold back the floodwaters awakened debate over the most effective methods of protection from floods.

[39] Barry 189
[40] Barry 181-201
[41] Barry 194

While the Mississippi River floods alone would most likely have been sufficient to push Congress to act, New England was also hit by flooding, especially Vermont, in late 1927. Deborah Pickman Clifford and Nicholas Clifford study that flood in their book *The Troubled Roar of the Waters*.[42] One of Clifford and Clifford's noteworthy findings is that after the flooding, there was almost no expectation that the government would step in to aid those who had suffered losses caused by the waters. President Calvin Coolidge, a Vermont native, notably stated that the federal government should not be involved in insuring its citizens against natural disasters, a position that would lose support within a few decades. Though part of the Vermonters' stand against federal aid may be attributed to the stereotypical self-reliant spirit of New Englanders, it also reveals a laissez-faire attitude toward natural disasters that would dissipate at the federal level in the coming years.

Thanks to the experiences of 1927, even the most entrenched supporters of the MRC's policy began to realize more fully the folly of relying solely on levees. Though they can be useful when employed wisely, levees are problematic in at least two important ways. For one, if they are breached, they can offer no further protection, and may in fact make a situation worse than if no levee had existed at all due to the destructive force of so much rushing water. Second, the more levees are built on any particular river, the fewer escape routes will be available to floodwaters, causing an increase in floodwater levels. Flood control acts passed in 1928 and subsequent years

[42] Deborah Pickman Clifford and Nicholas Clifford, *The Troubled Roar of the Waters: Vermont in Flood and Recovery, 1927-1931* (Durham, NH: University of New Hampshire Press, 2007).

established federal support for other types of floodplain control, such as those suggested by Humphreys, Eads, and Ellet—floodways and reservoirs playing important roles.

In direct response to the floods of 1927, the House of Representatives Flood Control Committee evaluated over 300 proposals for new flood control plans. Two of those plans emerged as leading contenders, one developed by the Mississippi River Commission and one developed by Edgar Jadwin, Chief Engineer of the Army Corps of Engineers. Neither plan advocated maintaining a complete reliance upon levees, although the MRC's plan would have continued to see them as the primary method of controlling floods. Jadwin's plan incorporated some aspects of the MRC's plan—the plans were not developed in complete isolation of each other—but also diverged in some important aspects. One point of divergence was levees. Jadwin's plan called for only a modest bolstering of the levee system, rather than the more major reinforcement suggested by the MRC. His plan also embraced a heightened reliance upon floodways, including one that would stretch approximately 50 miles to protect Cairo, Illinois. The Jadwin Plan, as it came to be known, was the plan that ultimately won favor with the Flood Control Committee, and the Flood Control Act of 1928 passed it into law.[43]

Federal funding with the express purpose of flood control had first been authorized for the Mississippi River with the Flood Control Act of 1917. Prior to that time, debates about the propriety of federal funding of flood control structures had dictated that any funding, even if its actual intent was to control floods, must be funded as

[43] Reuss 103-121

'channel improvement.'[44] This was not completely disingenuous, as flooding certainly makes rivers more difficult to navigate. It does, however, indicate the line that Congress continued to draw between infrastructure improvements that were seen as benefiting the nation as a whole, and property protection that was seen as benefiting individuals.

The Flood Control Act of 1917 stated, "For controlling the floods of the Mississippi River and continuing its improvement … the Secretary of War is hereby empowered, authorized, and directed to carry on, … the plans of the Mississippi River Commission heretofore or hereafter adopted; to be paid for as appropriations may from time to time be made by law."[45] Reflecting the aforementioned concerns about the constitutionality of federally-funded projects that only benefit a portion of the nation's population rather than the nation as a whole, the 1917 act instituted a requirement that any locality to be protected by a proposed levee improvement must contribute a "just and equitable" amount to construction costs, not to be less than half of construction costs.

The 1917 act only funded levees, but the 1928 version also authorized federal support for other types of structural flood controls, such as reservoirs to hold floodwater and floodways to channel excess water away from flooding rivers. The 1928 act appropriated 345 million dollars for flood control works, making it the largest public works appropriation in American history at the time.[46] Finally, the 1928 act began to crack the previous policy that benefiting localities must provide a large portion of the funding for any flood protection project. While local contributions were still required for

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[44] Joseph Arnold, *The Evolution of the 1936 Flood Control Act* (Fort Belvoir, Virginia: Office of History, US Army Corps of Engineers, 1988). 14.
[45] Sixty-Fourth Congress, Sess. II. Ch. 144. 1917.
[46] Arnold 21

most projects, those along the Mississippi were exempted from that requirement, recognizing the large amounts (estimated in the bill at 292 million dollars) that localities along the Mississippi had already poured into levee construction.[47]

The Flood Control Act of 1936 basically shattered the policy that had started to show fissures in 1928. The 1936 act eliminated requirements for benefiting localities to provide financial contributions to flood control projects, other than a requirement that they provide the necessary land for the projects to the federal government at no cost. The Secretary of War, however, could waive even this requirement. The 1936 act recognized floods as a menace to national welfare, and therefore made flood protection the business of the federal government. No longer was the federal government expressing concern about funding projects that only benefit a limited number of people. As the 1936 act stated, "the Federal Government should improve or participate in the improvement of navigable waters or their tributaries, including watersheds thereof, for flood-control purposes if the benefits *to whomsoever they may accrue* (emphasis added) are in excess of the estimated costs, and if the lives and social security of people are otherwise adversely affected."[48]

These changes in flood control policy, of course, did not happen in a void. President Franklin Roosevelt, who took office in 1933, led a push to expand the role of the federal government in numerous areas. Though changes had been occurring well before his election—federal funding of levees expressly for flood control in 1917, and the

[47] Seventieth Congress, Sess. I. Ch. 596. 1928.
[48] PL 78-53

end of levees-only in 1928—the 1936 flood control act was the one that was most revolutionary in redefining the federal government's role in flood protection.

With levees-only a thing of the past, and a new approach to flood control not yet fully ascertained, a rare opportunity for new ideas presented itself. The intellectual landscape, however, was somewhat barren. The realm of discussion to that point was largely limited to alternative methods for engineers to confront high waters, and was not greatly changed from the days of Eads and Humphreys. The years after 1927 saw a variety of responses to the dangers of inundations. As water historian Martin Reuss has demonstrated, without a firm policy to guide its endeavors, the Army Corps of Engineers found itself pushed to action by various forces that did not always lead to the best long-term results. One such force was public opinion. After 1927, popular fear of floods was at high tide, leading to an outcry for immediate action. Though Congress did take time to consider the proposals that included the Jadwin Plan, other ideas were funded in the meantime. Lawmakers would not allow themselves to be seen as doing nothing. The result, in part, was a hurriedly developed system of levees, floodways, and spillways in the Atchafalaya Basin. Though the system seemed to make sense when compared to relying solely on levees, its hasty planning led to problems. The planned floodways were not large enough to accommodate large floods, levees were built on unstable ground, and sand dredged from the channels suffocated the local ecosystem. Another force was powerful legislators, who took advantage of public opinion to push parochial projects. Mississippi congressman William Whittington lobbied successfully for the construction of a series of flood control reservoirs on the Yazoo River and its tributaries. Though the

reservoirs were shown to be much more expensive than the value of the flood control they would provide, Whittington was able to spearhead their construction. Public opinion was a powerful tool in his arsenal, as the construction projects could be justified as public works programs that would provide jobs for the unemployed.[49]

Even by 1936, however, one thing had not changed—the official focus on structural methods of floodplain management. Official policy no longer relied solely on the strategy of confining waters within their banks, but it did continue to focus on modifying the natural environment via added tools such as floodways and reservoirs. The mindset of the nineteenth and early twentieth century was, in general, one of humans imposing their will upon the natural landscape. In 1874, George Perkins Marsh, scarcely known as an advocate of the ruthless exploitation of the earth's resources, wrote that with effective management techniques, "every great river may, in a considerable degree, be deprived of its powers of evil and rendered subservient to the use, the convenience, and the dominion of man."[50] That same year, Eads stated, "(d)isasters and serious accidents are always evidence of bad engineering. … I believe [man] capable of curbing, controlling, and directing the Mississippi, according to his pleasure."[51] Eads, Humphreys, and Ellet each had somewhat different ideas about how the Mississippi River should be controlled, but each clearly saw control as the primary objective. The Mississippi River Commission, with its levees-only approach, continued the quest for control. This

[49] Martin Reuss, "The Army Corps of Engineers and Flood-Control Politics on the Lower Mississippi," *Louisiana History* 23:2 (Spring 1982) 131-148.
[50] George Perkins Marsh, *The Earth As Modified by Human Action* (New York: Scribner, Armstrong & Co., 1874). 498.
[51] Quoted in Barry, 75

mentality was evident well beyond the realm of the Mississippi River. The belief that rivers could be controlled and made to perfectly serve the needs of humans was a logical manifestation of the Progressive Era faith in the ability of expertise to solve nearly all problems, as well as the faith in the potential of engineering that had burgeoned throughout the nineteenth century.

