

Hydrologic Regimes

Notions of Flooding in the Puyallup River Valley

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As 1977 entered its final month, Pierce County's customary drizzle became a torrential downpour. The region's rivers, already invigorated by months of winter rain, quickly overtopped their banks. By December 10th, floods in Western Washington had caused upwards of fourteen million dollars in damages, and ten counties had been declared Federal disaster areas. Among them was Pierce County, where the Puyallup River Valley experienced two million dollars in damages alone.¹ This catastrophe came nearly thirty years after the completion of Mud Mountain Dam, which was designed and built solely for the purpose of controlling floods on the White and Puyallup Rivers. Mud Mountain did not fail, nor was it improperly opened; so how did millions of taxpayers' dollars fail to protect the valley from this flood? Faced with such widespread destruction, how did residents of the Puyallup River Valley react to the flood? Through a careful examination of floods in the Puyallup Valley in 1933 and 1977, and the social, cultural, and economic changes that connect them, I will illustrate a gradual progression from completely anthropocentric conceptions of man pitted against nature to a more holistic understanding of the natural world and humanity's place within it. While this holistic notion remained wrought with misconceptions and guided by an anthropocentric conception of nature, it demonstrated Pierce County residents' increasing acknowledgement of the limits to their ability to control nature.

Literature Review

In his seminal work *A Sand County Almanac*, Aldo Leopold exposed the need for "an ecological interpretation of history," thus illuminating the academic niche later filled with the creation of environmental history.² However, environmental history was never truly a new field,

¹ Vern Shomshak, "State Flood Damage May Equal 1975," *Tacoma News Tribune*, December 6, 1977, A-1.

² Aldo Leopold, *A Sand County Almanac, and Sketches Here and There*, (1949; reprint, New York, 1987), 205.

but rather a synthesis of existing fields, such as geography, anthropology, and other natural sciences, studied through an historical lens. The overarching goal of the field is “to deepen our understanding of how humans have been affected by their natural environment through time, and conversely...how they affected that environment and with what results.”³ This, as environmental historian Donald Worster explains, involves three avenues of analysis. First is an analysis of natural environments as they change through time. Second is an analysis of human constructions within the natural environments. And third is an examination of the ideologies, values, or cultural processes that influenced the previous two categories.⁴ Scholars such as Jared Orsi, Robert Kelley, and Ted Steinberg have illustrated interactions between people, floods, and other natural disasters. In the scientific realm, countless hydrologists, geologists, and policy analysts have studied flooding in the Pacific Northwest; however, an historical account of flooding in the Pacific Northwest is significantly harder to locate. By studying human understandings of flooding and flood control in the Puyallup River Valley circa 1930, I intend to combine the three aforementioned avenues of analysis with the goal of providing a deeper understanding of “nature, economy, and society in an integrated fashion.”⁵ Through an amalgamation of research in forestry, hydrology, land use policy, and cultural history, this project will provide a much needed academic bridge between historical and scientific research on the topic of flooding the Pacific Northwest.

Although it is generally thought of as a place passed over by many forms of natural disaster, the Pacific Northwest is a land constantly affected by flooding. Fueled by the melting ice and snow of the Cascade Mountain Range and compounded by months of steady rainfall,

³ Donald Worster, “Transformations of the Earth: Toward an Agroecological Perspective in History,” *Journal of American History* 76 (March 1990).

⁴ Worster, 1091.

⁵ William Cronon, “Modes of Prophecy and Production: Placing Nature in History,” *The Journal of American History* 76 (March 1990).

Washington State's rivers are powerful, unpredictable, and prone to flooding. In addition, sustained and widespread logging by lumber companies such as Weyerhaeuser has stripped many of Washington State's hillsides of their forests, and the natural flood protection those forests provided. But forestry is not the only human action to affect flooding; in fact, a recent study has shown that urban development has a more pronounced impact on flooding than forest practices.⁶ Thus, I will examine the interaction between flooding and human activities, such as logging and urban development, in or near the Puyallup River Valley. In doing this I will illustrate how residents of the Puyallup River Valley understood their role in the creation of floods, and what consequences that understanding had for the valley as a whole. This project will study two floods in particular—one in 1933, and another in 1977—and the social, political, and cultural changes that unite them, providing a bridge between the fields of hydrology, history, and land use management.

The topic of flood control has been addressed by several historians, hydrologists, and researchers from other fields, whose work has provided this particular field with a wealth of knowledge. Jared Orsi's *Hazardous Metropolis* illustrates the history of the Los Angeles River through the successes and follies of its flood control measures. Orsi raises fascinating questions regarding community reliance on flood control, and has also provided a model, although an extended one, of a successful history of flooding and flood control. Joining Orsi is Robert Kelley, whose *Battling the Inland Sea* expounds the story of humanity's quest to control the Sacramento River, and both the positive and negative consequences of those actions. With a wider scope, Ted Steinberg's *Acts of God* details the history of natural disasters in the United States; yet despite its broad focus, the pieces pertaining to flooding raise insightful questions

⁶ Grant, Gordon E. et al. "Effects of Forest Practices on Peak Flows and Consequent Channel Response." United States Department of Agriculture. General Technical Report no. 760 (2008): 46.

regarding the interplay of flood control and conflicts over race and class. Although these masterful natural disaster histories have offered guidance and inspiration, their larger themes have been constructed in geographic areas which differ greatly from the Pacific Northwest in terms of weather patterns, fish species, development strategies, population demographics, and countless other variables. Thus, these works have left a valuable area of inquiry unexplored.

Scientific works, on the other hand, have frequently addressed flooding in the Pacific Northwest, as it is a relatively common occurrence in the region. Specifically, Gordon E. Grant's study regarding the effects of forest practices on flooding has truly enlightened my research. Grant's study suggests that although logging measurably amplifies flooding, its effects pale in comparison to those of urbanization and flood control damming.⁷ Grant's study is but one example of the scientific studies I plan to consult. Jon R. Luoma's *The Hidden Forest* provided excellent information on water runoff in forests and clear-cuts; Christopher P. Konrad's study, "Effects of Urban Development on Floods" corroborated Grant's claims and grounded them in local examples; and population and land use numbers from the United States Census Bureau aided my understanding of the region's agricultural and urban development. But while studies regarding the hydrology and forest practices of the Pacific Northwest have and will continue to vastly improve my knowledge of regional processes, their approach remains firmly scientific. Therefore, I intend to harness the appropriate scientific research and apply its findings of natural processes to my analysis of human conceptions of flooding in order to place the past and present in coherent conversation.

What remains unexplored in the realm of flood control? To my knowledge, no environmental historian has investigated human understandings of flooding and flood control in

⁷ Grant, 46.

the Pacific Northwest. A skeptic may question the importance of flooding to the larger development of the region, but the influence of floodplain management is undeniable. Before the installation of permanent flood control measures, agriculture in the Puyallup River Valley existed but was frequently washed out. For instance, over a fifteen month period in 1934-35, “flood losses...[accumulated] into more than a million dollars” in the agricultural industry alone.⁸ Whether a successful agricultural industry would have developed without the installation of a flood control dam is a difficult question, and one to be discussed later. It is certain, however, that flooding is the most common type of natural disaster experienced in the Pacific Northwest and is an important aspect to be considered in the history of the region. Thus, in a land devoid of more widely studied natural disasters like tornadoes and hurricanes, cultural conceptions of flooding may reflect common conceptions of natural disasters in the Pacific Northwest. More broadly, this avenue of inquiry may reflect larger regional and cultural perceptions of nature and the role of humanity within it.

