

## **Inundation of the Heartland**

### Tropical Storm Agnes and the Landscape of the Susquehanna Valley

**Abstract:** Environmental perception and poor land use practices in the twentieth century are argued to be the primary agents which led to widespread devastation of the Susquehanna Valley following tropical storm Agnes in the summer of 1972. The flooding from Agnes in Central Pennsylvania had been the catalyst to promote changes including altering the role of all levels of government during subsequent disasters as well as an increase in environmental mindfulness by promoting the proper use of land across the nation. A renewed contribution to the analysis of tropical storm Agnes in Pennsylvania will be employed through an environmental approach by interpreting the dynamic relationship that citizens of the Susquehanna have with their landscape. The various methods of flood control, environmental attitudes, and the historic response from the federal government in the twentieth century are examined to understand the impact of tropical storm Agnes at the local, regional, and national levels.

**Keywords:** Environmental History, Natural Disaster, Land Use, Flood Control, Environmental Policy

In the summer of 1973 Governor Shapp toured the many towns and cities throughout Pennsylvania that had been ravaged by the flooding from Agnes to commemorate the one-year anniversary of the historic floods. While visiting Wilkes-Barre on June 23, the Governor gave a speech observing the passing of the previous year's destruction of the Wyoming Valley stating that "The history books will never record the countless deeds of heroism, human courage, human decency, and compassion that have brought us so far down the road to recovery."<sup>1</sup>

This particular excerpt from the Governor's speech reveals the monumental tasks which millions of citizens across the Commonwealth faced following the record shattering floods of June 1972. It is a valid concern by the Governor to express that history may never accurately document the efforts to overcome an emotionally charged tragedy such as the devastating losses from tropical storm Agnes. It is fundamentally difficult, if not impossible, to truthfully capture and record the people's emotional narrative of pain and anguish as the places they called home succumbed to the power of water and the wrath of Agnes. Yet the attempt to document and interpret the story of Agnes is critical in being able to reflect on this profound experience which had been a local and national primary agent of change. It is necessary for all those who inhabit the mighty Susquehanna in the years to come to be reminded of the power in which this river and her lands invoke.

While Agnes' physical force flooded homes and destroyed communities, all that was known had been questioned; and suddenly reality was shattered due to the pain of loss. The environment demanded respect by subjecting humans to the fury of water which forcefully imposed a sense of helplessness and a lack of control over engineered landscapes within the Susquehanna Valley. The floods from Agnes during the first days of summer in 1972 in the Susquehanna River basin would become the most devastating singular agent of change in the

history of Pennsylvania. The story of tropical storm Agnes not only demonstrated disaster relief recovery efforts but was also emblematic of larger philosophical trends towards conservation, environmentalism, and land use. The flooding from Agnes in Central Pennsylvania had been the catalyst to promote change including altering the role of all levels of government during subsequent disasters as well as an increase in environmental mindfulness by promoting the proper use of land across the nation.

One local historian, Robert P. Wolensky, tells the story of Agnes in the Susquehanna region and focuses heavily on the relief efforts in the greater Wilkes-Barre region. In his book *Better Than Ever*, Wolensky interprets the efforts of The Flood Recovery Task Force, a unique coalition of local politicians and citizens working towards the rebuilding of their towns by acting as liaisons to the federal and state governments. Another interpretation of Agnes in the region was written from firsthand experience by Paul Walker titled *The Corps Responds: A History of the Susquehanna Engineering District and Tropical Storm Agnes*. Each of these histories primarily analyze the relief efforts by different groups or agencies. This particular interpretation is the most common within the historical literature when telling the story of the Agnes in the Susquehanna Valley in 1972. Although these stories of relief and recovery are compelling and unique to the region, they do not address the historical context of flooding and its agency within Pennsylvania before Agnes in 1972. They are written as if they are singular snapshots in time with little context on historical continuity.

Another work that contributes to the historiography was written by William Shank is titled: *Great Floods of Pennsylvania*. This retired engineer contextualizes the history of flooding in the region, but his work, like those aforementioned, also emphasize the agency of humans rather than identifying that humans are within the vast ecological web we define as nature. The

isolation of humanity from the natural world is a classic historical perspective which will be challenged in this work. A renewed contribution to the analysis of the floods of 1972 in the Susquehanna Valley through an environmental approach will be utilized in this essay to interpret the “push and pull” dynamic relationship and the intimate dependency that citizens of the Susquehanna, as biological organisms, have with their landscape.

### **The Storm of the Millennium**

The first Atlantic hurricane of the 1972 hurricane season spawned from a low pressure depression near the Yucatan Peninsula on June 15.<sup>2</sup> A name now infamous in meteorological history; Agnes produced copious amounts of rain, several tornadoes, and a dangerous storm surge in the Gulf of Mexico in the days following the storm's conception. After traveling north across the western half of Cuba and making landfall in Florida on June 19, the hurricane was degraded to the status of a tropical storm after already killing twelve people.<sup>3</sup> The storm continued to weaken as it moved across the state of Georgia and made its way back out to the Atlantic coast of the United States. Agnes regenerated strength as it progressed over the warm summer waters of the Atlantic Ocean between June 20 and 21. The following day, June 22, the storm made landfall once again near New York City and made its way into north-central Pennsylvania. At this moment, Agnes merged with an already existing low pressure extra-tropical cyclone over the region, stalling the storm for twenty-four hours over Pennsylvania.<sup>4</sup> According to the National Oceanic and Atmospheric Administration (NOAA), Agnes would rank as one of the weakest hurricanes in regard to its intensity, but had a relatively large diameter measuring nearly a thousand miles wide.<sup>5</sup>

Once the hurricane was downgraded to the status of a tropical storm, few if any Pennsylvanians felt threatened by the waning storm. On June 20, a Hazelton area newspaper

published a front page story about the storm titled “Hurricane Agnes Subsiding.”<sup>6</sup> Another local newspaper from Pottstown affirmed that Agnes’ “fury started to subside as it churned in land.”<sup>7</sup> Pennsylvanians seeing themselves isolated from the distant storm of the south paid no attention to the possibility of any threat to their homeland. Little did they know, Agnes would become the most devastating disaster to ever occur in Pennsylvania.

The following day on June 21 the torrential rainfall began to fall across the mid-Atlantic region. A flash flood watch was issued by the River Forecast Center in Harrisburg for the Susquehanna Valley at eleven in the morning and only four hours later a flash flood warning was issued.<sup>8</sup> It was recorded at the time that many residents of the area did not know the difference between a flood “watch” and flood “warning” which often negated the strained efforts of the National Weather Service.<sup>9</sup> All that day and into the next morning Agnes poured over ten inches of rain onto central Pennsylvania stretching through York, Lancaster, Cumberland, Dauphin, Northumberland, and Schuylkill counties.<sup>10</sup> The seemingly distant and “weak” Agnes unpleasantly surprised locals by submerging their homes and forcing them to flee to higher ground. Once the small, tranquil streams evolved into gushing torrents, residents living along the dendritic tributaries of the Susquehanna no longer questioned the strength of the storm, and unfortunately the worst was yet to come.