Secretary of the Interior Harold Ickes paid homage to this mindset in his 1935 speech dedicating the Hoover Dam, then known as the Boulder Dam. "Pridefully, man acclaims his conquest over nature," were the opening words of Ickes' speech of dedication. Yet, with the rest of his speech, Ickes attempted to draw a line between the old and the new, signaling that the Roosevelt administration did not plan to look at the world only in those terms. Moments later, he stated, "so long as nature can … destroy our handiwork by fire or flood, and unleash from the caverns of the winds mighty hurricanes to toss about in their rage all objects …, nature will continue to be unconquerable."[52] Within Ickes' own Department of the Interior, new ideas about flood control, and about how humans relate to nature in a broader sense, were percolating, soon to emerge on the nation's radar.

[52] "Honorable Harold L. Ickes, Secretary of the Interior, Delivers Address at Dedication of Boulder Dam." *The Reclamation Era* 25:11 (Nov 1935): 209-210.

CHAPTER 3

ACCOMMODATION, NOT DOMINATION: GILBERT WHITE JOINS THE DISCUSSION

Into the murky waters of change swirling in the 1930s stepped a young geographer, Gilbert Fowler White. White eventually developed a reputation as one of the leading minds in floodplain management, a reputation that was earned in large part by the ideas he articulated in his doctoral dissertation. White suggested that there are times in which it makes more sense to allow nature to run its course, rather than steadfastly pouring resources into modifying the natural environment, no matter the cost. Though the policy of relying only on levees had fallen by the time White became active in the field, the new way forward was not yet set in stone.

White's ideas did not immediately come to bear on governmental policy at the national level. Despite the demise of levees-only, the old guard remained focused on using engineering to keep water away from people. White's vision gradually gained acceptance as it became more widely disseminated. This chapter focuses on the development of White's thinking in regard to floodplains, and the spread of his doctrine to other professionals. By the early 1960s, the pioneering geographer had a notable following, and his ideas were poised to move into federal policy.

White, born in 1911, enrolled in the University of Chicago in 1927, settling a year later on geography as his field of study. After finishing his undergraduate studies in 1931, White immediately entered Chicago's graduate program in geography. As a graduate student, White had the good fortune of studying under Harlan Barrows, one of the most renowned geographers of the early twentieth century. Barrows, the departmental chairman and one of the pioneers of geography as a field of academic study, left his mark on the field through his attention to the relationship between humans and the environment. Despite the protests of his superiors, Barrows began in 1904 to teach a class called "Influence of Geography on American History," which would later be renamed "Historical Geography of the United States." His idea about this relationship did not remain constant, though. Later in his career, Barrows came to view geography as the study of human actors on a passive environment, rather than viewing the natural environment as a determining factor in human societies.[53] Barrows also took an interest in the conservation movement that flourished in the early twentieth century, an interest he shared with White.[54] Barrows was a gifted thinker in his own right, but his temperament was a millstone that perhaps held him back from ultimately becoming as influential as White. Barrows was not known for getting along with those who disagreed with him, and

[53] William Koelsch, "The Historical Geography of Harlan H. Barrows," *Annals of the Association of American Geographers* 59:4 (Dec 1969): 632-651. 637.
[54] Charles Colby and Gilbert White, "Harlan H. Barrows, 1877-1960," *Annals of the Association of American Geographers* 51:4 (Dec 1961): 395-400.

as White's biographer Robert Hinshaw relates, White took to calling Barrows "Simon Legree," after the cruel slaveholder in *Uncle Tom's Cabin*.[55]

White, in contrast to Barrows, possessed a much more non-confrontational reputation. Though his disposition undoubtedly helped him throughout his years as a graduate student, his humility has perhaps contributed to his lack of renown outside of the field of geography. White certainly provides a stark contrast with James Eads and Andrew Humphreys, the colorful characters who were in the midst of the debate over floodplains in the late 1800s. Despite his reputation as a peaceful man, however, White did not completely avoid conflict, but merely sought to remain outside of the spotlight.[56]

White's graduate studies were interrupted in 1933. That year, Barrows accepted an appointment to the Mississippi Valley Committee, under the auspices of the Public Works Administration. The committee, created as a part of Franklin Roosevelt's New Deal, had the purpose of "studying and correlating projects involving flood control, navigation, irrigation, power, reforestation and soil erosion in the Mississippi drainage area."[57] This appointment marked a move for Barrows from academia into public policy, one that would be consequential for his own career and also White's. Barrows asked White to follow him to the Mississippi Valley Committee, and White accepted. White assisted on Barrows' initial assignment, to evaluate possibilities for dams on the Missouri

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[55] Hinshaw 28. Hinshaw, an anthropologist, studied as an undergraduate at Haverford College in the 1950s when White was the president of the school, and the two maintained a friendship that endured until White's death in 2006.

[56] In describing White's personality, Hinshaw writes, "As early as high school, Gilbert was an accomplished manager, a behind-the-scenes enabler, usually reluctant to take center stage. (In grade school he avoided fisticuffs himself yet managed fist fights among his schoolmates!)" (vii)

[57] Arnold 31

River and its tributaries. The young geographer spent the next eight years working for the federal government on flood control projects, while developing his own opinions about the ways that alluvial regions should be used and regulated. Though his detour into public service delayed the completion of his degree, White undoubtedly gained perspectives during these years that he would not have found in a purely academic setting.

White entered the federal bureaucracy at a time of major change. The New Deal produced an unprecedented expansion of the federal government. The era has inspired a vast historiography, though New Deal era environmental policy has only received scholastic attention in recent years. In *This Land, This Nation*, Sarah Phillips argues that the Roosevelt administration focused on natural resources as a way to bring prosperity back to rural areas of the country.[58] In a section of the book focusing on New Deal era water projects, Phillips stays true to this theme, arguing that flood control projects undertaken during the 1930s were inspired in large part by two goals: rural electrification and erosion control.

Neil Maher takes a different approach in *Nature's New Deal*.[59] Focusing on the Civilian Conservation Corps, Maher argues that the environmental policies of the New Deal formed a bridge between the conservation movement of the Progressive Era, which promoted the protection of resources for future human use, and the environmentalist movement that took hold after World War II, which encouraged the preservation of natural areas due to their intrinsic value. Maher suggests that Roosevelt and some of his

[58] Sarah Phillips, *This Land, This Nation: Conservation, Rural America, and the New Deal* (New York: Cambridge University Press, 2007).
[59] Neil Maher, *Nature's New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement* (New York: Oxford University Press, 2008).

conservation advisors attempted to institutionalize this environmentalist ethic in the federal bureaucracy prior to World War II, but were defeated by advocates of the older conservation ethic. Though the available evidence does not point to White's direct involvement in this debate, his writings suggest that he was more loyal to the conservationist ethic than the environmentalist ethic, especially early in his career.

Roosevelt's proposal for a major, nationwide public works program, one that included flood control measures, was only one of the unprecedented steps he took upon entering office. With no previous model for federal public works programs of such a magnitude, Roosevelt's proposal initially set off a mad rush among legislators to try to gain as large a share of the pie as possible for their constituents. The Roosevelt administration quickly came to understand that without a unified plan, the proposed public works spending could not live up to its potential. Thus, FDR spearheaded the creation of numerous new planning agencies, of which White worked for several.[60]

In 1934, after assisting Barrows on his survey of dam possibilities, White moved with his mentor to the Water Resources Committee, the replacement for the Mississippi Valley Committee. In 1935, White became the staff secretary to the subcommittee on water. He also later served as the secretary to the subcommittee on land.[61] Federal lawmakers initially placed the Water Resources Committee under the jurisdiction of the National Resources Board, which was quickly replaced by the National Resources Committee and then, in 1939, the National Resources Planning Board. White spent the

[60] Rutherford Platt, "Floods and Man," *Geography, Resources, and Environment, Vol. II: Themes from the Work of Gilbert F. White*. 36-37.
[61] Hinshaw 18

final year-and-a-half of his stint in Washington working for the Bureau of the Budget (BOB). Created by Congress in 1921, the BOB, the predecessor of the modern Office of Management and Budget, was charged with assisting in the preparation of the national budget.

In his work for the federal government, White quickly developed concerns about the ways that flood control projects were justified. These reservations were evident as early as 1934, in a letter written by White to Mississippi Valley Committee chairman Morris Cooke. [62] White suggested several changes to the national flood control policy articulated in the Mississippi Valley Committee's comprehensive report to Harold Ickes, director of the Public Works Administration.[63] The report suggested that the fate of proposed flood control measures should be determined by their potential benefits, compared to projected costs, but did not go into much more detail. White saw this proposal as being too vague. For example, he thought authorities should distinguish between inherent and derived benefits of flood protection. Inherent benefits, as White defined them, include the most obvious benefits of flood control, such as reductions in loss of life and property. Derived benefits include indirect advantages such as potential increases in living standards or decreased expenditures for navigational improvements. White also criticized the report's proposed reliance upon calculations of damages averted as a meter for judging the worth of potential flood control projects. Differential in land

[62] Letter from Gilbert White to Morris Cooke, September 27, 1934.
[63] United States and Morris Llewellyn Cooke, *Report of the Mississippi Valley Committee of the Public Works Administration* (Washington: U.S. G.P.O., 1934).

productivity, he suggested, could be much more informative in some places, such as agricultural areas.