The process of harnessing historical research to serve the future is difficult and, in many fields, frowned upon. But among environmental historians, historical activism is the rule rather than the exception. Historical activism is, in other words, historical knowledge redirected to focus on current issues and progress for the future. William Cronon, a leading environmental historian, asserts that “it is no accident that many of the most important works in the field approach their subjects with explicitly present-day concerns.”⁹ This unabashedly subjective approach to history may make historians of other fields cringe. However, given that the goal of environmental history is often to bolster awareness and support for the preservation of the environment, doing otherwise seems downright irresponsible. Therefore, it is the goal of this

⁸ Charles Thomas, “The Necessity of Flood Control,” *Town Crier*, March, 1935, 15.

⁹ William Cronon, “Uses of Environmental History,” *Environmental History Review* 17 (1993).

analysis to redirect the knowledge of previous generations' interactions with flooding so that the Puyallup River Valley may adapt and progress.

There is another pitfall of which the environmental historian must be constantly mindful—when and how to draw connections and determine causality. To investigate this process, let us consider again Donald Worster's three levels of environmental historical analysis. William Cronon succinctly summarized Worster's three avenues of analysis as "first, the dynamics of natural ecosystems in time; second, the political economies people erect within those natural systems; and third, the cognitive lenses through which people perceive their relationship to the other two."¹⁰ Worster claims that a primary concern of the environmental historian must be determining where and when to draw connections and how to identify historical causality.¹¹ A proponent of environmental determinism, for instance, would maintain that the first level of analysis, the structure and dynamics of the natural world, is the chief deciding factor among these. And in many cases, especially those in which human settlement is contingent upon geographic distribution of natural resources, environmental determinism seems most plausible. However, Worster wisely warns that "the historian cannot rigidly adhere *a priori* to any single theory of causality but must be open to context and time."¹² That is to say, the objective historian must allow geographic context and historical time, among other factors, to guide his attribution of causality. Worster does, though, offer a general rule of thumb. In earlier times, when nature still wielded near total power over humanity, nature is more likely to be the causal element. But in more recent times, when humanity has learned to control aspects of nature, the third level of analysis, people's conceptions of nature, have become the determinant

¹⁰ William Cronon, "Modes of Prophecy and Production: Placing Nature in History," *The Journal of American History* 76 (March 1990).

¹¹ Donald Worster, "Transformations of the Earth: Toward an Agroecological Perspective in History," *Journal of American History* 76 (March 1990), 1091.

¹² Worster, 1091.

element.¹³ This rule of thumb seems to overlook the second level of analysis—human constructions within nature—as a determining factor. Nonetheless, I will speak to all three levels of analysis in some way, as they all played important roles in the transformation of the Puyallup River Valley.

Admittedly, an historical account of how people understood natural disaster rests precariously atop a common epistemological dilemma—how can one person understand the thoughts and perceptions of others? Sources such as diaries or recorded interviews, which directly detail the thoughts and ideas of residents of the Puyallup Valley are, unfortunately, very rare. However, newspapers are incredibly abundant and generally reflect the opinions of their local constituencies or, at the very least, illuminate the specific issues of a debate. Beginning with the creation of the Progressive Party, the 1920s ushered in an era of Populism in the United States.¹⁴ Populism, which called for greater representation of the interests of ordinary people, often manifested itself in the media, and the reason is simple—media coverage of populism is a thinly veiled form of pandering to the masses. If populist concerns are those most important to the greatest number of people, and people will buy newspapers that report the news that matters to them, then publishing populist views will result in a newspaper’s maximum popularity. Furthermore, the inhabitants of Tacoma were 98% Caucasian in the 1930s and 91% Caucasian in the 1970s; consequently, the task of accurately representing the population would have been relatively simple given its strict homogeneity.¹⁵ Therefore, we can conclude that the *Tacoma News Tribune* reported the news as it was seen by Tacoma’s dominant demographic—working-

¹³ Worster, 1091.

¹⁴ William E. Leuchtenburg, *Franklin D. Roosevelt and the New Deal* (San Francisco: Harper and Row Publishers, 1963), 33.

¹⁵ US Census Bureau, “Table 48: Race and Hispanic Origin for Selected Large Cities and Other Places,” United States Census Bureau, www.census.gov/population/www/documentation/twps0076/WAtab.xls.

class white people—and consulting the *Tribune* as a primary source will, at the very least, elucidate the terms of debate as they stood in each particular historical moment.

In order to better understand how residents of the Puyallup River Valley understood their relationship with flooding the natural world, I will examine three levels of analysis—natural systems through time, human constructions within natural processes, and human conceptions of both natural systems and human constructions—which Donald Worster suggests are paramount to the study of environmental history. I intend to study floods and flood control using Worster’s levels of analysis, which will lend balance to my research. This study will be a synthesis of hydrology, forestry, land use management, and history, and to my knowledge it will be the first of its kind to deal with flooding and flood control in the Puyallup River Valley. Thus, by filling this academic niche, my research may have broader implications regarding forest practices, urbanization, and flood control techniques in the Pacific Northwest.

Early Inhabitants of the Puyallup River Valley

In order to unpack the complexities of the 1977 flood, we first need to explore the situation’s origins. Around the year 1830, explorer and fur trader, Dr. William Frasier Tolmie explored the Puyallup River Valley and was greeted by approximately 2,000 of its native inhabitants.¹⁶ Their name was “S’Puyalupubsh, meaning ‘generous and welcoming,’” and they had lived in the valley for thousands of years, feasting on salmon, shellfish, and wild game.¹⁷ However, the valley’s abundant natural resources and striking beauty soon drew the attention of outsiders. After Washington became a territory in 1853, settlers flocked to the area and began to swarm the land of the people they referred to as the “Puyallup Indians.” This invasion of white

¹⁶ “The Land of the Generous People,” City of Puyallup, <http://www.cityofpuyallup.org/visitors/history/>.

¹⁷ Judy Wright, “Historical Overview,” Puyallup Tribe of Indians, <http://www.puyallup-tribe.com/index.php?nav=history&id=0>.

settlers led to years of bitter conflict until finally, in 1856, a renegotiated Treaty of Medicine Creek formed the Puyallup, Nisqually, and Squaxin Indian Reservations.¹⁸ Though because of the small size and inopportune placement of the reservations, the Puyallup Tribe felt cheated, and “to this day...recognize the injustice that prevailed.”¹⁹

Once the land had been effectively usurped from the Puyallup Tribe, white settlers began to capitalize on its rich, arable soil and other natural resources. Water, for one, is an indispensable resource—but not simply for drinking. A river also provides water for irrigation and transportation, fish for a nutritious diet, and its banks are often fertile enough for agriculture. However, despite its apparent suitability for development, “the mere existence of a flood plain is *prima facie* evidence of floods.”²⁰ Periodic flooding deposits fine, nutrient-rich particles of clay and silt. Due to their fine texture, these particles filter down into the pores of the soil, partially clogging the passageways through which water travels. This results in a lengthier period of saturation for the soil, which in turn gives the floodplain its exceptional fertility. However, this also means that the soil will be quicker to reach its saturation threshold, and will therefore flood faster. In other words, settlement of a floodplain comes with serious risk, as floodplains will, and indeed ought to flood.