Throughout the next two days, an additional five inches of rain fell in the lower Susquehanna basin making the official rainfall total the three days between June 21 and 23 at Harrisburg International Airport 15.8 inches.<sup>11</sup> The highest observed rainfall from the storm was in Klingerstown, Schuylkill County measuring nineteen inches of total precipitation.<sup>12</sup> Almost half of the average annual rainfall total for the Susquehanna River Basin fell in the period of three days. Under normal conditions the river level at Harrisburg hovers between seven and

eleven feet and major flood stage occurs at seventeen feet, but on Saturday June 24, the Susquehanna at Harrisburg finally crested at 32.57 feet, three and a half feet higher than the previous record in March of 1936.<sup>13</sup> The Susquehanna River and its tributaries swelled to record stages and destroyed entire towns and buried cities under a watery grave. To conceptualize the amount of water Agnes brought to the region, there would have been enough precipitation to fill a sixty-seven square mile lake measuring the depth of two thousand feet.<sup>14</sup>

Unprecedented flooding throughout the watershed disproportionately impacted the densely populated urban centers located within the floodplains of the Susquehanna River. From southern New York state, including Corning and Elmira to Pennsylvania's Wyoming Valley including Wilkes-Barre, Forty-Fort, and Kingston, then further south into the lower Susquehanna watershed into Danville, Harrisburg, Middletown, and York. According to the United States Geological Survey the flooding had been "especially severe between Wilkes-Barre and Harrisburg."<sup>15</sup> Under normal conditions the average annual water flow for the Susquehanna River at Harrisburg is roughly 34,000 cubic feet per second.<sup>16</sup> When the river crested at its highest recorded level on June 24, the peak discharge flowing past the Capitol building was over a million cubic feet of water per second.<sup>17</sup>

The waters of the once peaceful Susquehanna mutated into a furious ocean of debris, oil, and trash, exacerbating the devastating effects of the flood. Roads, bridges, and railways eroded away with the banks of the once harmless creeks and streams isolating communities for days. To make matters worse, the first half of June had been particularly wet in the state, which received or surpassed the average monthly rainfall total in the previous fifteen days.<sup>18</sup> Drainage runoff in the Susquehanna River Basin intensified due to the soil's inability to absorb additional water. Once the storm arrived and distributed massive amounts of water into the drainage basin, most of

the precipitation was runoff which immediately intensified the severity of the flooding. Agnes' floods caused roughly 3.1 billion dollars in damages and 118 deaths across the east coast, where 48 deaths and 2.1 billion of the damage total occurred within the Susquehanna Valley of Pennsylvania.<sup>19</sup>

### **Self-Inflicted Disaster**

Although Agnes is remembered as being the worst natural disaster in the history of Pennsylvania, the life sustaining abundance of water in the state has always been a source of mortality for its residents. Historically, flooding has continuously been a common natural phenomenon through the landscapes of the Commonwealth; as its inhabitants have an intimate memory of the reoccurring floods in the region and the ruthless destruction they have caused.<sup>20</sup> The Susquehanna watershed is one of the most flood-prone areas in the United States and is attributed to a variety of factors.<sup>21</sup> Much of the land in the state is composed of rugged, mountainous topography, particularly within the ridge and valley and Appalachian Plateau regions. These physiographic provinces include the Appalachian, Allegheny, and Blue Ridge Mountains as well as deep glaciated gorges in the northern part of the state. Pennsylvania's ancient mountains are often accompanied by steep valleys and undulating plateaus such as the Susquehanna Lowlands or the Cumberland Valley.

The geomorphological processes that produced such a unique topographic landscape has produced Pennsylvania's lands into an abundant network of attractive streams, creeks, and rivers nestled within these precious riparian valley ecosystems. For thousands of years, humans have disproportionately settled within or near flood plains to reap the natural resources of these valleys.<sup>22</sup> The Susquehanna, which drains over twenty-one thousand square miles of

Pennsylvania, has continually been used as an avenue of transportation, for farming its nutrient rich soils, and used as a primary source of power, food, and water. <sup>23</sup>

Through the nineteenth and twentieth centuries, the once isolated agrarian hamlets along the Susquehanna, such as Harrisburg and Wilkes-Barre, evolved into industrialized economic centers which specialized in energy and transportation. This occurred because of the strategic location in easily accessible lowland floodplains as well as the availability of Pennsylvania's raw materials such as coal, oil, timber, and water.<sup>24</sup> With existing infrastructure and institutions already in place during the market revolution and industrialization periods of the nineteenth century, periodic floods along the river deterred few from further investments of time and resources into culturally produced landscapes and favorable economic conditions.<sup>25</sup> As these engineered environments grew in size, many inhabitants of the Susquehanna grew disconnected with their natural landscapes owing to the fact that they were obscured by society, shielded by structures, and distracted within their socially bounded gridded towns.

Even though occasional flooding along the Susquehanna and its tributaries reminded people of their vulnerability and physical inferiority to natural elements and their immediate landscapes, its difficult and often times nearly impossible to separate people from their learned idea of home and sense of belonging, regardless if "home" is located in a hazardous floodplain. The cyclical intensification of economic investments and increased population density in floodplains along the Susquehanna allowed this pattern of cultural isolation and short lived environmental realization to persist through each successive generation, which also correlated with an increased risk of catastrophe from flooding. This historic continuity regarding land use in Pennsylvania and along the Susquehanna is critical towards the development of context for

understanding why urban population centers are located in their present geographical settings along the Susquehanna.

Given the aforementioned context, what exactly constitutes a natural disaster? Flooding is often labeled as a natural disaster and historically has been given a negative connotation, when in fact the event of flooding is more accurately conceptualized as part of the natural cycle of every healthy watershed. Flooding events only become titled “disasters” when cultural landscapes located floodplains are destroyed or altered by the natural phenomenon that has and always will continue to take place. Pennsylvanians decided to invest generations of time, labor, and resources into the floodplains of the Susquehanna and somehow expected that their reconfiguration of the land isolated them from the forces of nature. Being one of the most flood-prone regions in the United States, flooding will always continue to be an issue within the Keystone State.

The first half of the twentieth century saw a handful of factors which amplified the hazard of urban flooding throughout the Susquehanna River Basin. Urban growth and technological advances provided the catalysts towards a rapid increase of impervious surfaces from roads and buildings which decreased the availability of permeable drainage areas and allowed flooding to gradually become a more serious issue of urban spaces within reach of the Susquehanna River. For instance, the city of Harrisburg had less than five miles of paved roads in 1902 and by 1915 this figure increased to seventy-four miles of paved streets.<sup>26</sup> Cultural understandings of “useful” land in both Pennsylvania and the rest of the country before tropical storm Agnes have had dire consequences for the health of humans and the resources in which all organisms rely on to survive. The perception of productive land and a lack of knowledge urged people to develop and destroy ecologically important biomes, such as wetlands and flood plains,

which today we now know serve as natural buffers which filter and absorb water greatly reducing damages from flooding. Unfortunately, poor urban planning, a lack of public concern for the power of flooding, and an inaccurate interpretation of the land persisted through subsequent generations which greatly increased flooding hazards throughout Pennsylvania, especially in the twentieth century.