Within a few years, White began to make his suggestions public, writing articles like "The Limit of Economic Justification for Flood Protection" and "Economic Justification for Flood Protection," (two separate articles with very similar titles) in 1936 and 1937, respectively. In the opening sentence of his 1937 article, White succinctly stated the misgiving that had been troubling him over the previous several years: "methods for measuring the economic justification for flood protection have failed to keep pace with methods for determining engineering feasibility."[64] Going on, White declared,

> All who are familiar with the problem know that though one technician may find a given flood-protection project unjustified by a ratio of costs to benefits, another may find it amply justified through the use of the same data but proceeding on different initial assumptions. Given assumptions sufficiently liberal, some flood protection could be justified on most flood plains in the United States. Given another set of assumptions, only a slight amount of new flood-protection work could be shown as justified.[65]

By 1937, White was speaking publicly of using zoning to prevent unwise encroachment on flood-prone lands. At that time, zoning had been employed in the United States for more than two decades. The practice can be traced to Germany, where city planners hoped to make housing at the edges of cities more affordable by limiting population density. The first American zoning laws were passed in New York, in 1916, to limit the spread of skyscrapers and keep the city's transportation infrastructure from

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[64] Gilbert White, "Economic Justification for Flood Protection," *Civil Engineering* 7:5 (May 1937): 345-348.
[65] Ibid.

becoming overburdened. Zoning caught on quickly throughout the United States, but the intent behind it did not remain the same for long. Realtors and property owners came to see zoning as a way of stabilizing, and sometimes increasing, property values. As Daniel Rodgers describes in *Atlantic Crossings*, by the 1920s, landowners had developed a widespread faith that zoning, when well planned, would almost always benefit the involved property owners.[66]

White gave a talk at the National Zoning Conference, sponsored in part by the National Resources Committee, in December of 1937, arguing for increased usage of zoning to regulate floodplains. He identified two types of zoning: 'negative' zoning, which prevents further building in flood-prone areas, and 'positive' zoning, which encourages types of land use that are more suited to flood-prone areas, such as agriculture. Within this talk, White once again returned to his concerns over the economic viability of structural protections against flooding. At the time, the federal government was reviewing plans for major improvements to structural flood protections throughout the country. White noted that in many towns, the assessed value of the entire town was less than the cost of proposed flood protection structures. Zoning, he observed, costs almost nothing to enact.[67]

White's proposal contradicted the belief that zoning would increase property values. In his presentation promoting the benefits of flood plain zoning, White

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[66] Daniel Rodgers, *Atlantic Crossings: Social Politics in a Progressive Age* (Cambridge, Mass.: Belknap Press of Harvard University Press, 1998), 185. For a detailed discussion of the beginnings of zoning in the United States, see Seymour Toll, *Zoned American* (New York: Grossman Publishers, 1969).
[67] Gilbert F. White collection, Box 309, Folder 12.

acknowledged potential opposition to his idea. One broad sector of potential opposition, White noted, could be property owners who might resent being told what they could or could not do with their land. This concern would soon prove to be well founded, as various members of California's congressional delegation called for an investigation of White the following year.[68]

By the early 1940s, White had formulated and refined the ideas that would define much of his career. He distilled those ideas into a doctoral dissertation, entitled *Human Adjustment to Floods*. He completed his dissertation in 1942, and the geography department at Chicago accepted it the same year, but did not publish it until three years later. In the meantime, White, in accordance with his developing Quaker convictions, headed not back into government service, but to Europe to perform humanitarian work.

Some of the ideas White laid out in his dissertation had not gained mainstream acceptance at the time of its publication, but within a few decades, they would become highly influential to many people involved in floodplain management. A passage from the introduction to *Human Adjustment to Floods* serves to illustrate White's most basic argument:

> It has become common in scientific as well as popular literature to consider floods as great natural adversaries which man seeks persistently to overpower. According to this view, floods always are watery marauders which do no good, and which society wages a bitter battle. The price of victory is the cost of engineering works necessary to confine the flood crest; the price of defeat is a continuing chain of flood disasters. This

[68] The hearing is mentioned in Hinshaw, p. 36. Hinshaw cites a personal interview with White as his source. Further investigation has not turned up any more information about this hearing.

> simple and prevailing view neglects in large measure the possibilities of other forms of adjustment.[69]

An important component of White's dissertation is his analysis of the options available for responding to flooding risks. In *Human Adjustment to Floods*, White identified eight different methods of adjustment to flood risks that had proven to be effective in at least some situations. It is clear that White did not view all of these types of adjustments equally. One way to classify White's eight methods of adjustment is to analyze what sort of relationship with nature they advocated. He described physical flood control measures, which can be understood as attempts to overpower nature, least favorably, making a compelling argument against trying to control nature. While levees are effective to greater or lesser extents depending on the situation, they are not fail-proof. When they fail, it is as if nature has broken loose and released a powerful blow all at once, clearly carrying the potential for catastrophic damage. An area with a breached levee could easily suffer even more severe damage than if no levee had been there at all.

Other methods described by White embody a different attitude toward nature, a realization that even in their most well designed efforts, humans cannot completely subdue the natural world. In a continuum between trying to control nature and accommodating natural risks, physical flood control measures would fall directly on the "control nature" end of the continuum. Perhaps next closest to this end of the continuum would be land elevation. As might be expected, White's analysis of land elevation was not terribly positive either, noting its frequent impracticality, though he did not condemn

[69] Gilbert White, *Human Adjustment to Floods: A Geographical Approach to the Flood Problem in the United States* (Chicago: University of Chicago, 1945). 1.

it as severely as he did physical flood control measures. Erosion control seems to sit somewhere near the middle of the continuum, and it did receive White's endorsement, though limited to certain circumstances. On the "accommodate nature" end of the continuum lie emergency measures, structural adjustments, and land use readjustment. All three of these forms of adjustment to flooding received White's generally enthusiastic endorsement. It is readily apparent that White eschewed hubristic attempts to defy nature's tendency to unleash deluges from time to time, instead favoring approaches to floodplain management that would provide the greatest benefit for the least expenditure, whether of time, money, or other resources.

White also differentiated the solutions on the opposing ends of the continuum by where they place responsibility. "Insurance and structural adjustments, by requiring a property owner to make some payments for the advantages of floodplain location which he enjoys, stimulate the abandonment or movement of occupance that is not profitable," he wrote.[70] On the other hand, "(f)lood abatement, flood protection, and public relief, by placing upon public agencies the major burden for reduction of losses, encourage the occupants of flood plains to seek those adjustments at public expense even though other adjustments at private expense might be less costly and more effective from the standpoint of the nation."[71] White concluded, "present policy fosters an increasing dependence by individuals and local governments upon the Federal government for leadership and financial support in dealing with the flood problem. … (T)he policy does not help or stimulate beneficiaries to explore the possibilities of making other

[70] White, *Human Adjustment to Floods*, 209.
[71] White, *Human Adjustment to Floods*, 210.

adjustments…."[72] In other words, White charged that through federal policy, which favored domination of nature through massive public-spending projects, the government was subsidizing a system that was not economically viable.

This part of White's analysis reveals an awareness on his part that because of the federal government's changing role in floodplain management, the nation's entire approach to alluvial regions would have to change. In the past, left to their own devices, certain individuals and localities did sometimes attempt to fight floodwaters through ever-higher levees. Once the control of water became a federal interest, however, the flaws in attempting to fight nature quickly became obvious. Though he did not explicitly mention it, White had identified one of the strengths of the nation's flood control policies in earlier decades, and his dissertation suggested that it could be possible to merge the risk calculations made by private landowners in the 1800s with the federal government's twentieth century foray into flood control measures. For the United States to utilize its floodplains most effectively, White suggested a plan that would use all eight of the approaches he had identified. While methods such as levees and reservoirs are appropriate at certain times, he suggested, they must be balanced with techniques of accommodation rather than domination of nature.

White's eight methods of adjustment to flood risks are summarized in the following paragraphs, ordered roughly according to his attitude toward them.[73] Emergency evacuations, White argued, offer one of the best opportunities to decrease flood-related

[72] White, *Human Adjustment to Floods*, 211.
[73] See *Human Adjustment to Floods* 205-208 for White's concise summary of the eight methods of adjustment.

losses—life, more so than property—without spending a lot of money. The success of emergency measures depends on the existence and broad knowledge of flood evacuation plans and on accurate weather forecasts.

White also saw land use readjustment as an important and underused way to reduce damages. Though some buildings on flood plains must be there because of their functions, alluvial regions are also often used for activities that do not depend on ready access to water or deep soils. Zoning against future building is fairly easy, White noted, but removing existing building presents more of a challenge and must often rely upon public subsidies for relocation, purchasing of land, and demolition.

Flood insurance was another tool in which White saw promise. Private insurers in the United States had tried their hand at offering policies to cover losses caused by high waters and failed well before 1942. Nonetheless, White saw flood insurance as being an important component of successful adaptation to flood hazards. Because of insurability issues, White realized that this sort of adjustment might need government support to be sustainable. He envisioned using flood insurance regulations to encourage adoption of other types of adjustment such as improved emergency measures and structural readjustments.

In many cases, White believed, extant development in low-lying regions could be structurally adjusted to reduce potential damages. Such structural adjustments are on a smaller scale than physical protection, and would include measures such as re-grading streets and re-thinking the layout of existing buildings. Rather than tearing up entire

neighborhoods or cities, White suggested that these structural adjustments could be implemented as a part of regular maintenance.