Because of the Puyallup River Valley’s countless natural amenities, early settlers were willing to take that risk. Practices such as blasting new channels for the White and Puyallup rivers became relatively commonplace in the subsequent years.²¹ These demolitions were

¹⁸ Judy Wright, “Treaty of Medicine Creek,” Puyallup Tribe of Indians, <http://www.puyallup-tribe.com/index.php?nav=history&id=1>.

¹⁹ *Ibid.*

²⁰ Luna B. Leopold and Thomas Maddock, Jr., *The Flood Control Controversy* (New York: The Ronald Press Company, 1954), 14.

²¹ Alan J. Stein, “Mud Mountain Dam,” *Historylink.org*, Essay 3584 (2001), http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=3584.

carried out by farmers and landholders with presumably little or no pyrotechnic experience; however, the presence of local legal authority was minimal at the time. These extralegal activities continued until 1898, when the White River breached its banks and overtook the Stuck River Channel, prompting an investigation by U.S. Army Corps of Engineers Major Hiram Chittenden. The investigation concluded that there had been “a good deal of interference by citizens of both [Pierce and King] counties” with the river’s banks, resulting in a complete alteration of its natural course.²² So, after countless homemade efforts to control the unruly rivers were proven dreadfully ineffective, Pierce County River Improvement was forced to intervene and construct levees, a diversion dam, and a drift barrier along the Puyallup and White Rivers. These initial flood control measures trace the contours of a very interesting decision made by early settlers. In 1898, land in the Pacific Northwest was relatively abundant. Yet, despite its frequent flooding, they chose to remain on the banks of the Puyallup and White Rivers. They could have relocated to a less volatile location; instead, they attempted to alter the land to better suit their needs. These actions reflect assumptions which will echo throughout the history of the Puyallup River Valley. Specifically, these changes made to the river illustrate an idea of human superiority to the natural world, or simply the notion that man is entitled to permanently alter his environment.

Soil and the Hydrology of Floods

The same rivers that drew settlers to the valley and kept their settlements firmly rooted to the floodplain would also carry the floodwater which later destroyed their homes and livelihoods. This seemingly paradoxical relationship between settlers and the rivers warrants a discussion of the natural processes which create floods. Jared Orsi neatly summarized the vast and complex

²² Sato, Mike, *The Price of Taming a River*, (The Mountaineers Books, 1997).

field of hydrology in three short sentences: “Water flows downhill. That much is simple. From there, however, things get more complicated.”²³ In this brief overview of the hydrology of flooding, I will discuss a handful of occurrences which commonly lead to flooding in the Pacific Northwest—some natural, others caused by humans. This section is not meant to be exhaustive; it is only meant to provide the scientific background for an historical analysis of floods.

First, the underlying reason for nearly all flooding in the Pacific Northwest is rain, and generally lots of it. The effect of this rain is often worsened by several things. Two natural circumstances, rain on saturated soil and rain on snow, will create far worse floods than rain on dry soil. When soil is saturated, it is unable to absorb any of the rain or runoff, and instead serves as a slick runway. When the ground is covered by snow, however, the problem is slightly different. As soon as it comes in contact with the snow, the warmer rain begins to melt the snow; as the snow melts, it creates more water which melts even more snow downhill. Consequently, multiple days’ worth of precipitation will enter the river below all at once, which can have drastic effects on flooding.

Compared to these natural occurrences, the extent to which human actions affect flooding is quite a bit more complicated. Scholars have long debated the connection between forests and flooding; in fact, as Gordon Grant points out, Plato even discussed the issue in his dialogue, *Critias*.²⁴ Nevertheless, recent research has shown that the link between deforestation and flood intensification is undeniable. One study of small watersheds in Oregon found that streams located near a clear-cut experienced increases of 50 percent in peak flows, and “as long as

²³ Jared Orsi, *Hazardous Metropolis: Flooding and Urban Ecology in Los Angeles* (Los Angeles: University of California Press, 2004), 2.

²⁴ Grant, 2.

twenty-five years after a clear-cut, flows remain 25 to 40 percent higher.”²⁵ In other words, these findings illustrate that clear-cuts directly raise the amount of water in nearby streams for a period of up to 25 years after the initial cut. But how does the absence of trees actually change the flow of a river or stream? The first mechanism by which trees can alter stream flow is called evapotranspiration. This term refers to the combined effect of evaporation and transpiration in forests. Evaporation occurs when rainwater is intercepted by a forest canopy or other vegetation and evaporates before reaching the soil. Transpiration, on the other hand, refers to the process by which trees and other plant life actively draw moisture out of the soil and transport it upward to facilitate growth. The combination of these two forces in forested areas results in dryer soils, which means that they have a higher capacity to absorb water in the case of a rainstorm. Conversely, the soils of a recently clear-cut area will become saturated faster because of the absence of these two forces, which in turn creates greater runoff and increases peak flows.

However, the authors of the aforementioned study posited that it was not necessarily evapotranspiration that created the greatest change in peak flow. Instead, they claimed it was the network of roads used by the loggers to transport wood out of the clear-cut. This is an excellent example of a second human influence on flooding—the compaction or outright replacement of soils with impervious material such as concrete. Gordon E. Grant, a renowned hydrologist, found that “moderate amounts of urbanization in watersheds located in Puget Sound increased peak flows by factors of 1.5 to 2.75.”²⁶ To understand Grant’s research, one must consider the implications of urbanization as they apply specifically to the ground. At an undeveloped or rural site, the ground will be covered with vegetation, and below that, soil. Water will either collect on the vegetation, where it will eventually evaporate or fall to the soil, or it will directly enter the

²⁵ Jon R. Luoma, *The Hidden Forest* (Corvallis: Oregon State University Press, 1999), p. 182.

²⁶ Grant, 46.

soil, to be absorbed by plants or filter downward to enter the water table. If this same site were to become urbanized, and its soils covered by cement and asphalt, then it would lose the absorptive capacity of the soil and vegetation. A study by Christopher P. Konrad, which corroborated Grant's results, concluded that because urban development reduces the natural storage capacity for water, "urban streams rise more quickly during storms and have higher peak discharge rates than do rural streams."²⁷ Urban development, therefore, removes the natural processes of evapotranspiration and soil absorption, and provides a slick, watertight surface upon which water may travel unimpeded into a nearby stream or river.

Disaster in Pierce County

On December 10th, 1933, precipitation gauges on the upper White River recorded 3.14 inches of rainfall, nearly equaling the total rainfall for the month of November in a span of just 24 hours.²⁸ This torrential rainfall incited "one of the severest floods in the history of the Puyallup Valley... [by which] hundreds were driven from their homes... traffic was paralyzed, and much livestock drowned."²⁹ Headlines such as "Dismal Loss, But Also High Courage"³⁰ and "Many Risk Lives to Save City Water Lines"³¹ juxtaposed the stark destruction with the heroic actions of residents. Other accounts personified natural forces, describing the "turgid waters of the Puyallup River [that] swirled and boiled in abated anger... as a bright sun looked briefly down upon a scene of desolation."³² The article then told one of the "hundred stories of heroic work in the saving of men, women, and children," in which two teenage boys "hazarded

²⁷ Christopher P. Konrad, "Effects of Urban Development on Floods," U.S. Geological Survey Fact Sheet FS-076-03, 2003.