### **Flood Control Measures Before Agnes**

Prior to the 20<sup>th</sup> century, a diverse wetland which occupied the area just north of Harrisburg once known as “Wetzel’s Swamp” was sacrificed as a result of the City Beautiful Movement. An ecologically important biome was once “carpeted with flowers” and largely inhabited by skunk cabbage, blood root,<sup>27</sup> turtleheads, and “ladies’ tresses, a delicate fragrant orchid.”<sup>28</sup> Unfortunately, this once thriving and productive wetland that helped absorb and filter some of the flood waters to the north of Harrisburg was often blamed for many of the city’s problems. Wetzel’s Swamp was notoriously known as an unproductive landscape that was “responsible for the typhoid fever in the city”<sup>29</sup> and a place that once sheltered malarial mosquitoes.<sup>30</sup>

This historic perspective regarding the functionality of wetlands and their alleged uselessness to humans is a reminder that these landscapes have been poorly misunderstood for they were often known as places of disease, recklessness, and filth. With this being said, many Harrisburgers had been in favor of “Draining the Swamp”<sup>31</sup> for civic improvements to make way for the Pennsylvania Railroad which would dually eliminate the “practically worthless” disease ridden wetland.<sup>32</sup> Through the efforts of Mira Lloyd Dock, Wetzel’s Swamp was acquired and was transformed into Wildwood Park for the sole purpose of controlling the flooding of Paxton Creek which runs directly through Harrisburg. The park’s primary lake which was “thought to

be the largest artificial body of water in the state” upon its completion around 1910 contained the headwaters of Paxton Creek and released water at a steady volumetric discharge.<sup>33</sup> The Harrisburg Telegraph later boasted the efficacy of the new Wildwood Lake in the summer of 1915 claiming that the lake is the sole reason “why floods are no more” in Harrisburg.<sup>34</sup>

This early example of large-scale engineered flood control in the Susquehanna Valley begins a century long narrative of combating the forces of this mighty river. The efforts of Dock were primarily motivated by the Progressive Era conservation movement, which largely began in Pennsylvania as a result of “the problems engendered by late nineteenth century industrialization and urbanization.”<sup>35</sup> Ironically, the demolition of Wetzel’s Swamp, a wetland which was likely several hundred acres, further contributed to the destruction of Pennsylvania’s unique ecosystems and fragile wetlands rather than having promoted their conservation, which is what Dock is historically known for. Although this is an exception to the story of Dock in her grand efforts towards conservation it shows that, in this case, she favored the progression of cultural landscapes at the cost of sacrificing natural ones. Wildwood Park is now a physical memorialization that once attempted to preserve urban space in floodplains rather than allowing ecological processes work together to naturally mitigate the natural and healthy function of flooding.

Twenty years later, this early method of flood control failed to keep Harrisburg free from inundation at the height of the Depression. Until 1972, the flood of 1936 was once known as the most devastating natural disaster in Pennsylvania.<sup>36</sup> Known as the St. Patrick’s Day Flood, this flood was the high-water mark of natural disasters in Pennsylvania throughout the twentieth century until 1972. A disaster of this magnitude during the Depression intensified the cry of poverty stricken Pennsylvanians, and a call for a more organized and regulated public response

to flooding was sought to help protect against further economic and social destruction.<sup>37</sup> Massive destruction and chaos in Pittsburgh and Harrisburg exacerbated the effects of the struggling economy in the industrial powerhouse of Pennsylvania. An event of such magnitude quickly quieted idealistic claims of Harrisburg being free of flooding.

In the age of the New Deal, and at the height of American progressivism, federal and state governments began to implement unparalleled political oversight for those devastated by the Depression. Several New Deal programs were developed to reverse the impacts of both human caused environmental problems, such as soil erosion and deforestation from large scale extraction economies, and naturally occurring environmental problems including flooding. Following the flood of 1936, the Roosevelt Administration recognized the need for a national flood control mitigation.<sup>38</sup> Since major floods affected the commerce and economic welfare of the entire nation, the federal government felt it was necessary to play a primary role in future planning for flood prone areas such as Pennsylvania's Ohio and Susquehanna river watersheds.

Congress passed the Flood Control Act of 1936, and in doing so the federal government assumed the role of implementing flood control for the entire country.<sup>39</sup> During the Depression, localized volunteer efforts could not handle the widespread effects of urban flooding and state and local municipalities could not afford the additional financial stress and instability, therefore the ideology of New Deal federal liberalism took on the task of relieving those living within floodplains.

The Flood Control Act of 1936 represented the first comprehensive piece of legislation in the United States to have the federal government assume full responsibility for flood control measures.<sup>40</sup> Agencies such as the Tennessee Valley Authority, Department of Agriculture, United States Forest Service, Army Corps of Engineers, and the Civilian Conservation Corps

were given the authority to implement projects necessary to reduce the impacts of soil erosion and flooding. In reaction to the flooding in 1936, at the state level Pennsylvania followed suit with the federal response and passed the Flood Control and Pure Streams Act of 1936 in an effort to further reduce the effects of both flooding and soil erosion in the Commonwealth.<sup>41</sup>

These flood control measures drastically affected landscapes throughout the Keystone State. The proposed mitigations towards flooding were implemented through structural means to reduce the impact of flooding and soil erosion in lowland urban settlements; thus imposing permanent features throughout both urban and rural sceneries. Dams, levees, flood walls, reservoirs, and creek channeling were common projects in Pennsylvania throughout the 1930's and 1940's to combat the forces of flooding seen in the spring of 1936. Suppressing localized opposition over land use became easier after the passage of the Flood Control Act in 1938, which gave the Army Corps of Engineers the right to acquire land through eminent domain for the use of flood control.<sup>42</sup> These legislative and political measures allowed the era of dams to begin which saw unprecedented and costly construction of engineered flood control methods. These massive earth moving projects were one way to employ thousands of jobless young men whom were both eager to work and passionate to protect their hometowns during the Depression.