Forest management, White believed, was a tool that was potentially beneficial, albeit time-taking to implement and not applicable in all situations. Strong, healthy forests can reduce erosion and the flow of debris. This type of adaptation, White said, had proven to be successful in certain instances but had not been sufficiently studied, as of 1942, to make broad generalizations about its utility in flood mitigation.

Land elevation, White wrote, is generally reliable, but often economically unjustifiable. It is particularly difficult to implement in areas that have already been developed. This method of confronting high waters involves moving earth to raise the level of buildings away from flood hazards.

Physical protections from floods, including levees, reservoirs, and floodways, includes the methods that were most commonly employed throughout the United States in the early 1940s. One problem endemic to levees and floodwalls is that if they are breached, then severe damage will occur. Not only will the floodwaters be just as high as if there was no levee in the first place, but the waters will also rush over the land extremely rapidly, and with great intensity. Additionally, White posited that physical protections might invite further settlement of floodplains by providing a sense of safety that may not be completely justified. Despite his concerns about over-reliance upon such methods, White did conclude that in many instances, physical protections offer the most effective way to reduce losses caused by floods.

White did not write fondly of public relief, yet neither did he dispute its necessity. Although he implicated the broad availability of public relief in encouraging people to build irresponsibly on floodplains, he acknowledged that it must remain available in some form as long as the other methods of adjustment have not been fully adopted. In practice, it seems highly unlikely that White's other ideas would ever be adopted so completely that public relief would *never* be necessary.

White's preference for accommodating, rather than dominating, nature does not necessarily mean he was some sort of proto-environmentalist. Many modern environmentalists advocate accommodating nature because of its inherent value. White, in his dissertation, expressed no such sentiments. His frequent preference for accommodating nature derived instead from cost-benefit analysis. In White's evaluation, attempts to dominate nature were often more expensive than the value of the benefits they provided, and in certain cases such as breached levees, the difference could be dramatic.

Critics such as White's opponents from California's congressional delegation charged that his ideas would amount to the government dictating to its citizens how they could and could not use their own private property. While there is truth to this suggestion, those who harbored that concern neglected an important reality: even before the 1930s, the federal government already had been telling its citizens how they could use flood plains. Its method of doing so was perhaps more subtle than the zoning regulations White proposed, but it was nonetheless very real. By providing funding for levees, the government was telling people that it was fine to live in flood-prone areas. Furthermore, as White noted, by providing relief and recovery money, often with no terms attached,

the federal government was suggesting not only that was it was acceptable to inhabit floodplains, but that if the flood was severe enough, they could count on public dollars to bail them out in times of high waters.[74] From 1874 through the mid-1920s, this relief consisted largely of emergency relief such as food, tents, and medicines. However, after 1927, Congress passed bills with language such as "to aid in rehabilitation of farm lands in areas affected by floods" and "to aid the State of Alabama in construction of roads damaged by floods in 1929."[75] While these bills did not place certain development off-limits, as White later argued for at the National Zoning Conference, they definitely increased the federal government's role as an active player in determining the future direction of floodplain development.

Another component that White saw as a part of a comprehensive floodplain management plan was an understanding of the benefits of inhabiting floodplains. Some types of inhabitation, such as factories that need large amounts of water for cooling, draw great advantages from locating on lands susceptible to flooding, advantages that might not be found anywhere else. Other types of inhabitation, such as mills, depended on their locations near rivers for power at one time, but by the time of White's thesis, that dependence may have been broken by cheap electrical power. Still other types of inhabitance, such as low-income housing, derive no material benefits from being located in floodplains.[76]

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[74] White, *Human Adjustment to Floods*, 26.
[75] Referring to 43 US 53 and 46 US 84, respectively
[76] White, *Human Adjustment to Floods*, 209.

As the capstone of his analysis, White argued that in an effective system of floodplain management, "any action will promote adjustments or readjustments that favor the type or types of land occupance most likely to contribute to effective use of flood-plain resources."[77] In short, White had articulated a set of ideas that demonstrated the marked changes that had taken place in flood control in the prior century and foreshadowed further changes yet to come. In the mid nineteenth century, it would have been unthinkable to consider a comprehensive federal plan for dealing with floodplains, because the protection of floodplains was not understood at that time to be a federal responsibility. With the formation of the Mississippi River Commission in 1879, the federal government began to wade into floodplain management, albeit with the ostensible purpose of improving navigation. Its methods, however, were largely the same as those employed by state and local governments, and private citizens: the construction of levees. By 1927, though, insurmountable evidence existed to suggest that riparian fortifications alone could not protect America from raging floodwaters. When the levee system was limited to the piecemeal efforts of individuals and local governments, its flaws remained disguised. With federal support, though, the levee system was no longer piecemeal, but unified and built to impressive specifications. When the levees still continued to fail, it became obvious that a new approach was needed. White's dissertation would eventually provide the blueprint for such a new approach.

The 1930s, when White served in the federal bureaucracy, had been a time of significant change in the way the nation responded to the threat of floods. By the time

[77] Ibid.

White finished his dissertation, however, that era of change was nothing more than a memory. World War II demanded a large portion of the federal government's attention in the first half of the 1940s, and even after the war was over, its specter remained for years to come. It would not be until the 1960s that the federal government vigorously renewed its focus on the issues of floods and floodplains in the United States.

Silence did not prevail on the subject of floods, though, even during the intervening years. While the federal government turned its attention to other matters, scholars continued to ponder how to respond to the dangers posed by deviant waters. The fact that White's ideas helped drive the discussion is just as critical as the ideas themselves. White's significance does not derive solely from his origination of a new vision. More than half a century before White delved into the issue of floodplain management, Vermonter George Perkins Marsh, considered by some to be one of America's first environmentalists, expressed concerns that parallel some of White's ideas. Like White, Marsh described a variety of possible ways to reduce damage from floods, although Marsh largely limited his discussion to structural means of adjustment. In a passage that was a harbinger of White's dissertation, Marsh stated, "Upon the whole, it is obvious that no one of the methods heretofore practiced or proposed for averting the evils resulting from river inundations is capable of universal application. Each of them is specially suited to a special case. But the hydrography of almost every considerable river and its tributaries will be found to embrace most special cases, most known forms of fluid circulation."[78] White certainly added his own new ideas to the discussion on floodplain

[78] Marsh 498

usage, but his importance is also due to the fact that he was able to put his beliefs into action, ultimately affecting the dialog on floodplains to a much greater extent than his intellectual forebears.

Within a few years of its 1945 publication, the influence of White's dissertation started to become evident in the thinking of others. One scholar who was an early advocate of White's ideas was political scientist Arthur Maass. In 1951 Maas published *Muddy Waters*, which criticized the Army Corps of Engineers's irrigation flood control projects as too influenced by the desires of special interests and individual members of Congress, rather than by the good of the country as a whole.[79] In his discussion of how a responsible floodplain management program should be designed, Maass discussed seven of the eight forms of adjustment described by White, leaving out only public relief. Maass credited White, who he deemed "a distinguished geographer and water expert," with inspiring his vision for a responsible approach to floodplains.[80]

In 1953, the dissemination of White's ideas gained steam when his dissertation went through a second printing.[81] The geographer's influence is evident in the writings of Luna Leopold, a hydrologist who was the son of renowned ecologist Aldo Leopold. In *The Flood Control Controversy* (1954), which Luna Leopold co-authored with Thomas Maddock, the authors wrote, "flood plain occupancy … is in direct competition with the river. Floods … are characteristic of rivers. The mere existence of a flood plain is prima

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[79] Arthur Maass, *Muddy Waters: The Army Engineers and the Nation's Rivers* (Cambridge, Mass.: Harvard University Press, 1951).
[80] Maass 146
[81] Hinshaw confirms that the re-publication of White's dissertation led to a broader audience, though he lists its republication date as 1954.

facie evidence of floods. This does not in any way imply that flood protection is not a necessity in the civilized world. It merely means that complete prevention of floods is a physical impossibility." The authors cited White in this discussion, though even without the citation, his ideas are plainly evident.[82]

William Hoyt and Walter Langbein, co-authors of the 1955 book *Floods*, clearly demonstrated their allegiance to the new way of thinking about floodplains. Popular enough to warrant second and third printings in 1966 and 1970, *Floods* was obviously influenced by White's ideas. As Hoyt and Langbein stated, "(o)ur present practice is to adjust rivers to man's convenience, without stopping to think whether there is merit to the opposite idea embodied in the title of a too-little-known book by Gilbert White, President of Haverford College, entitled *Human Adjustment to Floods*."[83] Commenting on the increasing development of flood plains, channeling White, Hoyt and Langbein wrote,

> This growing use of the flood plain is running counter to the diminishing importance of rivers as avenues of trade. The reasons of course reflect the real and seeming advantages of flood plains: valley lands are level, water supplies are close at hand, waste disposal may be easy, and so on. The trouble lies not so much in the fact that flood plains are occupied, as in the fact that so much of the use disregards the basic functions inherent in the flood plain as a part of the river.[84]

By their suggestion that a floodplain should be viewed as a part of a river, Hoyt and Langbein clearly endorsed White's viewpoint that there are risks that must be considered when inhabiting floodplains. Further, with this suggestion, Hoyt and Langbein

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[82] Luna Leopold and Thomas Maddock, *The Flood Control Controversy: Big Dams, Little Dams, and Land Management* (New York: The Ronald Press Company, 1954). 14.
[83] William Hoyt and Walter Langbein, *Floods* (Princeton, NJ: Princeton University Press, 1955), 91.
[84] Hoyt and Langbein, *Floods*, 91.

implied that these risks are often greater than the potential rewards. The authors of *Floods* also agreed with White's analysis that by the middle of the twentieth century, rivers were no longer as important for many types of development as they once had been.