²⁸ United States Army Corps of Engineers, *White River Flood Control Project: Mud Mountain Dam, Specifications for Construction of Dam and Appurtenant Works* (Seattle: University of Washington Press, 1939), 31.

²⁹ "Floods Receding After Inflicting Loss of Million," *Tacoma News Tribune*, December 11, 1933, A-1.

³⁰ "Dismal Loss, But Also High Courage," *Tacoma News Tribune*, December 11, 1933, A-1.

³¹ "Many Risk Lives to Save City Water Lines," *Tacoma News Tribune*, December 11, 1933, A-1.

³² "Dismal Loss, But Also High Courage," *Tacoma News Tribune*, December 11, 1933, A-1.

the swift current...and caught a boat coming down the mad stream of water.”³³ Leopold and Maddock, authors of *The Flood Control Controversy*, claimed that “the average American has some unrealistic ideas about rivers and floods due, perhaps, to the kinds of literary descriptions which appear in news stories.”³⁴ Indeed, the Tacoma News Tribune’s accounts of human interactions with the flood illustrated scenes of heroism, sacrifice, and teamwork against the raging temper of Mother Nature. Their articles ascribed a menacing agency to the river, blaming the river which was often described as angry or mad, while portraying humans as selfless heroes concerned only with saving their fellow man. The accounts which came closest to offering an explanation of the flood simply noted the recession of the rain, then returned to terrifying personifications of the flood and tales of heroism.

The flood affected thousands in the Puyallup Valley, but among those hit hardest were the residents of a Hooverville by the name of “Hollywood on the Tideflats.”³⁵ In 1929, when financial institutions around the country failed, hundreds of people in the Puyallup River Valley found themselves unemployed. Many of those left homeless in the Tacoma area turned to “Hollywood on the Tideflats,” a makeshift settlement located on the tideflats where the Puyallup River meets Puget Sound. In the early 1930s, the colony was populated by approximately 80 men and just a few women, all unemployed and otherwise homeless. Although the “Hollywood” moniker was used lovingly by residents, others referred to the settlement more disparagingly as the “home of the great un-washed.”³⁶ Because of the settlement’s location near the mouth of the Puyallup and the impermanence of its makeshift homes, the majority of the property was washed

³³ *Ibid.*

³⁴ Luna B. Leopold and Thomas Maddock, Jr., *The Flood Control Controversy* (New York: The Ronald Press Company, 1954), 9.

³⁵ Herman Hunt, “Tideflats Resort Suffers in Flood,” *Tacoma News Tribune*, December 12, 1933, A-1.

³⁶ *Ibid.*

away, leaving only a handful of stilted homes standing.³⁷ Its location near the Puyallup River posed an ever-present risk of incurring significant damage from even a small flood, but the land was otherwise vacant so residents remained there out of necessity. On December 10th, 1933, that flood hazard was dramatically realized.

The language used in these articles revealed certain underlying assumptions held by residents of the Puyallup Valley about their relationship to flooding and the natural world. The depictions of the river as angry and menacing suggested that only the river was at fault for the destruction. This attribution of blame fails to acknowledge the simple fact discussed earlier in this analysis—floodplains exist because they are often flooded. Their existence promises both fertile soil and occasional disaster. The style with which the *News Tribune* speaks of most instances of flooding suggests its ignorance of this fact. However, the *Tacoma News Tribune's* coverage of flood damage in Hollywood on the Tideflats was accompanied by an odd change of tone. Detailing the possessions lost by Hollywood residents, the author mentions that several cars were damaged, despite the fact that “police patrol and prowl cars are more frequent callers in the colony than are highly polished sedans.”³⁸ In other words, the article made an apparent attempt to describe Hollywood residents as criminals. Then, in its description of the damage wreaked upon Hollywood on the Tideflats, the *News Tribune* admonished residents for its “packing-box” homes “built too close to the river bank.”³⁹ This was an interesting departure from the *News Tribune's* earlier portrayals of the heroic acts of locals. In the first years of the Great Depression, when so many people fell on hard times, it seems especially odd that the *News Tribune* took this tone regarding the homeless population of Hollywood. Clearly, this article

³⁷ *Ibid.*

³⁸ *Ibid.*

³⁹ Herman Hunt, “Tideflats Resort Suffers in Flood,” *Tacoma News Tribune*, December 12, 1933, A-1.

blamed Hollywood for its own destruction, citing residents' encroachment upon the river. In all the *News Tribune's* depictions of damages from this flood, this was the only one which faulted human actions. Correct as it may have been to blame humans for the location of the development, it is interesting that this accusation was directed at the poorest residents of Tacoma and no one else. These Hollywood inhabitants lived near the mouth of the river not by choice but by necessity; the same cannot be said for hundreds of other flood victims in Tacoma, whom the *News Tribune* hailed as heroes. By blaming human development for encroaching upon the river, the *News Tribune* showed the beginnings of a holistic conception of humanity's place in nature; nevertheless, by attributing the blame solely to Hollywood and its residents, the *News Tribune* revealed its hypocritical conception of flood liability, determined not by guilt but by social status.

Flood Control

With most calamities, the search for a remedy is never more fervent than after an outbreak of the ailment. Flooding is no different. After this catastrophic flood, talk of flood control was abundant. A journalist for the *Enumclaw Courier-Herald* claimed that "a great deal of the damage caused in the Puyallup Valley could have been averted if the [proposed] dam had been in place."⁴⁰ Charles Thomas, a former river engineer writing for the *Town Crier*, argued that flood control is a "permanent improvement of rivers, [which will open] up a useful avenue of employment."⁴¹ Nevertheless, when President Roosevelt signed the Federal Flood Control Act into law in 1936, and authorized the construction of dams such as Mud Mountain, not a single drop of ink was spilled over it by either the *Tacoma News Tribune* or the *Enumclaw*

⁴⁰ "Flood Causes" *Enumclaw Courier-Herald*, Dec 15, 1933

⁴¹ Charles Thomas, "Necessity of Flood Control," *Town Crier*, March 1935, 15.

Courier-Herald. This phenomenon could be called “transience of the public eye”—the public often demands solutions, but is rarely patient enough to see them achieved.