In the four decades following the flood of 1936, the Army Corps of Engineers constructed projects all across Pennsylvania. Rather than developing any comprehensive hazard mitigation plans for floods in the future, many of these manmade efforts to control flooding in Pennsylvania were reactionary measures planned around the precedent setting flood of 1936. For example, the earthen dikes constructed around Wilkes-Barre were built only three feet higher than the recorded crest of the Susquehanna in 1936.<sup>43</sup> Following the destruction of Agnes, Maurice Goddard, the Secretary of the Pennsylvania Department of Environmental Resources,

stated that “this new storm indicates that we were too conservative” when engineering these massive landforms to protect against flooding.<sup>44</sup>

These structural methods to relieve lowland areas of continual flooding were viewed as the only logical method to deal with the forces of nature, or known to many as the “acts of God.” Relocation was not an option given that entire industries, ethnic communities, and ways of life would be uprooted. Social ties, cultural affiliation, and the perception of home were some of the only parts of a community that the Depression strengthened; developing a sense of social order, and uniqueness. The willingness to preserve existing engineered landscapes and the lives of those who inhabit them were a top priority of the anxious Pennsylvanians trying to advance beyond the ailments of the Depression years. Massive engineering projects imported a landscape of laboring men and heavy machinery in rural Pennsylvania which provided an illusion of progress for isolated locals during a time when unemployment was commonplace. The construction of the Kinzua Dam on the Allegheny River, the earthen levees in Wilkes-Barre, the flood walls in Sunbury, and the Rock Dam on the Codorus Creek in York were the desperate measures to save and preserve these cultural and social landscapes that connected people to reality during such frightful times. Engineered monuments dedicated to controlling nature were in essence the physical embodiments symbolizing both fear and hope for Pennsylvania’s future.

These various flood control measures had been tested to their fullest abilities in the summer of 1972. Fortunately, all of the dams constructed in Pennsylvania proved to be very successful in reducing the impact of the flood waters by effectively retaining millions of gallons of water.<sup>45</sup> Despite the ethical concerns and political backlash by claiming eminent domain over the Seneca Nation’s land in Northwestern Pennsylvania, the effectiveness of the Kinzua Dam proved its value during the floods of Agnes; otherwise Pittsburgh and Johnstown would have

been all but destroyed. Other dams constructed by the Army Corps of Engineers on the West Branch of the Susquehanna saved Williamsport and Lock Haven from being inundated with record flooding. Concrete flood walls, also a product of the US Army Corps, saved the City of Sunbury from being traumatized by the flood greater than that of 1936.<sup>46</sup> Although the dams proved to be successful land use measures in the effort to reduce the loss of property and life, other structural flood control measures failed miserably.

Once Tropical Storm Agnes entered the region, nobody believed the dikes in Wilkes-Barre could be topped. The River Forecast Center in Harrisburg predicted that the North Branch of the Susquehanna was going to crest higher than forty feet, seven feet higher than the flood of 1936.<sup>47</sup> As 100,000 people were evacuated out of the valley in anticipation of potential dike failure, the local Civil Defense Unit worked furiously to close the gaps in the dike. Unfortunately, the massive dikes around the city failed to contain the water of the Susquehanna in the deep gorge of the Wyoming Valley.<sup>48</sup> Downtown Wilkes-Barre was under ten feet of water which led to Luzerne County's contribution of nearly seventy percent of the total fiscal losses in Pennsylvania during the flood.<sup>49</sup> These archaic earth mounds provided a false sense of security for the citizens of the Wyoming Valley since their construction in 1943.<sup>50</sup> Although only fifteen hundred acres were flooded in the Wilkes-Barre area, a total of twenty thousand residential homes were affected by the waters of the breaching Susquehanna.<sup>51</sup> Even though there were flood control measures in place, the issue of high population density in flood-plains proved to be a considerable problem in the region during the summer of 1972.

The continual presence of federal operations in the Susquehanna heartland and the changes in the landscape to control flooding further validated the federal responsibility of flood control measures in the minds of Pennsylvanians. Local and state governments can barely

balance budgets, let alone plan, execute, and fund massive land moving projects, so the logic to assume that the federal government is responsible is a reasonable belief, especially during the Depression. Flood mitigation responsibility soon percolated into disaster relief and long-term disaster recovery policies once other threats, such as nuclear war during the Cold War, loomed over the nation. Authoritative involvement in flood mitigation continually progressed and broadened with power over the next several decades.

### **Infancy of Non-Structural Flood Control**

As the federal government assumed the responsibility of flood control and disaster relief between the 1930's and 1960's, new ideas of land use and conservationist measures also began to emerge. Environmental awareness in the 1960's began a monumental shift of consciousness towards issues of land use, pollution, and a general concern for the future of human interaction with the rest of the natural world. Pennsylvania's own Rachel Carson and her paradigm-shifting work in *Silent Spring* paved the way towards early environmental legislation such as the Clean Air and Clean Water Acts in 1963 and 1965 respectively.<sup>52</sup> Once again, this legislation was not the unilateral action of Congress, but they were products of dynamic cooperation supported by environmentally conscious citizens fighting for the protection of the natural world which included their own porous, vulnerable bodies.

Another piece of legislation which had been influenced by the environmental movement was the National Flood Insurance Act of 1968. This act developed the guidelines for the National Flood Insurance Program (NFIP), a federally operated insurance agency for individuals living in flood prone areas. This act was the introduction of the shift towards more proactive non-structural methods of flood control methods for the nation. Since private insurance companies could not afford the risks of insuring existing property in flood-plains, the federal

government once again assumed this responsibility. The attempt to impose this permanent land use control measure was introduced with guidelines to reduce the massive financial burden of flooding, which the federal government had appropriated in previous decades.<sup>53</sup> This act identified at risk areas, offered insurance, and simply encouraged state and local municipalities to introduce and enforce local flood zoning ordinances.

Unfortunately, this act proved to be a dismal failure for a variety of reasons once Agnes inundated the Susquehanna Valley. Flood insurance was fairly expensive when the policies were introduced in the late 1960's averaging around a hundred dollars annually or around six hundred dollars today.<sup>54</sup> Few people were interested in investing in an insurance policy for something that may never happen, especially if it was not required. This was particularly true for those who experienced the flood of 1936 and felt that nothing would ever compare to such an event, therefore they believed they had the hindsight of interpreting "at risk" areas themselves. Additionally, the general public failed to embrace flood insurance due to a lack of information available to them despite the obtainable materials from the NFIP and the US Army Corps of Engineers. In the late 1960's, while implementing the NFIP, the Corps published informational guidelines for "reducing flood damages" to reinforce the changing perspectives towards the landscape.<sup>55</sup> The guidelines represent the changing ideology regarding the perception of flood control measures from the federal government. Within the guide, the literature acknowledges that structural measures "running into the billions of dollars for flood control works, the increase in flood damages has led to a new approach...the application of planned development and management of flood-hazard areas."<sup>56</sup>

The initial failure of the NFIP was largely due to the lack of interest by local communities and municipalities. Since only local governments themselves had righteous

authority over their land use ordinances, the NFIP and the federal government could only recommend rather than enforce localized flood ordinances. Once Agnes swept through the region, there had been only two flood insurance policies sold in Wilkes-Barre; where the worst of the flooding occurred.<sup>57</sup>

Even though local and municipal governments never embraced flood insurance with open arms, this does not mean Pennsylvanians were not concerned with their environmental resources. The late 1960's saw a surge of interest regarding the protection of land and resources. Local, municipal, and state conservation programs were eager to promote wise land use and resource management to preserve existing institutions. Two decades earlier, sixty-six conservation districts in Pennsylvania were created via the Conservation District Law in 1945 in reaction to a national environmental disaster known as the Dust Bowl.<sup>58</sup> The conservation districts were primarily responsible for manmade environmental issues that were faced during the Depression including soil erosion and water resource management. These principles of conservation, resource management, and sound land use naturally expanded as the seeds of environmentalism rapidly sprouted in the 1960's. As environmental awareness spread and Pennsylvanians became more conscious of their symbiosis with the natural world, the responsibilities of the conservation districts naturally assumed the tasks of flood control and flood plain management.