Hoyt and Langbein also addressed the question of whether floodplain zoning laws are undemocratic, the issue that had dogged White two decades earlier. Hoyt and Langbein conceded that floodplain zoning laws can be interpreted as in opposition to the American individualist ethic, wherein every person has the liberty to decide on their own what risks they are willing to take. The authors were basically acknowledging the same attitude that caused California's Congressional delegation to question White's patriotism. As Hoyt and Langbein noted, however, the involved individuals do not always know those risks. In one early instance of people trying to address this situation, Hoyt and Langbein pointed out that "a group of engineers in Iowa City, Iowa, advised the city to consider informing those who request permission to build along Ralston Creek of the ever-present hazards of flooding."[85] Perhaps if that information had been more widely disseminated, or if local officials had gone so far as to take the "un-American" action of preventing development along the creek, some of those concert-goers described in the introduction to this thesis would not have been scrambling to save their possessions scant days later.

White's ideas also continued to carry weight in the University of Chicago's geography department, which he had returned to as its head in 1956 after a stint as the president of Haverford College. In 1958, White's Chicago colleague Francis Murphy

[85] Hoyt and Langbein, *Floods*, 95.

published *Regulating Flood-Plain Development*.[86] In its preface, Murphy noted that while he had been working in the field of flood control for twenty years, "it was the chance reading of Mr. White's book *Human Adjustment to Floods* that supplied the inspiration and will to undertake this study."[87] From the perspective of 1958, Murphy wrote that "(t)he picture of past accomplishments in flood-plain regulation is bleak. However, recent increased uses of some techniques of regulation—mainly zoning, urban renewal, and government acquisitions—enable one to view future accomplishments more optimistically."[88] Murphy acknowledged that continued floodplain development in the United States is probably inevitable, but suggested that "if we seriously want to reverse the trend of ever increasing uneconomic development and its resulting increasing flood losses and flood-damage prevention costs, then a greater attempt needs to be made to guide this development."[89] Murphy also addressed the issue of flood insurance, noting that its effectiveness in reducing flood losses would depend on how it is regulated—a topic that would come to the forefront a decade later. Even the cover of *Regulating Flood-Plain Development* reflected White's thinking, specifically on the topic of structural adjustments. The cover features two pictures. One is of floodplain-level buildings severely damaged by flood. The other is of a modern looking (by 1958 standards) building that is also on a floodplain, but is supported by pylons well above

[86] Francis Murphy, *Regulating Flood-Plain Development* (Chicago: University of Chicago, 1958).
[87] Murphy, *Regulating Flood-Plain Development*, iv.
[88] Murphy, *Regulating Flood-Plain Development*, 163.
[89] Murphy, *Regulating Flood-Plain Development*, 164.

potential flood levels. The second building, a caption notes, easily avoided damage despite enduring the highest flooding the region had seen in 20 years.

As White's ideas began to influence others who were thinking about floodplains, the geographer himself continued to address the issue in various writings, increasingly focusing on a new type of challenge. White edited a collection of essays in 1961 entitled *Papers on Flood Problems,* which included contributions by thirteen authors, most of whom addressed the sorts of issues first raised by White's dissertation.[90] In the book's introduction, White acknowledged that by 1961, some of the ideas he promoted were gaining more widespread acceptance. More options, however, meant a harder decision process. In the 1930s and 1940s, floodplain adjustment was rather straightforward, since works of engineering were largely the only forms of adjustment to be given official consideration. Thus, in any particular situation, the equation was simple: are structural improvements financially justifiable? If so, proceed, but if not, do not proceed. With the increased attention being paid to the various other forms of adjustment suggested by White, the equation was becoming more complicated, as authorities had to make decisions about which types of adjustment were most suitable to any given situation, rather than simply deciding whether or not structural protections were justified.

White cited Lewisburg, Tennessee, and Laona Township, Illinois as two communities in which his ideas were being employed by 1961, albeit through different approaches. Lewisburg took advantage of expertise supplied by the Tennessee Valley Authority, which offered detailed flood risk analysis to the town. With that information,

[90] Gilbert White, ed., *Papers on Flood Problems* (Chicago: University of Chicago, 1961).

Lewisburg enacted zoning ordinances to prevent further encroachment into flood-prone areas. Laona Township, on the other hand, was not offered such federally funded expertise, but nonetheless enacted zoning ordinances based on the knowledge of local farmers.[91]

By the early 1960s, a new approach to floods and floodplains, initially advocated only by a few scattered voices in the wilderness, had gained a healthy following among those concerned with floodplain management. The federal push into alluvial administration had made clear by 1927 that a new approach was needed, and over the next three decades, numerous professionals took part in formulating one, none more important than Gilbert White. In 1960, however, this new approach had yet to conquer the highest levels of federal policy. The presidency of Lyndon Johnson would present an opportunity for that to happen.

[91] Gilbert White and Robert Kates, "Flood Hazard Evaluation," in *Papers on Flood Problems*.

CHAPTER 4

WHITE'S IDEAS FULFILLED: THE NATIONAL FLOOD INSURANCE PROGRAM

In 1965, Hurricane Betsy provided the most immediate impetus for the process that would ultimately result in sweeping changes to the way that the American government approached floods. The first hurricane to cause over one billion dollars in damages in the United States, not adjusted for inflation, Betsy pounded New Orleans in early September of that year.[92] Betsy's fallout would ultimately include the creation of a federally subsidized flood insurance program, one of the adjustments Gilbert White had proposed in his dissertation. This insurance program is especially representative of White's thinking because it was also laden with incentives to encourage another non-structural adaptation, alluvial zoning. Never in the past had the federal government been so supportive of measures that would encourage people to consider accommodating nature's most flood-prone regions, rather than trying to overcome sometimes-insurmountable challenges. This chapter addresses the process leading up to the 1968 creation of the National Flood Insurance Program, and also examines previous abortive efforts to implement a system of federally supported flood coverage. Though White was not involved in the creation of the legislation itself, he led a study that was commissioned

[92] Arnold Sugg, "The Hurricane Season of 1965," *Monthly Weather Review* 94:3 (March, 1966) 183-191

in response to Betsy with the objective of proposing a new approach to floods. That survey, and a sister study focusing specifically on insurance, provided the knowledge base for the legislators who would legally encode a new way of relating to natural risks.

In the Southeast Hurricane Disaster Relief Act of 1965, which was passed in response to Betsy and contained mostly relief provisions, section five called for the Secretary of Housing and Urban Development (HUD) to initiate a study of alternative ways to aid those affected by natural disasters including floods. The study was to focus substantially on the unfunded and dormant program laid out by the Federal Flood Insurance Act of 1956.[93] Recognizing the need to study alternative adjustments to floods, but believing that the HUD-led study was not given enough time or resources to provide a thorough overview of the current situation, the Bureau of the Budget (BOB) formed a task force to prepare a second study. Unlike the dual studies led by Ellet and Humphreys more than a century earlier, these two study groups worked together as allies rather than as rivals, coordinating their focuses so as to avoid needless duplicate efforts. The BOB study, which Gilbert White led, provided a broader look at flood plain usage, while the HUD study, with Marion Clawson in charge, focused more specifically on flood insurance.[94] The White-led task force produced a report in 1966, entitled *A Unified National Program for Managing Flood Losses*.[95] In a letter that accompanied the report to the House of Representatives, President Lyndon Johnson praised twenty years of efforts to mitigate flood losses. However, Johnson also observed that wayward waters

[93] PL 89-339
[94] Platt 51
[95] United States, *A Unified National Program for Managing Flood Losses* (Washington: U.S. Govt. Print. Off, 1966).

were still costing the United States over a billion dollars annually. The report itself noted several flooding catastrophes that had occurred over the previous decades, suggesting that with a broader approach to floodplain regulation, the disasters might have been avoided, or at least diminished. He cited the 1951 flood in Kansas City, in which floodwaters crested levees that were presumed to provide sufficient protection, and the 1965 South Platte flood near Denver, in which urban development sprawled into flood-prone areas. [96]

Disasters like these, Johnson wrote, were the inspiration for a continued push to find even more effective resolutions to the problem of flooding. Significantly, Johnson stated, "the key to resolving the problem lies, above all else, in the intelligent planning for and State and local regulation of use of lands exposed to flood hazard."[97] Thus, by 1966, the president of the United States was embracing the ideas that Gilbert White had put forward over 20 years earlier. Accommodating the risks posed by floods, rather than simply trying to dominate nature, had become a presidential position.

The Task Force on Federal Flood Control Policy, the group commissioned by the BOB, had nine members, with White serving as its chairman. Also on the committee was Walter Langbein, co-author of *Floods*. Other committee members included Irving Hand, president of the American Institute of Planners, environmental economist John Krutilla, housing policy specialist Morton Schussheim, agricultural economist Harry Steele, John Hadd of the U.S. General Accounting Office, Richard Hertzler of the Army Corps of Engineers, and James Goddard of the Tennessee Valley Authority.