Three years later, when plans for Mud Mountain Dam were revealed, magazines and newspapers began to take notice. Construction of Mud Mountain Dam began in 1939, and it was instantly hailed for its sheer size and grandeur. Magazines devoted entire articles to the engineering marvel that was this mammoth dam. *Motor Transportation* lauded the workers, “dwarfed by the size of the canyon, hammering, blasting and sluicing away overhanging and rotten portions of the canyon wall,” and added that “there is little probability the dam’s capacity will ever be attained.”⁴² These words attempt to romanticize the ruggedness of the workers, while simultaneously painting the natural world, symbolized here by the canyon, as a Goliath opponent. Even the project description by the Army Corps of Engineers was laden with superlatives, claiming that “the dam is outstanding because it will be the highest rolled earth fill dam ever constructed.”⁴³ The inclusion of this phrase in a document which claimed to be a simple description of the design seemed out of place. First of all, the Army Corps’ use of word “outstanding” noticeably interjected a hint of pride, or perhaps admiration of the audacity required to build such an enormous structure. Second, the inclusion of this sentence seemed to serve no purpose other than to showmanship. Even then, the Army Corps was not bragging about the effectiveness or the efficiency of the dam, but rather its sheer size. Thus, the language used to describe the dam indicated the notion that human engineering achievement could overcome anything—that given funding and the right scientific expertise, human ingenuity could best any problem the natural world presented.

⁴² “Mud Mountain!” *Motor Transportation*, July, 1940, 8.

⁴³ United States Army Corps of Engineers, *White River Flood Control Project: Mud Mountain Dam* (Seattle District: 1939), 2.

Human ingenuity, however, could not present any answers to the challenge of war. Consequently, construction of Mud Mountain Dam was interrupted just two years after it began by the outset of World War II. In 1947, work resumed, and the dam was officially completed in 1948. When finished, it was just as massive as planned. The reservoir created by the dam had a capacity of nearly six billion cubic feet, and the concrete spillway was designed to control 139,000 cubic feet of water per second—roughly five times the rate of flow in the 1933 flood.⁴⁴ Indeed, it looked as if *Motor Transportation's* prediction of the dam's fortitude would hold true.

A Valley Transformed

In the years between the construction of Mud Mountain Dam and the disastrous flood of 1977, the Puyallup Valley underwent a series of changes that exacerbated the effects of flooding in the area. Between the processes of rapid urbanization and heavy logging, developers of the Puyallup River Valley essentially precluded Mud Mountain Dam's success in controlling floods.

When the United States entered World War II, the previously stagnating demand for lumber skyrocketed, revitalizing Washington's oldest natural resource industry. Wartime demand for lumber pushed the productivity of Washington timber companies to new heights but resulted in the deforestation of many hillsides in Western Washington. To illustrate the incredible demand, one author contrasted America's lumber demand for the entirety of World War I, which "totaled a little more than six billion feet of lumber," with the demand for "almost four billion feet in 1941 alone, [and] another four billion feet in 1942."⁴⁵ To put it simply, the timber resources of Western Washington were put under great stress during World War II, and

⁴⁴ United States Army Corps of Engineers, *White River Flood Control Project: Mud Mountain Dam* (Seattle District: 1939), 2.

⁴⁵ Stewart H. Holbrook, "Timber...! Our Logs Answer Call to Arms," *Sunday Oregonian*, May 4, 1941, magazine section, 1A.

that stress only continued to grow with the explosion of the housing market in the years following the war, and the demand for wood thereby created.⁴⁶ This sustained and widespread logging stripped many of Washington's hillsides of their forests, including the Puyallup River Valley, which was "heavy logged by Weyerhaeuser Corporation."⁴⁷ The result of this deforestation was the removal of the natural flood protection those forests provided and an increase in erosion and river sedimentation. Yet contrary to popular belief, logging is rarely the primary cause of flooding. Gordon Grant illustrated that although logging measurably amplifies flooding, its effects pale in comparison to those of urbanization.⁴⁸

During the years following WWII, the Puyallup River Valley experienced a period of immense urbanization. The Weyerhaeuser Timber Company had experienced incredible growth thanks to the wartime economy's effect on the timber industry, and the Northwest's aviation industry was on the rise with the rapid growth of Boeing.⁴⁹ Furthermore, thanks to the overwhelming number of articles that glorified Mud Mountain Dam as an invincible feat of engineering, the Puyallup River Valley came to be seen as a floodplain without floods. In other words, the construction of a flood control dam upriver from the Puyallup Valley was seen by residents of the lower valley as a guarantee that their homes and businesses would be safe from floods. Therefore, booming industries such as Boeing and Weyerhaeuser gave the Northwest a thriving job market which, paired with the end of World War II, the return of thousands of

⁴⁶ Weyerhaeuser Timber Company, *Annual Report: 1947*, University of Washington Digital Collections, <http://content.lib.washington.edu/cdm4/document.php?CISOROOT=/reports&CISOPTR=2267&REC=6>.

⁴⁷ United States Army Corps of Engineers, *Environmental Statement: Mud Mountain Dam and Reservoir, White River, Washington*, (Seattle District: 1971), 2.

⁴⁸ Grant, Gordon E. "Effects of Forest Practices on Peak Flows and Consequent Channel Response." United States Department of Agriculture. General Technical Report no. 760 (2008): 46.

⁴⁹ Weyerhaeuser Timber Company, *Annual Report: 1947*, University of Washington Digital Collections, <http://content.lib.washington.edu/cdm4/document.php?CISOROOT=/reports&CISOPTR=2267&REC=6>.

soldiers, and an apparent guarantee of safety from floods, resulted in an explosion in the Puyallup River Valley's population.

Population numbers collected by the United States Census Bureau illustrate this growth clearly and succinctly. Despite a relatively constant growth rate between 1920 and 1940 of approximately 20,000 people every ten years, Pierce County's population jumped from 182,081 in 1940 to 275,876 in 1950, and then to 321,590 in 1960.⁵⁰ Consequently, property taxes skyrocketed, forcing out many farmers, and all but paving-over the valley to make way for new homes and industry.⁵¹ According to farmer Wally Staatz, "the best agricultural land in the Puyallup-Sumner-Fife area [was] built over," by 1976, at which point the valley was composed mostly of industry and homes.⁵² Thus, Pierce County and the Puyallup River Valley experienced rapid population growth between 1940 and 1960, accompanied by large-scale construction of suburban housing developments, and previously unparalleled amounts of logging. These actions left the Puyallup Valley with an excess of paved surfaces and a shortage of tree, soil, and vegetation coverage—a combination that greatly reduced the area's capacity to absorb water runoff, and thereby intensified the effects of flooding immensely.⁵³

The Rebirth of Environmentalism

While the Puyallup River Valley experienced these drastic changes to the natural environment, so too did a large portion of America. Fifteen years after World War II, suburban America was growing rapidly and synthetic materials like plastics, pesticides, and detergents

⁵⁰ University of Virginia Library, "Historical Census Browser," University of Virginia, <http://mapserver.lib.virginia.edu/>.

⁵¹ "Harvest of Doubt," *Tacoma News Tribune*, March 31, 1976, D-16.

⁵² *Ibid.*

⁵³ Christopher P. Konrad, "Effects of Urban Development on Floods," U.S. Geological Survey Fact Sheet FS-076-03, 2003.

were becoming common household chemicals across the country. However, with the publication of *Silent Spring* in 1962, Rachel Carson breathed life into the embers of environmentalism, left smoldering by John Muir half a century ago, and started a war against those chemicals which is still being waged today. *Silent Spring* detailed the extent to which “birds, mammals, fishes, and indeed practically every form of wildlife” were being killed by man-made chemicals “indiscriminately sprayed on the land.”⁵⁴ Not only was *Silent Spring* widely read, it instantly inserted itself into American public discourse. Just months after publication, *Silent Spring* was partially serialized by *The New Yorker*, named a best-seller, and given television coverage on multiple occasions by *CBS Reports*. Moreover, it shaped the questions President Kennedy received at press conferences and it landed Carson before a Senate committee investigating the effects of pesticides.⁵⁵ In other words, *Silent Spring* vaulted pesticides and, more importantly, the seedlings of environmental concerns to the forefront of American thought.