For example, Pennsylvania's Cumberland County's Soil and Water Conservation District Program was initially developed to help farmers in the county to be economically productive through methods to prevent soil and water loss. Fears derived from the dustbowl hysteria fueled the support for the county conservation district programs, especially if it meant saving one of the most economically prosperous sectors of Pennsylvania's economy. Cumberland County inhabitants historically have an intimate relationship with the abundant natural resources

including its extremely fertile soil, natural karst springs, and the County's Conodoguinet and Yellow Breeches Creeks which flow into the Susquehanna River. Implementing conservation plans were essential to develop both sound and practical stewardship practices of the land, which paved the way for long term plans to protect the resources in which the people of the Cumberland Valley rely on for economic growth.

Much like at the federal level, over time the program gradually expanded its interest in all methods of soil and water conservation for the county to "work with all agencies, organizations, and individuals interested in soil conservation, land use, planning, watershed protection and flood prevention."<sup>59</sup> The development of these dynamic relationships and the shared belief of protecting valuable resources between all levels of government and conservation minded citizens allowed for these non-structural methods of environmental protection to thrive.

At the regional level, environmental attitudes of the period concerned with the management of natural resources and land use led to the creation of the Susquehanna River Basin Commission. In 1970, the Susquehanna River Basin Commission was signed into law as a heroic effort between New York, Pennsylvania, Maryland and the federal government to promote "The conservation, utilization, development, management, and control of the water resources of the Susquehanna River Basin under comprehensive multiple purpose planning, will bring the greatest benefits and produce the most efficient service in the public interest."<sup>60</sup> Once again the relationship and coordination between local citizens and the federal and state governments to conserve and protect natural resources provides evidence that healthy use of land does not always come from federal authorities, yet is a product of pragmatic people influenced by general trends concerned about the place they call home. Protection of the water resources

and the promotion of practical land use in the Susquehanna watershed had been a mutual agreement between all polities because they also protect economic investments of the future.

In addition to the conservationist measures taken, another form of non-structural flood mitigation in the Susquehanna Valley was that of flood forecasting efforts by the National Weather Service (NWS) and the River Forecast Center (RFC) located in Harrisburg. Debatably the most effective pre-Agnes method of disaster preparedness, the NWS and RFC staff was responsible for forecasting the deadly flooding and were “stretched to the breaking point” during their work recording the historic event.<sup>61</sup> Even though much of the river forecasting equipment was destroyed, the RFC was responsible for accurately predicting the crest levels in Wilkes-Barre which “triggered a massive evacuation of 80,000 to 100,000 people” and thus preventing a catastrophic loss of life.<sup>62</sup> Without the admirable efforts of the staff at the NWS and the RFC, working tirelessly under candlelight through several nights to send out warnings, there would have been many more lives lost in the wake of Agnes. Governor Shapp praised the RFC in Harrisburg stating that “you and your associates have every reason to be proud of your contribution to our common safety.”<sup>63</sup>

These non-structural methods demonstrate that the ideals of environmentalism of the 1960's and 1970's began a paradigm-shifting trend towards proper land use measures and flood control methods in Pennsylvania. The benefits of non-structural flood mitigation techniques began to be taken seriously by all levels of government, primarily because of the massive cost reduction when compared to the construction of physical measures. Although they were still largely in their infancy, flood insurance, resource conservation, and flood forecasting, methods of hazard mitigation and preparedness were available for inhabitants of the Susquehanna to be more proactive rather than reactionary.

## **Red Tape and Relief**

Even though the implementations of non-structural flood mitigation were gaining recognition, they continued to be a secondary method to that of structural methods. All existing measures of flood mitigation, disaster preparedness, relief, and recovery were thoroughly tested when Tropical Storm Agnes brought unprecedented amounts of rainfall to Central Pennsylvania. The towns and cities within the Susquehanna Valley ravaged by flooding far more resembled the carnage of war than a place called home. Although no matter how well prepared the citizens of the Susquehanna Valley could have been, adequate measures to combat the extent of destruction from Agnes could never have been developed.

Following the President Nixon's tour of Harrisburg, he demanded that the Office of Emergency Preparedness and all other agencies "provide all Federal assistance needed, and do it immediately by cutting through red tape."<sup>64</sup> Similarly at the state level, Governor Shapp sent out a memo to all state employees to exercise the broadest "administrative discretion in the elimination of red tape" and to allow any possible resources available to those in need.<sup>65</sup> A few days after the President visited Harrisburg, Governor Shapp stated that he was getting "double-talk and zero action" when referring to the federal government's inability to cut through red-tape to speedily provide flood relief.<sup>66</sup> Although both the President and the Governor urged the elimination of "red-tape", the sense of urgency could not instantaneously eliminate measures of standard operating procedures within these existing agencies. Flood victims and politicians alike had developed unrealistic expectations about the capabilities of state and federal agencies to flawlessly distribute assistance into Central Pennsylvania.

While state and federal governments quarreled over policy and pointed fingers, the citizens of Pennsylvania were simultaneously developing a collective memory of unwanted

experiences steeped in loss and destruction. Water treatment plants destroyed by the flooding were unable to treat water for safe use. Municipalities, such as the City of York, urged the conservation of water due to the failure of their massive electric water pumps which supplied thirty-nine million gallons of potable water to the city on a daily basis.<sup>67</sup> All methods of obtaining necessary food and medical supplies throughout the Susquehanna Valley were disabled. Not only was the current food supply soiled by the flood waters and industrial contaminants, three million acres of Pennsylvania agriculture planted in the “fertile floodplains were destroyed.”<sup>68</sup> All fundamental modes of subsistence had ended for the time being. There was no time to wait for help, it was needed immediately. Massive volunteer and humanitarian efforts were underway as churches, schools, and neighbors took the positions of providing disaster relief to those in need. Organizations such as the American Red Cross, The Salvation Army, and the Pennsylvania National Guard were the first on the scene to assist in relief and rescue missions across the Susquehanna Valley.<sup>69</sup>

Since both Pennsylvania and the federal government heavily relied on engineered measures to combat flooding disasters for the previous 40 years, during Agnes’ devastation, both utilized an existing reactionary patchwork system of flood relief through employing existing agencies to deal with flood relief as it was needed. Although flawlessness can never be expected during such a critical time, preparedness should be expected given the historical permanency of catastrophic floods in the region. The Pennsylvania National Guard was one of many agencies which experienced widespread personnel, management, and logistical problems throughout the critical period of rescue and relief missions during the floods of Agnes.