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[96] United States, *A Unified National Program for Managing Flood Losses,* 7-8.
[97] United States, *A Unified National Program for Managing Flood Losses,* iii.

In its report, submitted to Congress on August 10, 1966, the task force articulated five broad goals that it recommended the United States government pursue. [98] First, it suggested improving basic knowledge about flood hazards. One facet of this effort would be a three-stage program undertaken by agencies including the United States Geological Survey and the Army Corps of Engineers. The first two stages were designed to be rapidly attainable, in six months and two years, respectively. For the first phase, the Corps of Engineers, with aid from other agencies such as the Department of Agriculture, the Department of the Interior, and the Tennessee Valley Authority, would compile a listing of all towns and streams with flooding problems. For the second stage, the Geological Survey would outline floodplains on maps or aerial photographs. In the third stage, the Corps of Engineers would accelerate its program of providing flood hazard information reports to communities at risk. The Corps of Engineers had already supplied such evaluations to around three hundred communities, but the task force argued that there were ten times more localities that still needed these flood hazard analyses The risk appraisals were to be completed within ten years.[99] A second suggestion to help improve knowledge was the establishment of a uniform technique of determining flood frequency. The Water Resources Council, which had been established in the Water Resources Planning Act of 1965, would lead this effort, drawing on expertise in the areas of hydrology, mathematics, and economics.[100] A third facet of this goal would be to collect more-detailed data on flood damage than the current standard, and to collect this

[98] United States, *A Unified National Program for Managing Flood Losses*, 1-2.
[99] United States, *A Unified National Program for Managing Flood Losses*, 21-22.
[100] United States, *A Unified National Program for Managing Flood Losses*, 22-23.

information in uniform fashion. The Corps of Engineers and the Department of Agriculture would make decennial flood-damage appraisals, concurrent with the census, and those agencies would conduct special surveys any time a particularly severe flood occurred.[101] Finally, the Departments of Housing and Urban Development and Agriculture and the Geological Survey would jointly conduct research to better understand flood plain occupancy and urban hydrology. This would include studies of flood-resistant building designs, successful flood plain zoning ordinances, and factors that affect decisions to occupy the flood plain.[102]

The improvement of basic flood knowledge is clearly in line with White's way of thinking. Dating back to his early years in the New Deal bureaucracy, White had been calling for improved cost-benefit analyses of flood control projects, and the quality of such analyses is wholly dependent on the level of available information. Floodplain maps, uniform determinations of flood frequency, and flood damage appraisals would also be essential components of a successful flood insurance program.

A second goal articulated by the task force report was to coordinate and plan any new development in flood plains. The task force noted that although the federal government directly controlled the building of federal installations in alluvial regions, it was less able to regulate the building done by private individuals and corporations. Those builders are regulated at the state and local levels, so the report challenged the federal government to provide leadership that would be followed by state and local governments. The task force saw the Water Resources Council as an important part of this effort, and

[101] United States, *A Unified National Program for Managing Flood Losses*, 23-24.
[102] United States, *A Unified National Program for Managing Flood Losses*, 24-25.

suggested that the Council should work with state and local governments to develop state- and local-level flood plain regulations. The assembled flood experts also called for the WRC to hold an annual conference that would bring together federal, state, and local agencies to discuss flood plain usage.[103] Another recommendation made by the task force toward the accomplishment of its second goal was to ensure that state and local planning, working with certain federal programs, would take proper account of flood hazards. Land development proposals in connection with federally backed mortgage programs would receive engineering analyses that would take flooding and drainage problems into account. Likewise, highway planning would take risks of flooding into account more fully, to reduce the maintenance costs made necessary by flood-damaged roads. The department of Housing and Urban Development would direct federal grants for the purchase of open space for conservation and recreation, as authorized by the Housing Act of 1961, to be used to purchase flood-prone land when possible, to keep it from other forms of development.[104] A third recommendation toward the goal of coordinating and planning new flood plain developments was that the Office of Emergency Planning, the Small Business Administration, and the Treasury Department, among other agencies, should increase their support of relocation and floodproofing, as opposed to repetitive reconstruction. This could be accomplished by ordering the Small Business Administration to require relocation as a qualification for certain loans, and by creating tax incentives to encourage relocation away from floodplains and floodproofing.[105]

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[103] United States, *A Unified National Program for Managing Flood Losses*, 25-27.
[104] United States, *A Unified National Program for Managing Flood Losses*, 27-31.
[105] United States, *A Unified National Program for Managing Flood Losses*, 31-32.

Finally, the task force recommended President Johnson issue an executive order directing federal agencies to take flood hazards into account when undertaking new construction, and directing that when flood-prone federally-owned land is transferred to non-federal entities, restrictions should be attached to preclude future development that could create public expenses in either relief or flood protection. [106] This final recommendation was the first in the entire report to be acted on. In his letter transmitting the report to Congress, Johnson announced an executive order requiring all federal agencies to take flood risks into account when building new federal facilities.[107]

Several of the recommendations relating to the goal of regulating new alluvial development would have required either new laws or expansions of federal and state bureaucracies, or both. Ultimately, insurance would offer a method of advancing this goal with much less overhead. By basing the availability of insurance on wise floodplain development, the need for legal regulation would be decreased.

The third goal stated by the task force was to provide technical services to managers of flood plain property. "Construction of works for flood control is better known and understood than the alternative and supplementary measures for reducing flood damages," the report stated, echoing the concern articulated by White as much as three decades earlier.[108] The task force recognized that some government agencies had already made the effort to compile data and reports that could be useful in implementing alternative methods of reducing flood damages, but observed that these reports were not

[106] United States, *A Unified National Program for Managing Flood Losses*, 32.
[107] Exec. Order No. 11296, 31 FR 10663, 1966 WL 7714 (Pres.)
[108] United States, *A Unified National Program for Managing Flood Losses*, 32.

well publicized. To remedy this situation, the experts called upon the Army Corps of Engineers to compile and broadly distribute a listing of available information and reports.[109] Further, the task force noted that while some publications existed, many types of adjustment to floods lacked adequate instructive materials, particularly those discernible to laymen. To address this problem, the flood specialists called for a series of guides and pamphlets on alternative measures, an effort to be led by the Army Corps of Engineers.[110] The task force also urged improvement to a particularly important type of technical service, flood forecasting. This task was to be assigned to the Environmental Science Services Administration, which at the time included the Weather Bureau. The report called for automated reporting of river levels, to better predict floods, and flash flood forecasts to enable emergency evacuation and protection.[111]

The fourth goal identified by the task force was to enact a national flood insurance program. "The concept of flood plain occupance charges and indemnification of flood losses constitutes a theoretically ideal procedure for using economic incentives to adjust flood plain use optimally in taking into account the hazards imposed by nature," the report stated.[112] The council's discussion of flood insurance was relatively brief, including the precaution that if enacted improperly, it could actually increase the magnitude of flood losses by discouraging those building in flood plains from reconsidering their building locations or floodproofing. In contrast, a well-planned flood insurance program would have several benefits. It would ensure that people choosing to

[109] United States, *A Unified National Program for Managing Flood Losses*, 33.
[110] United States, *A Unified National Program for Managing Flood Losses*, 33-34.
[111] United States, *A Unified National Program for Managing Flood Losses*, 37.
[112] United States, *A Unified National Program for Managing Flood Losses*, 38.

live in areas prone to flooding would take financial responsibility for their choices. It would encourage regulation of flood plains. Most importantly, it would help prevent new development in flood plains in which the projected benefits would not exceed the cost of insurance. The task force recommended that the Clawson study be granted more time to include a detailed examination of flood insurance, a recommendation that was partially enacted. The Clawson study group did not receive as much time as the task force had recommended, but it did include a major emphasis on flood insurance in its report.

The final goal articulated by the task force was to adjust federal flood control policy to ensure a more efficient return on the federal investment. One way the task force proposed to achieve this was to shift the expenses of flood control projects so that those who stood to gain from them would pay a larger share of the costs. "The more widely the beneficiaries share in costs, regardless of the type of project, the more likely the programs will promote efficient and socially desirable use of flood plains," the report stated.[113] In one way, this was reminiscent of the way flood control projects were funded during the United States' first century, when they were the responsibility of individuals and local governments. It ran directly countered the position advanced by the Flood Control Act of 1936, which promoted the federal funding of flood control projects as long as they provided a worthwhile benefit to *someone*. The task force was hardly calling for a return to simpler days, however, as it obviously advocated a strong, and in many ways increasing, role for the federal government. The task force also recommended distinguishing the benefits derived from flood control projects into two categories:

[113] United States, *A Unified National Program for Managing Flood Losses*, 42.

reduction of damages to existing property, and benefits that could accrue from future development.[114]

In many ways, these goals reflect White's ideas about floodplain control. By improving basic knowledge about flood hazards, communities and individuals would become more able to make informed decisions about development and flood preparation. By encouraging federal and state agencies to coordinate developments on flood plains, more governmental oversight would help prevent people from building in particularly risky areas. Looking back to the methods of adjustment identified in White's doctoral dissertation, four of the methods described most favorably by White—structural adjustments, land use adjustments, emergency evacuations, and flood insurance—are among the ideas advocated by the task force report. As the report concludes, "the effect of these recommendations over the long run would be to reduce the annual bill which the Nation pays for flood losses and to curb uneconomic federal expenditures for new flood control. This would be achieved without setting up new federal organizations, and without placing a heavy burden upon federal personnel."[115] White's ideas of accommodating the risks of flooding were being presented as the best economic option.