This newfound awareness of environmental issues found its way into countless facets of American culture and politics. Membership in environmental groups skyrocketed; in 1960, these groups reported an estimated 300,000 members, while in 1968 the National Wildlife Foundation alone had 365,000 members.⁵⁶ This boom continued, and culminated two years later in two of the most important developments in the history of environmentalism—one political, one cultural. On January 1st, 1970, the National Environmental Policy Act (NEPA) was passed into law, and with it, the Environmental Impact Statement (EIS) was born. Then, on April 22nd, 1970, approximately 20 million Americans, all across the country, celebrated the first Earth Day.⁵⁷

These two advances represented a major victory for the cause of environmentalism. The EIS

⁵⁴ Rachel Carson, *Silent Spring*, (Boston: Houghton Mifflin, 1994), 85.

⁵⁵ Edwin Diamond, "The Myth of the Pesticide Menace," *Saturday Evening Post*, September 28, 1963, 16, accessed via: <http://www1.umn.edu/ships/pesticides/library/diamond1963.pdf>.

⁵⁶ Kirkpatrick Sale, *The Green Revolution*, (New York: Hill and Wang, 1993) 17.

⁵⁷ Sale, 24.

required that the environmental impacts of a project be clearly documented and opened to public debate, and the massive celebration of Earth Day in 1970 illustrated that a passionate coalition existed to contribute to that debate on behalf of the environment. From these momentous achievements, a cascade of environmental legislation followed and environmental concerns began their ascension into the core of American culture and politics.

While this sentiment for the environment was the catalyst of some indispensable additions to American legislation as well as important cultural and political changes, it was created by inherently selfish motivations. As Kirkpatrick Sale illustrates in his *Green Revolution*, it was the groups which addressed pollution that saw the greatest increase in membership.⁵⁸ Clearly, pollution was the driving force behind this boom in environmentalism. The reason for this became clear several years later in the U.S. Forest Service proviso, which offered “the guiding principle...that ‘wilderness is not set aside for the sake of its flora and fauna, but for people.’”⁵⁹ These words illustrate the notion that the natural world exists for the sake of humanity, and its highest purpose is serving human needs. Thus, the environmental issues that took root were those that coalesced with our anthropocentric concerns. Consequently, the issue of pollution drove the environmental boom at the national level because it had the most obvious impact on human quality of life.

In the case of the Puyallup River Valley, it was a different set of concerns which gave credence to the environmental cause, yet they too were anthropocentric in nature. In the Pacific Northwest, salmon are the pinnacle of a large and successful fishing industry, and the Puyallup and White Rivers are important hubs of that industry which offer “annual runs of coho, chinook,

⁵⁸ Sale, 33.

⁵⁹ Sale, 39.

pink, and chum salmon,” as well as “steelhead and searun trout.”⁶⁰ The Muckelshoot and Puyallup Tribes of Indians also “depend on fishing for subsistence and income.”⁶¹ It was with these concerns in mind that people began to voice concerns over the sediment levels of water passing through Mud Mountain Dam. Because the White River is fueled by glacial melt, its water carries a lot of sediment; however, this sediment poses a risk of clogging fish gills and dislodging eggs from the riverbed. Indeed, Mud Mountain Dam’s Environmental Impact Statement confirmed that “at times in the past the project has been operated without complete understanding of the needs of fishery resources.”⁶² That is to say, the dam’s sediment tunnel was opened completely, releasing up to 250,000 cubic yards of sediment into the river channel below. Perhaps the most revealing aspect of the Environmental Impact Statement, however, is the use of the term “man’s environment” to describe the natural world.⁶³ With these two words, the document which was meant to help guard against injustices done unto the land by humans implies precisely the opposite. This language implies that the environment belongs to man and exists at his disposal. Thus, even with this incredible restructuring of priorities to incorporate the natural world more holistically, human concerns both locally and nationally remained firmly focused on human wants and needs.

1977 Flood

When the rain subsided in the second week of December, 1977, two million dollars of damage had been wreaked on Pierce County alone. Statewide, seven million dollars of damages had been done to highways and bridges; approximately fourteen million dollars in total

⁶⁰ United States Army Corps of Engineers, *Environmental Statement: Mud Mountain Dam and Reservoir, White River, Washington*, (Seattle District: 1971), 3.

⁶¹ *Ibid.*

⁶² *Ibid.*

⁶³ *Ibid.*

destruction.⁶⁴ In the Puyallup Valley, “at least 200 families were temporarily homeless,” but for the most part, the flood had a unifying effect on its victims.⁶⁵ “Volunteers came from schools, military bases, or just the farm across the road,” to sling sandbags, shovel debris, haul away cars, and pack up scattered possessions.⁶⁶ In other words, affected residents were able to unite against the rising waters to prevent further damage by building sandbag levees; meanwhile, their portrayal in the *News Tribune* casted a rosy, heroic light onto the scene. Perhaps this was everyday media sensationalism, or perhaps it was true, disaster-stricken camaraderie.

Fisheries across the state were devastated by the flood. High sediment levels can be dangerous for fish populations, but in floods such as this, the danger is exponentially greater. The turbid waters and debris combine to create “a scouring of the river bottom, [which] washes the eggs right out of the gravel,” and even mature fish can be suffocated if the sediments become too concentrated.⁶⁷ According to Ramona Bennett, a representative of the Puyallup Tribe, that is precisely what happened. “Silt, debris, and rushing water killed this year’s salmon spawn,” she said.⁶⁸ Indeed, state fisheries estimated a loss of 4.7-7.5 million Chinook and Coho eggs, fry, and yearlings, which would have a “two million dollar impact on the 1979 Coho fishery alone.”⁶⁹ Bennett went even further, directly blaming the timber industry, claiming that “clear-cut logging practices” intensified flooding in the area and wiped out the rivers’ fish species.⁷⁰ Responding to these comments, Hill Wallace, a Department of Natural Resources forester argued that

⁶⁴ Vern Shomshak, “State Flood Damage May Equal 1975,” *Tacoma News Tribune*, December 6, 1977, A-1.

⁶⁵ “The Flood,” *Tacoma News Tribune*, December 3, 1977, A-3.

⁶⁶ *Ibid.*

⁶⁷ Robert H. Mottram, “Fishery Losses could be in Millions,” *Tacoma News Tribune*, December 6, 1977, A-3.

⁶⁸ “Flood Damaged Salmon, Puyallup Chairwoman Says,” *Tacoma News Tribune*, December 5, 1977, A-9.

⁶⁹ Robert H. Mottram, “Fishery Losses could be in Millions,” *Tacoma News Tribune*, December 6, 1977, A-3.