When the National Guard was ordered to mobilize for duty, there had been “a long delay...in determining the duty status of personnel involved in this operation and produced

major problems and raised fundamental questions as to the Guard's primary mission."<sup>70</sup> If there are problems determining duty status during at the most critical time in recent past, then there clearly has been little minimal training in regard to large scale disaster response. The lack of disaster preparedness training was also evident with local politicians and civic leaders whom "were not aware of proper procedures in requesting assistance" thus resulting in false promises, confusion, and a "duplication of efforts" at a time when resources were scarce.<sup>71</sup> In addition to inadequate preparedness measures, the National Guard and other organizations were ill-equipped, partially due to much of their local equipment being destroyed by flood waters. Given that all telecommunications in the Susquehanna Valley were out of service, inadequate communication also heightened widespread catastrophe, resulting in the "acute shortage" of radio units which dissolved any existing chain of command.<sup>72</sup>

At the federal level, the Office of Emergency Preparedness (OEP) was in charge of directing disaster preparedness and relief operations.<sup>73</sup> Although the OEP was supposed to have "authority" over other agencies, this was not the case during the flood. According to Governor Shapp "OEP did not exercise that authority in Pennsylvania, HUD set its own rules, SBA set its own rules, and we had the type of chaos."<sup>74</sup> OEP did not address individual problems itself; their job was to delegate the particular relief and recovery missions of the disaster to other departments, even if they had no real authority over them. Existing departments such as Housing and Urban Development, Agriculture, Small Business Administration, Army Corps of Engineers, were sub-contracted by the OEP to handle specific issues throughout the relief process.<sup>75</sup> This patchwork method was a disaster within itself considering these sub-contracted departments have to deal with the daily workload in addition to the urgent labor of disaster response. George

Romney, the Secretary of Housing and Urban Development in 1972, explained this problem to President Nixon in regard to the flooding in Pennsylvania.

The magnitude of this disaster has strained the response capabilities of all federal and nonprofit agencies. I recommend that our national preparedness programs be examined, revamped and strengthened as necessary to assure that an adequate state of readiness is established and maintained for such major catastrophes. This should include preventative measures as well as action plans for an immediate and effective response on the part of all Federal agencies when a disaster occurs.<sup>76</sup>

### **Evolving Landscapes**

Although a plethora of agencies were involved with the relief effort, much of the physical tasks of implementing these efforts were passed on to a few agencies, and ironically this included efforts from the Army Corps of Engineers. During the flood, the Susquehanna River basin fell into the responsibility of the Army Corps Baltimore district. This local office became so overwhelmed with the severity of the flooding that the Corp felt it was necessary to create a new temporary district appropriately named the Susquehanna Engineer District.<sup>77</sup> In the following weeks after the flood, the new district was unceremoniously given an endless list of tasks, which were passed onto them by the Department of HUD, OEP, and the EPA.<sup>78</sup> One of the most monumental tasks included the flood debris clean-up of the mountains of trash piled high in the mud baked streets all throughout the Susquehanna Valley. Limited personnel and a lack of supplies, tools, and materials "...stretched the capacity of all emergency relief structures to the fullest."<sup>79</sup>

Much of the municipal trash removal was contracted to privately owned businesses equipped with an operational fleet of tri-axles and loaders to haul trash to controlled burning areas<sup>80</sup> such as the parking lot at the Pennsylvania Farm Show complex in north Harrisburg.<sup>81</sup> Trash removal in the city of Harrisburg alone had been estimated to cost \$60,000 daily.<sup>82</sup> This critical dynamic relationship between the Corps and private business owners suggests that

without the cooperation of local able bodied citizens and the availability of their equipment to help federal agencies, the post-flood clean-up would have been inconceivable, if not impossible.

In addition to the removal of debris, the Corp was in charge of returning the Susquehanna and its major tributaries to “pre-flood” conditions. Although the definition of “pre-flood” is somewhat arbitrary because flooding as a natural phenomenon causes erosion and sediment deposits regardless of human interaction. Since so many Pennsylvanians live within reach of the Susquehanna, they have developed a perception of how the landscape should appear for proper habitation where they also contributed to the destruction of their beloved river by living in floodplains and allowing their urban waste to be taken by a natural process. The reconstruction of waterways through the region primarily included the removal of debris from the riverbeds and the dismantling of lodged wreckage from engineered infrastructure such as dams, walls, and bridges but also involved battling land owners to gain access to smaller tributaries, heightening social tension.<sup>83</sup>

The effect of existing urban populations of Wilkes-Barre and Harrisburg within the floodplains of the Susquehanna allowed for an insurmountable volume of debris, chemicals, and oil to be swept into the river channel which significantly intensified the environmental effects of the flood. Once the flooding receded, hundreds of barrels containing hazardous waste were visible in the Susquehanna, confirming that the environmental effects of inhabiting floodplains lingered for months.<sup>84</sup> Further east outside of the Susquehanna watershed, drums of hazardous and explosive chemicals<sup>85</sup> as well as over five million gallons of waste oil were washed away into the Schuylkill River leaving a black film on trees forever altering the biotic harmony of the historic river.<sup>86</sup> This is yet again another example that confirms that most of the human derived industrial waste that was carried by the flood could have been largely avoided if non-structural

flood mitigation techniques were used, including local ordinances of proper land-use within floodplains.

The Susquehanna, being the largest contributor of fresh water to the Chesapeake Bay, wreaked havoc on the estuary's fragile ecosystems and wetlands in the summer of 1972.<sup>87</sup> The putrid, oily Susquehanna bled massive amounts of contaminated fresh water, industrial waste, and sediment into the Chesapeake Bay which severely disrupted the shellfish<sup>88</sup> and recreation<sup>89</sup> industries throughout the largest estuary in the United States. The Susquehanna introduced massive nutrient loads including nitrogen and phosphorous into the Bay selfishly disrupting the environmental and economic stability of Maryland and Virginia.<sup>90</sup>

The widespread distribution of debris and pollution from Pennsylvania made it necessary for the Army Corps of Engineers from the Baltimore District to remove over 334 tons of debris from the Bay where the "20 percent of the debris was taken from the mouth of the Susquehanna River."<sup>91</sup> Another issue which Pennsylvania indirectly caused due to massive runoff was the desalination of the Bay and its thousands of branching estuaries which killed shellfish and other marine biota.<sup>92</sup> The results of poor land use practices including flood plain development and over fertilization in Pennsylvania certainly do not recognize superimposed geopolitical boundaries such as the Mason-Dixon line.