White was not directly involved in the creation of the HUD report on flood insurance, but the document nonetheless bore unmistakable signs of his influence. "Two objectives of flood insurance are equally important: to help provide financial assistance for victims of flood disasters in order to rehabilitate their property; and to help prevent unwise use of land where flood damages would mount steadily and rapidly," the appraisal

[114] United States, *A Unified National Program for Managing Flood Losses*, 44.
[115] United States, *A Unified National Program for Managing Flood Losses*, 45.

stated.[116] The report identified insurance as one of seven ways to reduce damages and aid victims, the others being land use regulation, flood warning systems, flood forecasting, flood protection works, planning and management of flood-prone areas, and flood relief. All seven of these methods were discussed in White's 1945 thesis. The HUD report contained many suggestions that would be passed into law in 1968, including that the program initially focus on dwellings of four families or less, that it decline coverage to new construction in high-risk zones, and the federal government seek participation of private insurers in the proposed program.[117]

At the time of the two reports in 1966, flood insurance was not yet readily available in the United States. This is not to say that flood insurance was an entirely new concept to Americans at the time of the creation of the NFIP. A private company that sold flood insurance was founded after flooding along the Mississippi River in 1895 and 1896. The company did not last long, however, as further flooding in 1899 ruined it financially.[118] The company's failure is not surprising. No matter how well capitalized an insurer may be, selling flood insurance in the open market, with terms similar to other types of insurance, is a losing proposition. Even publicly supported flood insurance had created blips on the national radar prior to the process leading up to 1968. In his call for relief spending for the midwestern floods of 1951, President Truman asked Congress to create a national, federally supported flood insurance program. Flood insurance was only

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[116] United States, *Insurance and Other Programs for Financial Assistance to Flood Victims. August 1966*. (Washington: U.S. Govt. Print. Off, 1966). 2.
[117] United States, *Insurance and Other Programs for Financial Assistance to Flood Victims*, 10-13.
[118] Hoyt and Langbein 104

one of five parts of the relief bill Truman asked for, with the other four parts being much more traditional: indemnification of flood losses, low-interest loans to flood victims, aid to help farmers drain and rehabilitate their land, and loans to allow state and local governments to expand their rehabilitation efforts. On flood insurance, Truman stated,

> The lack of a national system of flood-disaster insurance is now a major gap in the means by which a man can make his home, his farm, or his business secure against events beyond his control. It is a basic requisite to the rapid reopening of plants in the flood region, where dikes cannot be rebuilt for some months, and companies are unwilling, in some cases, to undertake the risk of being inundated in the meantime.[119]

Truman proposed that the flood insurance program be modeled after the war-risk insurance in effect during World War II, with private insurers offering policies and being reimbursed by the federal government. In his report, Truman pitched the flood insurance program not only as a way to speed the recovery of flood-damaged individuals and businesses, but also as a method of decreasing the need for future relief payments. "Once the system of flood insurance is in effect, there should be no need in the future for a program of partial indemnities such as is now proposed for the Midwest flood victims," Truman stated. "As a permanent national policy, insurance is far superior to direct Federal payments."[120]

Response to Truman's call was mixed. Though it received some support, representatives of the insurance industry were not sold on its viability. In a hearing on the matter before the House of Representatives, J. R. Berry, general counsel for the National Board of Fire Underwriters, expressed deep doubts about the insurability of floods. "My

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[119] "A Report Relative to the Flood Disaster in the Middle West of the United States," House Document 228, 82nd Congress, 1st session. 5.
[120] House Doc 228, p5.

guess is that it is not going to be insurance, but it is going to be a subsidy," he responded to Mississippi Representative Jamie Whitten's question about the role of government in the program. Expanding later on this idea, Berry stated, "(t)hat is why we do not like the word 'insurance' in these bills. We like to think, gentlemen, of insurance companies paying their obligations and meeting their expenses in full, being self-sustaining, and I think it will have to be recognized as something other than insurance."[121]

After a period of congressional inaction, and still hoping to pass flood insurance legislation, Truman sent Congress a further statement on flood insurance. "I am sure that the great majority of the people want to provide in advance out of their own resources for protection of their property against floods—just as they do now against fire and other hazards," Truman wrote. "A Federal system of flood insurance is the logical answer."[122] In this second statement, Truman even included a draft of legislation that he hoped Congress would pass into law. His statement contained one revealing passage, however, that indicates he may not have fully understood the finances of flood insurance: "I believe that this flood insurance program should be set up on a basis that is designed to permit the Government to break even."[123] Even despite Truman's added pressure, Congress took no action on flood insurance during his administration.

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[121] United States, *Rehabilitation of Flood-Stricken Areas. Hearings Before the Committee on Appropriations, United States Senate, Eighty-Second Congress, First Session, on H.J. Res. 341, Making Appropriations for Rehabilitation of Flood-Stricken Areas for the Fiscal Year 1952, and for Other Purposes* (Washington: U.S. Govt. Print. Off, 1951).
[122] United States, and Harry S Truman, *National Flood Insurance* (Washington: U.S. G.P.O., 1952).
[123] United States, and Harry S Truman, 2.

A federally subsidized flood insurance was actually passed into law twelve years before the creation of the National Flood Insurance Program. In 1956, Congress approved the Federal Flood Insurance Act.[124] The passage of this act became relatively unimportant, however, when Congress declined to appropriate the funding necessary to support it. Apparently, some lawmakers had no problem with the concept, but were less enthusiastic when asked to pay for it. As did the plan that was actually put into action in 1968, the 1956 plan called for a cooperative program between private insurers and the federal government, in which federal subsidies would carry the private companies through catastrophic floods. The 1956 act did include a provision to prevent the insurance of property built counter to local floodplain zoning laws, but the available knowledge of flooding risks at the time was simply not sufficient to enable this type of zoning in many places. As they had in 1951, some voices within the insurance industry opposed the flood insurance enacted by the 1956 legislation on the grounds that it was a subsidy, rather than true insurance. At the time, some insurance company representatives also questioned the propriety of the federal government entering an industry that had long been recognized as a domain of private enterprise, even while acknowledging that private companies could not offer effective flood insurance.[125]

The flood insurance legislation that was passed into law in 1968 was originally proposed a year earlier, as the National Flood Insurance Act of 1967, building off of the ideas offered by the White and Clawson reports. The Congressional hearings on the

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[124] PL 84-1016

[125] Edwin Overman, "The Flood Peril and the Federal Flood Insurance Act of 1956," *Annals of the American Academy of Political & Social Science* 309:1 (January 1957): 98-106.

proposed bill reflect the change in mentality that had taken place since Truman called for a federal flood insurance program some sixteen years earlier. Absent from the 1967 hearings were the protests from the insurance industry that helped sink Truman's proposal. A thorough examination of these hearings reveals a few words of caution, but not a single testimony strongly opposed to the creation of a federal flood insurance program. Whether directly or indirectly, White's ideas were reaching the minds of lawmakers and professionals concerned with reducing the damages caused by marauding waters. Politicians, representatives of the insurance industry, and laymen supported the proposed legislation for a number of reasons, several of which are elucidated in the following paragraphs.

The American Insurance Association, a trade organization for property and casualty insurance companies, extended its full support for the proposed federally subsidized flood insurance program. In his testimony before the Senate committee, T. Lawrence Jones, president of the association, emphasized the program's emphasis on modifying the ways people inhabit floodplains when offering his backing. "A very important feature of the proposed program is the authority which would be granted to the Department of Housing and Urban Development to develop criteria for more effective and widespread flood plain regulations," he stated. Further, Jones believed, "The concept that flood insurance would eventually be available only in areas where appropriate land use and control measures have been adopted is essential to the success of a joint industry-government insurance program for the efficient and humane handling of financial

assistance to flood victims."[126] The emphasis on modifying the use of floodplains was not only in line with White's ideas, it also provided the insurance industry a powerful assurance that the proposed program would not simply be a subsidy for reckless property owners.

Ellie Schill, a homebuilder from New Orleans who represented the National Association of Homebuilders before the Senate, offered somewhat more qualified support for the implementation of building restrictions. Initially praising the thinking behind the restrictions, Schill then added, "(i)t should be recognized, however, that a great deal of buildable land is open to the possibility of flooding at some time. This program will have to be very carefully administered to avoid eliminating from development much land that is highly valuable and otherwise well located for housing."[127] At another point in his testimony, Schill revealed that the mindset of his organization was not necessarily one that had much in common with the ideas promoted by people such as Gilbert White, and embraced in the proposed legislation. Quoting the policy position of the National Association of Homebuilders, Schill stated, "The burden of natural disasters such as hurricanes, floods, tornadoes, and earthquakes falls unfairly and unevenly on the affected community and its citizens."[128]

Another rationale used to support the National Flood Insurance Act was that it would allow victims of floods to support themselves and reduce the need for charity.

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[126] United States, *National Flood Insurance Act of 1967. Hearings, Ninetieth Congress, First Session,* (Washington: U.S. Govt. Print. Off, 1967). (Senate). 144.
[127] United States, *National Flood Insurance Act of 1967. Hearings, Ninetieth Congress, First Session,* (Washington: U.S. Govt. Print. Off, 1967). (Senate). 161.
[128] United States, *National Flood Insurance Act of 1967. Hearings, Ninetieth Congress, First Session,* (Washington: U.S. Govt. Print. Off, 1967). (Senate). 160.