⁷⁰ “Flood Damaged Salmon, Puyallup Chairwoman Says,” *Tacoma News Tribune*, December 5, 1977, A-9.

cutting practices had little to do with the flood... There is only one 80-acre clear cut near the river, and it could have made little difference. Even old growth timber only retains about 5 hundredths of an inch of rain... The problem is that we got three days' worth of normal rain in the space of 24 hours... and it was a warm rain so it took a lot of snow with it.⁷¹

However, revisiting the Environmental Impact Statement for Mud Mountain Dam throws Wallace's statement into question. The EIS clearly states that "rapid run-off and increased sediment loads in the White River have resulted from extensive clear-cutting over large areas of the upper drainage."⁷² Perhaps Wallace was correct regarding the amount of runoff, but he failed to address the issue of sedimentation. When an area is stripped of its vegetation, the soil is much more likely to erode without roots to secure it in place. This leads to a sizeable increase in the amount of sediment in watersheds below, and it is precisely these sediment loads which pose such a threat to fish populations, as they clog gills and scrape eggs loose from the river bottom. Furthermore, although Bennett may have been correct in blaming timber companies for the decrease in salmon populations, she went on to situate the claim in a purely anthropocentric context. By saying that clear-cutting is bad "for local taxpayers, for sports fishermen, and for Native Americans who depend on fisheries for our existence and way of life," Bennett reinforced the notion that the environment is meant to serve human life, and showed that environmental issues matter most when they directly affect humans.⁷³

⁷¹ "Flood Control Efforts End, but Cleanup Continues," *Tacoma News Tribune*, December 8, 1977, A-3.

⁷² United States Army Corps of Engineers, *Environmental Statement: Mud Mountain Dam and Reservoir, White River, Washington*, (Seattle District: 1971), 4.

⁷³ *Ibid.*

Along with fish populations, the residents of the Bowman-Hilton Mobile Home Park and their possessions were also devastated by the flood⁷⁴—this fact illustrates that impoverished people continued to be disproportionately victimized by flooding, even as late as 1977. Thirty mobile homes were damaged or destroyed by the flood’s high waters, and the entire park was evacuated.⁷⁵ Presumably this is a result of extremely low property values and a lack of regulation on floodplain land use, resulting in the least expensive land located closest to flood-prone river banks. This is unfortunate for all parties involved, for as long as the land is inexpensive, unaware property-buyers will continue to inhabit it.

As a result of this flood, Washington State Senator Kent Pullen reintroduced legislation to implement a flood warning system all across the state. This action suggested that residents of the Puyallup River Valley had at least come to the conclusion that they could not entirely prevent flooding. Indeed, Sultan Police Chief Richard Dunlap voiced this notion, saying “this is just something that happens periodically; every two years...you just have to grin and bear it.”⁷⁶ Dunlap’s statement is evidence of a significant change in the local understanding of nature. By acknowledging that flooding simply happens, he implicitly acknowledged the fact that there are limits to man’s ability to control nature.

True as it may have been, this resolution may seem unsatisfying. After all, why does Mud Mountain Dam still exist if it fails to do its one and only job every two years? Quite simply, the Puyallup River Valley still floods periodically, in spite of Mud Mountain Dam, because it is surrounded by watertight surfaces like roofs, sidewalks, parking lots, and roads. According to the U.S. Army Corps of Engineers, the Port of Tacoma alone accounted for 3300

⁷⁴ “Way Clear for U.S. State Aid,” *Tacoma News Tribune*, December 3, 1977, A-1.

⁷⁵ *Ibid.*

⁷⁶ “Floods in State Kill at Least Two, Hurt Four,” *Tacoma News Tribune*, December 3, 1977, A-1.

acres of industrial land use in 1971, with the area directly upriver classified as “intense residential and industrial” land use.⁷⁷ Undoubtedly, these areas are predominantly covered with impervious surfaces, removing the highly absorbent trees and soil from the local water cycle, and allowing runoff to flow directly into streams and rivers. In 1976, Bob Burmeister, manager of Puyallup Valley Chamber of Commerce, expressed a concern that the valley would “be paved over like Kent and Auburn.”⁷⁸ Not only does this sentiment illustrate that the valley was becoming dominated by impervious surfaces, it also explicitly states that Kent and Auburn were already predominantly paved. This is especially troublesome for the valley, as Auburn is located directly on the White River, which meets the Puyallup River at the town of Sumner. Thus, even if Mud Mountain Dam did its job effectively, the White and Puyallup Rivers could still flood below the level of the dam because of the prevalence of paved surfaces in Auburn, Puyallup, Tacoma, Fife, and other cities along the river.

Conclusions

In 1933, residents of the Puyallup River Valley understood their connection with natural disaster as a type of protagonist-antagonist relationship, and their actions clearly reflected assumptions about humanity’s superiority to the natural world. The river was but a destructive nuisance, further adding to their economic woes by destroying homes, crops, and livestock with its periodic flooding. Figures like Charles Thomas, a river engineer, called flood control damming “a permanent improvement” of the river. Not only does this suggest that man is entitled to permanently alter his environment, it also claims that said alteration would be an

⁷⁷ United States Army Corps of Engineers, *Environmental Statement: Mud Mountain Dam and Reservoir, White River, Washington*, (Seattle District: 1971), 4.

⁷⁸ “Harvest of Doubt,” *Tacoma News Tribune*, March 31, 1976, D-16.

improvement. This illustrates an understanding of human superiority among Puyallup River Valley inhabitants, as well as the idea that human control over nature was limitless.

In 1977, however, there was a growing concern both nationally and locally regarding the effects of human activity on the rest of the natural world, and this concern was brought to the forefront by the occurrence of destructive natural disasters. Victims of the 1977 flood began to realize that they could not prevent flooding entirely, and that they were better off learning to avoid and react to floods successfully. The Puyallup River Valley is a floodplain, and therefore, its occasional flooding ought to be expected. The most enlightened acknowledgement of this simple fact came in 1979 with Pierce County Public Works Director William Thornton's declaration that "the battle against flood destruction hasn't been won here, probably because people continue to build and live in flood-prone areas."⁷⁹ Recognition of this dilemma suggests that some residents had at last realized the irony of their situation and begun to move away from a completely anthropocentric conception of man versus raging water. Floods were precisely that which gave their soil its incredible fertility and provided them with such flat land upon which to build their towns. By attempting to prevent floods, they were removing the processes which enriched their soil and gave them abundant salmon, therefore negating the exact resources that led their ancestors to settle the valley initially. Furthermore, the perception that floods had been prevented resulted in a stimulated rate of urbanization, thereby leading to the spread of impervious ground surface and the associated intensification of flooding. Therefore, it seems the only problem was that they fought the floods instead of expecting them.

By revisiting Worster's three levels of analysis, we can determine the direction of causality between humans and nature in the Puyallup River Valley. These levels of analysis

⁷⁹ "Floods Could Hit Any Time, but County Better Prepared," *Tacoma News Tribune*, February 18, 1979, A-3.

were neatly summarized by William Cronon as “first, the dynamics of natural ecosystems in time; second, the political economies people erect within those natural systems; and third, the cognitive lenses through which people perceive their relationship to the other two.”⁸⁰ In the late 1800s, despite the destruction caused by periodic flooding, white settlers stayed rooted to the Puyallup Valley because of its abundant resources. If fresh water, shellfish, salmon, timber and an array of other natural resources had not been so widely available, white settlers may not have competed with the Puyallup Tribe for the land. And if the soil had not been so fertile and productive from countless years of flooding, then early farmers might have left after the first disastrous flood. Nevertheless, the benefits of inhabiting the flooding continued to outweigh the consequences; as a result, inhabitants of the Puyallup River Valley consistently grew in number. Therefore, it is quite clear that early settlement of the Puyallup River Valley was driven by the geographic distribution of natural resources.