Pennsylvania's pollution crisis literally discharged into Maryland, impacting the life and livelihoods which depend on the Chesapeake Bay for survival. Devastating consequences of Pennsylvania's cultural land use practices directly impacted the natural resources of Maryland including water quality, biodiversity, and destruction of temperamental wetlands and tidal marshes of the Chesapeake Bay region. Directly following the floods of Agnes in Pennsylvania and Maryland, there had been immediate concerns regarding the health of the Chesapeake Bay

including those who rely on the natural resources of the Bay to survive. Fisheries and independent fishermen of Maryland “realized since Tropical Storm Agnes that the Bay needs protection.”<sup>93</sup> Evidence such as this helps validate that the environmental problems of the Chesapeake Bay following Agnes directly influenced changing environmental perception regarding the Susquehanna and the Bay. Tropical storm Agnes undoubtedly assisted in the change of environmental perception in the 1970’s and is believed to have caused a long-held paradigm shift that motivated the public to “abandon the prevailing view of the Bay as an extension of the sea and instead to see the Bay as a distinct ecosystem that is dominated by the influences of its watershed.”<sup>94</sup>

In addition to the changes to the ecological systems of the region, the debris cleanup effort also drastically altered the cultural landscape of the mid-state. The demolition of houses and the removal of entire sections of communities were necessary because of the extensive flood damages they sustained. Buildings and structures destroyed by water and river silt were condemned by local municipalities<sup>95</sup> and if these locations were identified as major flood-plains then they would often times be demolished if the removal costs were estimated to be less than \$25,000.<sup>96</sup> This demolition effort which was coordinated between land owners and the federal, state, and local governments following the flood drastically altered the local landscapes and is still visible today throughout the mid-state region. When the cost of the repairs to the damaged property exceeded the value of the structure itself, demolition was the next logical financial decision. Homes where families had developed fond memories were unrecognizable with their warped floorboards, crumbling plaster, and oil ridden river silt crammed into every crevice. Unfortunately for the homeowners and their municipality, the decision to completely remove the

structures and re-classify the land use type was and continues to be the cheapest type of flood insurance available.

The Susquehanna Valley's engineered landscapes were further altered through the methods of implementing temporary mobile home neighborhoods throughout the region. These quasi-communities were composed of trailers issued by the Department of Housing and Urban Development where the majority were located in Luzerne and Dauphin counties. Geographic areas for these emergency 'Levittowns' were selected by the Pennsylvania Department of Community Affairs and installed with modern infrastructure such as running water, sewage, and electricity.<sup>97</sup> In addition to installing the mobile homes on temporary sites, the Susquehanna Engineering District was given the task to design these neighborhoods, which they also sub-contracted to public engineering and architectural firms. An official in the Harrisburg office instructed the contractors to integrate winding roads and open spaces to emulate "...the feeling of suburbia..." in the effort to avoid creating "instant ghettos" by using the common symmetrical grid patterns of local cities.<sup>98</sup> Preferring to impose the atmosphere and layout of typical suburban neighborhoods in favor over the common gridded urban street pattern is clearly a culturally constructed idea regarding the planned landscape which likely was derived from contemporary ethnic and social stereotypes.

### **New Visions of Flood Mitigation**

The various political and financial issues throughout the Susquehanna Valley following Agnes was profound enough to find the need for permanent changes in the way federal government responds to flooding. The primary goal was to cut down and relieve "an increasing burden on the Nation's resources."<sup>99</sup> In 1972, Agnes imposed tremendous stress on the federal budget with the passage of the Agnes Recovery Act which allocated nearly two billion dollars to

the relief effort to Pennsylvania alone.<sup>100</sup> Given that the majority of these flood relief funds were being sent to Pennsylvania, the Commonwealth was in the spotlight as the catalyst for deep reform measures related to flooding and disaster preparedness. Non-structural measures were the only logical solution following Agnes, given that the previously constructed engineered landscapes only alleviated flooding rather than nullifying its hazards all together.

Once the flooding receded and the memory of Agnes was instilled within the minds of millions of people, the conversation regarding flood control and mitigation changed nearly overnight. Calls for floodplain regulations and concerns regarding proper regional planning and urban land use surfaced. The forty years prior to Agnes, the existing structural flood-control methods gave many residents a false sense of security and made them believe that these engineered landscapes could handle any future floods. Even though there had been flood control measures in place, one Harrisburg resident recalls both the 1936 and 1972 floods stating that “Agnes was twice as bad.”<sup>101</sup> Many of these structural measures did successfully alleviate the effects of flooding, and were praised by prominent public officials, but their interpretation of flood control mitigation shifted towards favoring non-structural methods due to the inability of structural methods to remove the hazard of flooding from human life altogether. Directly following the flood, Pennsylvania and the federal government signed a floodplain management agreement “to eliminate most of the financial losses in designated flood-prone areas.”<sup>102</sup> This was a preliminary plan to promote practical floodplain land use and eliminate construction within them during the recovery process.

As a direct response from Agnes and the problems experienced in the Susquehanna Valley, Congress condemned the efficacy of New Deal structural flood mitigation and passed the Flood Disaster Protection Act in 1973. This paradigm shifting policy transformed federal flood

mitigation policy from structural to non-structural stating that “despite the installation of preventative and protective works...these methods have not been sufficient to protect adequately against growing exposure to future flood losses.”<sup>103</sup>

The Flood Disaster Protection Act applied the same principles and ideas of the floodplain management agreement between Pennsylvania and Washington. This flood control philosophy implemented a non-structural solution to the problem of flooding by greatly expanding the National Flood Insurance Program which requires communities located in known flood-prone areas to participate in the program.<sup>104</sup> Additionally the law states that the availability of federal flood relief measures for an individual depends on whether their property is covered by a flood insurance policy. Requiring state and local governments to adopt “adequate flood plain ordinances” through sound and practical land use measures where flooding poses a danger to the loss of life or property diverts much of the burden of flood mitigation to local municipalities and their inhabitants.<sup>105</sup> The Flood Disaster Protection Act tried to create a sustainable and financially stable system of flood control by implementing non-structural measures through the protection and restoration of the natural hydrological functions of flood plains.

The historic impact of Agnes’ destruction in Pennsylvania and the subsequent bureaucratic blunders motivated the federal government to consolidate their relief efforts towards natural disasters. On June 19, 1978 President Carter signed an executive order “consolidating emergency preparedness, mitigation, and response activities.”<sup>106</sup> The creation of the Federal Emergency Management Agency (FEMA), which was to be completed by April 1, 1979, had been a direct result of the issues experienced from the flooding of tropical storm Agnes. Within President Carter’s reorganization plan, he was clear in that the transfer of all flood related responsibilities, including the NFIP and the Flood Disaster Protection Act of 1973, were to be

part of the objectives of the new agency now known as FEMA.<sup>107</sup> In an interview between Historian Robert Wolensky and Frank Carlucci, the “flood czar”, Carlucci stated that “Of course, what Hurricane Agnes led to was the creation of FEMA...I had a role to play and some people have called me the father of FEMA, in that I recommended that there be some kind of agency.”<sup>108</sup> There’s no doubt that Carlucci was certainly an influential political figure in the creation of the new agency, but calling himself the father of FEMA is a conceited exaggeration. Many people, including George Romney, recommended that a new agency be developed to consolidate federal efforts in order to independently handle disasters such as Agnes. A variety of factors likely led to the creation of FEMA, but the primary agents of change were the various issues that surrounded the federal government’s relief efforts following Agnes.