White would certainly have agreed with this justification, given his position that by employing a diversified approach to alluvial development, the need for emergency relief could be greatly reduced. The American Red Cross cited this justification in offering its full support to the creation of a federally subsidized flood insurance program. In testimony before the Senate, Robert Shea, Vice President of the American National Red Cross, emphasized his organization's central mission of providing immediate relief to the victims of disasters. "(T)he Red Cross makes no attempt to replace all disaster-caused losses," Shea stated. "It only provides the assistance to bridge the gap between what the families need as the result of the disaster and what they can do for themselves by utilizing resources available to them."[129] Shea noted that those other available resources, such as Farmer's Home Administration loans and comprehensive homeowners' insurance, are utilized "in the American tradition of helping oneself insofar as possible."[130] Shea viewed insurance, even federally subsidized insurance, as a tool rather than a handout or a subsidy, and voiced his unequivocal support of the proposed flood insurance program. "Such a program," he stated, "would have the desirable objective of enabling a homeowner or resident to protect his family against property risks that he cannot presently insure and thus make available a further shield against crippling disaster losses."[131]

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[129] United States, *National Flood Insurance Act of 1967. Hearings, Ninetieth Congress, First Session,* (Washington: U.S. Govt. Print. Off, 1967). (Senate). 60.
[130] Ibid.
[131] United States, *National Flood Insurance Act of 1967. Hearings, Ninetieth Congress, First Session,* (Washington: U.S. Govt. Print. Off, 1967). (Senate). 59-60.

Hale Boggs, a Democratic representative from Louisiana who was serving at the time as the House Majority Whip, had been pushing for a federally backed flood insurance program even before 1967. In his statement to the House committee, Boggs emphasized the same idea that had been advanced by Shea: empowering people to protect themselves. "Our people want the opportunity to protect themselves," Boggs stated. "They do not want to rely on relief agencies, Government largesse, or charity. They want to protect themselves and it is up to us to help them do it. Passage of this legislation will go a long way in helping people to protect themselves against flood disasters."[132]

Jones, the insurance industry representative, supplied another reason why the federal government should become involved in flood insurance: the inability of private insurers to offer flood insurance without outside help. Unlike industry representatives in earlier years, however, Jones did not use this as a reason to suggest that private insurers would want no part of such a program. "It is often said that any insurance can be written for a proper price," Jones said. "This, however, gives a distorted meaning to the word 'insurance.' When our industry speaks of it, we mean the system by which the premiums of the many pay for the losses of the few."[133] Two important factors in determining insurability, Jones noted, are the catastrophic loss potential and the loss frequency. Residential fires have a high catastrophic loss potential, but their occurrence is relatively low, which makes urban fire an insurable risk. Car accidents occur with more frequency, but the potential for catastrophic loss is low, making auto insurance feasible. Among

[132] United States, *National Flood Insurance Act of 1967. Hearings, Ninetieth Congress, First Session,* (Washington: U.S. Govt. Print. Off, 1967). (House). 3.
[133] United States, *National Flood Insurance Act of 1967. Hearings, Ninetieth Congress, First Session,* (Washington: U.S. Govt. Print. Off, 1967). (Senate). 143.

those likely to seek flood insurance, both the frequency and the potential for catastrophic loss are high, leading Jones to classify floods as uninsurable in the open market. By mandating the purchase of flood insurance among broader sectors of the population, Jones noted, the risk could be spread more manageably, though he noted that such a mandate would be of questionable legality, as well as unpopular. Jones made no mention of the fact that a federally subsidized flood insurance program *would* spread the risk to a larger pool, albeit indirectly via the use of tax dollars.

From outside the halls of congress came another rationale for supporting a federally supported system of flood insurance: reducing spending. Robert Chuoke, president of the Sunday Morning Coffee Club from Galveston, Texas, wrote a letter in support of the legislation on behalf of the club to Galveston's congressman, Jack Brooks. In the letter, Chuoke emphasized fiscal responsibility. For many years, he noted, the federal government had been supporting relief efforts after floods while receiving no remuneration. Even though the flood insurance program would also involve the spending of federal money, the government would also take in money in the form of insurance premiums. This was a change that made a lot of sense to Chuoke and his fellow Coffee Club members.[134] Representative Boggs made a related argument, asserting that a federally directed and subsidized flood insurance program would save money over the piecemeal relief measures that had characterized the nation's response to floods in previous years.

[134] United States, *National Flood Insurance Act of 1967. Hearings, Ninetieth Congress, First Session,* (Washington: U.S. Govt. Print. Off, 1967). (House). 187.

With the support that was offered so abundantly by numerous testifiers, it should come as little surprise that the effort that started in 1965 proved to be the one that successfully enacted a federally supported program of flood insurance. The National Flood Insurance Program was passed into law as part of the Housing and Urban Development Act of 1968 in a section known as the National Flood Insurance Act of 1968. [135] The bill called for coverage to focus initially on small businesses and dwellings with four families or less living in them. No insurance was to be extended to properties built in violation of state or local floodplain zoning ordinances. In 1968, those ordinances were far from universal, and the bill had an answer to that problem, too: after June 30, 1970, no new coverage was to be provided in any locale that had not adopted ordinances to prevent building in especially flood-prone areas.[136] The bill provided two options for how the program would be operated. The first option was to provide federal backing to allow private insurance companies to offer flood insurance. If that plan did not work, or if private insurers were uninterested in participating, then the federal government was authorized to run the flood insurance program itself.[137] Chapter 3 of the National Flood Insurance Act, entitled "Coordination of Flood Insurance with Land-Management Programs in Flood Prone Areas," is especially reflective of the influence of White and the BOB task force. This section of the bill dictated that the Secretary of Housing and Urban Development must make the necessary arrangements with other governmental departments in order to publish, within five years, information on all flood-prone areas of

[135] PL 90-448
[136] PL 90-448, sections 1315 and 1316
[137] PL 90-448, chapter 2

the United States. It also authorized the HUD secretary, at his discretion, to purchase insured properties that had suffered severe flood damage. Once purchased, they would be kept under federal ownership and used only for purposes consistent with their flood-prone location. Finally, chapter three directed the secretary of HUD to encourage state and local governments to develop land-use regulations that would minimize new construction in flood-prone areas and encourage effective floodproofing.[138]

The passage of the National Flood Insurance Act of 1968 marked only the beginning of the National Flood Insurance Program, which continues in existence to the present day. Since its original enactment, the program has been amended heavily. Whether or not it advanced the ideas promoted by White in practice is certainly open to debate. Nonetheless, the passage of the National Flood Insurance Act serves to illustrate the broadening acceptance of a school of thought pioneered by Gilbert White.

[138] PL 90-448, chapter 3

CHAPTER 5

CONCLUSION

The National Flood Insurance Program was not an overnight success. The initial buy-in was almost laughable—twenty policies in the program's first two years of existence.[139] Various pieces of legislation have made major modifications to the program since its 1968 inception. Even with increased participation in more recent years, the program has not come anywhere close to eliminating losses caused by unchecked waters, as the experience of Iowa City, Iowa demonstrates.

Nonetheless, the NFIP's creation is a powerful sign of the ways that peoples' attitudes toward flooding, and toward the natural world as a whole, had changed. In Gilbert White's 1942 articulation of the eight methods in which people may respond to the risk of high waters, flood insurance was but one of those methods. In the analysis presented in Chapter 3, it is not even represented to be the adjustment that White favored most strongly. As it has been employed in the United States, however, flood insurance is also an instrument to encourage the increased practice of other methods that White favored. Without implementing restrictive legal measures, the NFIP has used the offer of insurance as an incentive to encourage people to modify their behaviors. One of the adjustments White supported most strongly in his dissertation was zoning. The National

[139] Platt 55

Flood Insurance Program provided a push for both individuals and municipalities in this regard. Coverage would not be offered for new construction in violation of local ordinances, and after a grace period, the government would not sponsor any coverage at all in areas that had not enacted guidelines for building in risky areas.

Buoyed by a steady faith in the abilities of engineers, people in the first decades of the century assumed that by manipulating the natural environment in just the right way, they could eliminate unwanted inundations. Even after the confidence in levees was eroded by the events of 1927, planners initially shifted their focus mainly to other types of physical modifications such as reservoirs to hold surplus waters and floodways to channel those waters into innocuous courses. The New Deal's emphasis on planning was fertile soil for new ideas to take hold, and it was in the Roosevelt bureaucracy that a young geographer developed his revolutionary idea that there are times in which accommodation of nature is the most logical choice. Some three decades later, that fledgling geographer had become one of the most respected voices in the discussion of floods, a status that granted his ideas a crucial role in plotting the nation's response to high waters in the 1960s.

The changes that took place between the 1920s and 1960s might never have happened if the federal government had not become deeply involved in managing riparian bottomlands. For sure, the National Flood Insurance Program would have never seen the light of day, since it owed its very existence to federal support. Even before that, however, the focus on controlling nature might never have declined. The folly of relying solely on physical adjustments was not vividly demonstrated until a thorough system of

levees had been completed, and that system was only completed with the backing of Uncle Sam.

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