After World War II, human developments began to alter this causal relationship. In 1947, Mud Mountain Dam was completed, ushering in new era of perceived safety from flooding in the Puyallup River Valley. The wartime economy had resulted in impressive growth in both the timber and aviation industries. And as the home of Weyerhaeuser and Boeing, two leaders in these industries, the Pacific Northwest’s job market flourished. The result was an incredible population increase between 1940 and 1960. Lumber demand remained high to keep pace with the construction of new suburban homes, and heavy logging of the Puyallup Valley ensued. By 1977, when the flood struck, the valley had been converted from a rural floodplain used largely for agriculture into a paved suburbia. The ground had been transformed from fertile floodplain soil into impervious roads, roofs, and parking lots. Therefore, during the years following World

⁸⁰ William Cronon, “Modes of Prophecy and Production: Placing Nature in History,” *The Journal of American History* 76 (March 1990).

War II, human developments became the causal factor in both the significant growth of the region and the amplification of flooding.

Thus, residents of the Puyallup Valley circa 1933 understood nature as the antagonist and themselves as the protagonist, largely due to the media's portrayal of nature's anger and fury as the cause of floods. In 1977, nature remained the antagonist, but Puyallup Valley residents understood the relationship differently. For most, floods were becoming rational, even normal occurrences—a change that removed the moral conflict, but left the physical conflict between man and nature mostly intact. Some environmentally holistic thinkers had begun to turn the finger of blame back upon themselves, yet for mostly the wrong reasons. Puyallup Tribe Chairwoman, Ramona Bennett, blamed lumber companies for flooding and decimation of the fisheries. Although her claim was motivated by anthropocentric concerns, such as the economic impact on the fish industry, it illustrates an important development in the way people understood their relationship with nature. And finally, people like Public Works Director William Thornton began to acknowledge that Puyallup Valley residents were entirely to blame for continuing to build and live on the floodplain. Therefore, in the 1970s, Puyallup Valley residents began to think more holistically about nature and their place within it. Rather than assuming superiority, locals began to acknowledge the limits to their ability to control nature, and specifically, that floods could not be conquered.

Implications for Floodplain Management

The land management practices used between 1933 and 1977 in Pierce County were not successful, as they perpetuated and exacerbated the problem of flooding, despite the installation of a massive flood control dam. According to its official website, Pierce County lost 18,000

acres of farmland to urban development between 1982 and 1997.⁸¹ And in February of 1996, Puyallup experienced “one of the worst [floods] in recent history.”⁸² Clearly, the problem grows with every house, road, or parking lot that is built. However, by reducing the prevalence of clear-cutting, installing permeable pavements and bioswales, and using land on floodplains responsibly and appropriately, city planners can help mitigate the problem of flooding in the Puyallup River Valley.

First and foremost, the technique of clear-cutting must be prohibited. Other practices which leave a percentage of trees standing, such as shelterwood cutting or thinning may be more acceptable, but because the problem of runoff is most likely linked to the logging roads, these changes alone will not suffice. Permeable pavements, which promote surface-water filtration, should be used on logging roads whenever safe and possible. Unfortunately, even these measures will only solve part of the problem; to tackle the entire issue, changes must be made in the cities themselves.

Hydrologist Christopher P. Konrad studied urban development and alternative uses for floodplains. His research shows that successful uses often included scenic areas, such as “parks and playgrounds that can tolerate occasional flooding.”⁸³ Or, when the land was used predominantly for housing, the installation of rooftop and parking lot drainage systems proved very effective, along with other techniques that promote storage of water in the soil, such as permeable pavements and bioswales.⁸⁴ Bioswales are low-lying, vegetated areas designed to

⁸¹ “About Us,” Pierce County, Washington, Jul 15, 2009, <http://www.co.pierce.wa.us/abtus/profile/agriculture.htm>.

⁸² “City of Puyallup Natural Hazard Mitigation Plan,” City of Puyallup, Sub-Section 4.5, p. 9, <http://www.cityofpuyallup.org/files/library/1ddce31846baf440.pdf>.

⁸³ Christopher P. Konrad, “Effects of Urban Development on Floods,” U.S. Geological Survey Fact Sheet FS-076-03, 2003.

⁸⁴ *Ibid.*

capture water runoff, thereby lowering the rate and volume of peak flows by entirely natural means. Not only do they lower the rate and volume of floods, they also help remove pollutants from water by naturally filtering runoff as it passes through the soil. Bioswales and permeable pavements have already been installed in many areas, including two neighborhoods in Seattle—Broadview and High Point. These neighborhoods are located above watersheds and streams which provide important salmon spawning habitat, and were selected on those grounds. Bioswales were installed in the Broadview neighborhood under the project name SEA Streets, and they have had an incredible impact on runoff. In the two years since the installation of bioswales, the SEA Streets project has “reduced [the] total volume of stormwater runoff by 99 percent.”⁸⁵ Furthermore, by capturing runoff in the soil, these bioswales prevent water from eroding the watershed as it travels rapidly downhill. This diminishes sediment levels in the stream below, and therefore provides a better habitat for fish species. Runoff management systems in High Point have been equally as successful. What is more, the park-like neighborhood of High Point reserved “50% of [its] 1,600 homes...for low-income residents,”⁸⁶ potentially removing homes from another common low-income housing location—the floodplain. These two neighborhoods serve as excellent examples of potential solutions for the Puyallup River Valley; thus, Pierce County developers and land use managers must integrate solutions such as these in order to slow urban development’s amplification of flooding.

If studying the history of flooding in the Puyallup River Valley may offer the future but one lesson, it ought to be that there are limits to our ability to control nature. Even with the successful implementation of the measures outlined above, the largest rainstorms will still cause

⁸⁵ Buranen, Margaret, “Seattle Takes Natural Drainage to a High Point,” *Stormwater: The Journal for Surface Water Quality Professionals*, March 2010.

⁸⁶ *Ibid.*

floods to occasionally torment the Puyallup Valley. Land use managers must learn to adapt to this inevitability by adhering to cautious and environmentally responsible principles of floodplain use. For instance, the land use of a particular area must be “consistent with the flood hazard on that area of land.”⁸⁷ Furthermore, to effectively protect inhabitants of flood hazard areas, awareness must be raised and floods must be forecasted so that locals may be warned.⁸⁸ By using a floodplain management approach that effectively integrates the measures I have outlined above, land use managers will be able to reduce flooding, improve water quality, protect fish spawning habitat, and provide safer land for more responsible future development.

⁸⁷ *Mekong River Commission Strategy on Flood Management and Mitigation*, Mekong River Commission, (Cambodia, 2001).

⁸⁸ *Ibid.*

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