Following President’s plans for FEMA, Pennsylvania lawmakers were motivated to develop and reorganize the Office of Civil Defense, to “reflect a more accurate description of their function” especially following another catastrophic flooding event in 1977.<sup>109</sup> The initial function of Civil Defense, was intended to protect the public from foreign nuclear attacks, took on the role of flood plain management and coordinating federal disaster relief during the floods of 1972 and 1977.<sup>110</sup> After several bills were introduced into state congress, the Pennsylvania Emergency Management Agency was created in November of 1978 where the state’s preparedness standards were to be “established by the Federal Emergency Management Agency.”<sup>111</sup> Ironically, in it’s first days of existence in as a new agency FEMA would be thoroughly tested on the Susquehanna River in March and April of 1979 to confront the worst nuclear disaster on American soil during the meltdown at Three Mile Island.<sup>112</sup>

At the State level Maurice Goddard, the Secretary for the Pennsylvania Department of Environmental Resources, originally had been an “inflexible advocate” for the creation of flood

control dams in the 1950's and 1960's including the controversial dam projects of Kinzua on the Allegheny River as well as Tocks Island and Evansburg in Eastern Pennsylvania within the Delaware River watershed.<sup>113</sup> Following the destruction of Agnes, Goddard's position on flood mitigation in the 1970's dramatically shifted towards the use of non-structural measures by using "A less expensive alternative is local zoning that prevents construction of conventional buildings on flood prone land."<sup>114</sup> Goddard went on to become an advocate for non-structural measures of flood control including legislation on floodplain and storm-water management. The Floodplain Management Act was developed at the state level to reiterate and reinforce the federally applicable Flood Disaster Protection Act. Both pieces were "hard sells to local communities and their representatives...because they were reluctant for the Commonwealth to tell them they had to place controls on construction on local property owners."<sup>115</sup> Finally in 1978, Pennsylvania enacted the Flood Plain Management Act because "the exclusive use of flood control measures, such as engineering projects, has failed to significantly reduce the human suffering and economic losses caused by recurrent flooding."<sup>116</sup>

Despite much public opposition from the "new right anti-environmentalists" this legislative evidence supports the claim that flood mitigation measures began to dramatically shift from the use of structural to non-structural methods of combating flooding following Agnes in 1972.<sup>117</sup> Not only did Agnes spark the debate regarding floodplain management, but the floods opened the debate and conversation about "the problem of land use planning and the rational consideration of the risks and advantages of different areas of human habitation."<sup>118</sup>

Tropical storm Agnes and the subsequent legislation regarding land use not only reinforced the environmental movement and its effort to promote a harmonious balance between humans and the environment, but it fueled the ongoing issues between advocates of property

rights and land conservationists throughout the Susquehanna Valley. The 1970's was a particularly heated decade in the Keystone state where environmentalists felt the measures of land use were for the health and safety of the general welfare, whereas property rights advocates saw them as government encroachment on civil liberties. Non-structural flood control imposed ordinances and more stringent construction codes on local municipalities which infuriated many Pennsylvanians concerned of the growth of the federal government. The issue of floodplain management and the polarization between environmentalist and property patriots within Pennsylvania in the early 1970's continued and intensified through the decade. These issues would continually become highly politicized in the land use battles for the right of way of the Appalachian Trail through the Cumberland Valley in the latter half of the decade.<sup>119</sup>

The pain in which tropical storm Agnes caused throughout the Susquehanna heartland undoubtedly contributed to a variety of changes throughout both Pennsylvania and the United States. The devastating flood was the primary agent which reminded people of the region to respect the power of the mighty Susquehanna. This reminder spurred national changes in flood control and hazard mitigation philosophy as well as identifying the need to respect nature and the human dependency on its resources. Public awareness about the hazards of flooding in the Susquehanna Valley have made tremendous strides since Agnes, but there still is a considerable amount of work to be done. As time continues to slip away, it will not be long until the story of Agnes becomes a folk tale shrouded in time and the danger of flooding remains. For Pennsylvanians to stay alert of the dangers they face it is critical that they be reminded of the lessons learned from the massive losses from "the flood." The summer of 1972 not only changed the landscapes of the Susquehanna but it changed the way people of Pennsylvania interpret the place they call home. The name "Agnes" shall continue to serve as an intimate memory marker

in the lives of Susquehanna Valley residents, that is until the next five-hundred-year storm inundates the Susquehanna heartland.

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<sup>1</sup> Milton Shapp to Wilkes-Barre Residents, Transcript from Governor’s Office, June 23, 1973, box 49, folder 14, Milton Shapp Papers, Pennsylvania State Archives.

<sup>2</sup> “Agnes Loses Power After Panhandle Hit,” *Pottstown Mercury* (Pottstown, PA), June 20, 1972.

<sup>3</sup> “Hurricane Agnes Hits Northwest Florida Coast,” *Simpson’s Leader-Times* (Kittanning, PA), June 19, 1972.

<sup>4</sup> National Oceanic and Atmospheric Administration, *Final Report of the Disaster Survey Team on the Events of Agnes: Natural Disaster Survey Report*, (Rockville, Maryland: February 1973) 7.

<sup>5</sup> United States Geological Survey, *Hurricane Agnes: Rainfall and Floods June-July 1972*, (Washington: United States Government Printing Office, 1975) 11.

<sup>6</sup> “Hurricane Agnes Subsiding,” *Hazleton Standard-Speaker* (Hazleton, PA), June 20<sup>th</sup> 1972.

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<sup>9</sup> *Ibid.*

To be clear, a flood watch is the confirmation that flooding may occur, and a flood warning is the confirmation that flooding will occur. This was confusing to many residents in the Susquehanna Valley who did not know the difference.

<sup>10</sup> William H. Shank, *Great Floods of Pennsylvania: A Two Century History*, (York, PA: American Canal and Transportation Center, December 1972) 53-54.

<sup>11</sup> United States Geological Survey, *Hurricane Agnes: Rainfall and Floods June-July 1972*, (Washington: United States Government Printing Office, 1975) 27.

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<sup>13</sup> NOAA, *Final Report*, 21.

<sup>14</sup> “Agnes’ Rain,” *Lebanon Daily News* (Lebanon, PA), July 1, 1972.

<sup>15</sup> USGS, *Hurricane Agnes*, 59.

<sup>16</sup> Pennsylvania Department of Environmental Resources, *Programs and Planning for the Management of the Water Resources of Pennsylvania*, (Harrisburg: November 1971) 67.

<sup>17</sup> USGS, *Hurricane Agnes*, 59.

<sup>18</sup> *Ibid*, 25.

<sup>19</sup> *Ibid*, 83.

<sup>20</sup> Alfred Napoli, Interview by Frank Grumbine, April 15, 2017.

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- <sup>38</sup> E. Willard Miller and Ruby M. Miller, *Natural Disasters: Floods*, (Denver: ABC CLIO, 2000) 6.
- <sup>39</sup> *Ibid*, 79.
- <sup>40</sup> Miller and Miller, *Natural Disasters*, 79.
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- <sup>82</sup> Paul Walker, *The Corps Responds*, 8.
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