

Using Actor-Network Theory to Examine the Effects of Hurricane Katrina on the City of New Orleans

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By

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction:

New Orleans, with its rich history, has long grappled with flooding issues dating back to the early 1990s. The city's formation from sediment deposited by the Mississippi River, coupled with its location on the southeastern tip of Louisiana near the Gulf of Mexico, renders it vulnerable to hurricanes, which have historically wreaked havoc upon it. Both local and federal governments have been made aware however of the vulnerability of the city and through their actions, or lack thereof, have profoundly impacted the city's well-being (Smith, N., 2006). In the case of Hurricane Katrina in August of 2005, the city was caught unprepared, uninformed, and seemingly with nobody to turn to for help. The aftermath of Katrina prompted extensive analysis by professionals seeking to reveal the causes of New Orleans' devastation. While some attribute it solely to failures in the levee and canal systems, others highlight miscommunications among officials and a deficiency in leadership. Moreover, notions of racial inequality have been raised, suggesting further disparities in preparedness and response as a result. However, these perspectives often fail to grasp the interrelated factors leading to the city's downfall.

Understanding the complexity of the event requires examining the interconnected web of decisions made by various actors, including individuals, groups, and organizations. Neglecting this holistic approach limits our understanding of the disaster and diminishes our ability to prevent similar disasters in the future. Drawing upon Actor-Network Theory, I will analyze how diverse actor networks influenced the disaster and its aftermath. This framework demonstrates how actors collaborate within networks to shape engineering outcomes. I argue that the catastrophe stemmed not from the actions of a single entity but from a multitude of failures in communication, technology, and decision-making, among others, by multiple groups of actors, both physical and non-physical, resulting in both physical destruction and communal trauma. In

examining numerous firsthand accounts and articles, I will present the roles of each actor and their collective impact on the system. These sources shed light on deficiencies in levee construction, governmental corruption, and inadequate responses, all pivotal in understanding the events surrounding this natural tragedy in New Orleans. Through this analysis, we gain valuable insights into the multifaceted nature of disasters and aim for more effective preparation and response strategies in the future.

Literature Review:

In this section, I will review multiple peer-reviewed articles that discuss different events that occurred during Hurricane Katrina in New Orleans. I will analyze their arguments to determine how well they encapsulate the intricate reasons for the devastating events that occurred. Although many accusations have been made towards individuals at fault, many scholars have failed to recognize the connections and links between the actors that fully encapsulate the reasons for the destruction of the case study at hand. Since the disaster in late August of 2005, many scholars have focused on specific reasons for the devastation in New Orleans. An article on Hurricane Katrina's levees was published in the Journal of Geotechnical and Geoenvironmental Engineering by multiple authors, most notably Javier Ubilla, in May of 2008. In the article entitled "New Orleans Levee System Performance during Hurricane Katrina: London Avenue and Orleans Canal South," Ubilla gives an in-depth account of the Levee systems surrounding the city and the reasons that he believes this was the cause of the city's failures during the natural disaster. Ubilla states that "Most of the damage was due to the failure of the levee system that surrounds the city to protect it from flooding." Later in the article, he gives several examples of how this occurred including where some levees were overtopped by the storm surge and places such as the 17th Canal where the levees failed without being

overtopped which is of significant concern. The moral of his argument is that the cities failure was due to the failure of the levees (Ubilla, J., Abdoun, T., Sasanakul, I., Sharp, M., Steedman, S., Vanadit-Ellis, W., & Zimmie, T., 2008)

In another article entitled “The response to Hurricane Katrina,” author Donald P. Moynihan argues an entirely different point of view. Much of Moynihan’s argument goes to say that the government was incapable of offering basic protections to the city of New Orleans and that in many cases the city was severely unprepared for the forces of nature. He later argues that “The poor response arose from a failure to manage several risk factors” further arguing that the risks of a large hurricane had been considered and specifically for Katrina the magnitude of the emergency was known days before the destruction occurred. The issue in the eyes of Moynihan was that the government and responders failed to effectively communicate the risks at hand and therefore the city saw a significant increase in death toll and disaster as a result (Moynihan, D. P., 2009) These arguments are similar in that they analyze ways in which the people of New Orleans were subject to danger and destruction however they fail to analyze the disaster from different viewpoints and tend to assign blame to specific areas. While several scholars have examined the different causes for the destruction of New Orleans due to Hurricane Katrina separately, scholars have not yet considered how the social, technical, natural, and conceptual actors involved collectively contributed to the ultimate devastation of the famous coastal Louisiana city. By considering this perspective on the scenario, we can effectively identify the causes of destruction and prevent similar events from happening in the future.

Actor-Network Theory:

The Science, Technology, and Society (STS) framework of Actor-Network Theory provides us with an effective tool to analyze how the social, technical, natural, and conceptual

components involved in the destruction of New Orleans connected to the breakdown of the city as a whole. The paper that follows uses the ANT framework set out by Michel Callon. In practice, ANT aims to analyze how heterogeneous human and non-human actors can be connected into networks in which they take on a role that determines their positioning within the network. ANT employs a translation process to establish and sustain an actor network. It begins with problem identification by network builders, followed by actor recruitment during the interestment phase. Roles are assigned to actors in the enrolment phase, after which mobilization is directed from the top down by the network builders. Finally, in the black box phase, the network stabilizes and actors operate cohesively as a unit. ANT aims to “follow the actors” through complex networks and looks to network builders as the “primary actors” that oversee and implement the network construction. The networks within ANT usually consist of scientists and engineers who have specific roles within the network. In many cases, heterogeneous parts of ANT can be both actors and networks within themselves. This occurs a lot in many large-scale engineering projects where the number of “actors” involved is seemingly endless with large-scale actors and small-scale actors as well as varying sizes of networks amongst those actors. Another difference between the STS framework of ANT and others is that it accounts for both human and non-human actors within a network. One of the ways in which non-human actors are considered in ANT is by not only considering the social actors but also the technical, natural, and conceptual actors involved in the network as well. Technical actors are often displayed as technology that is intended to improve a certain aspect of overarching concepts. Natural actors are often analyzed as how the natural world plays a part in engineering successes and failures. Conceptual actors include ideas or “concepts” within engineering projects that help shape the outcomes for better or for worse. Multiple authors, when referring to Actor Networks

say “It depends precisely on a combination of social and technical engineering in an environment filled with indifferent or overly hostile physical and social actors” thus further emphasizing the importance of non-human actors within crucial engineering networks (Bijker, W. E., Hughes, T. P., Pinch, T. J., & Douglas, D. G. 2012). By analyzing all actors and networks within an engineering project, a more holistic analysis of engineering endeavors can be achieved and eventually applied to other projects. Similarly, I will use the STS framework of Actor-Network Theory to analyze the failed sociotechnical actor network involved in the destruction of New Orleans during Hurricane Katrina. Using Callons framework I will analyze power dynamics in federal and local governments and their failed attempts to protect and serve the city of New Orleans. I will also use ANT to analyze how the non-human actors such as the levee and canal systems played a part in the destruction of the city as well as obvious racial discrepancies during the response to the disaster.

Network Formation:

The case of Hurricane Katrina in New Orleans can be reconstructed by using Actor-Network Theory to analyze the interworkings and connectedness of the actors involved in the city's demise. The process of using ANT for analysis begins with determining the heterogeneous actors, both human and non-human, that contribute to the success or failure of a network. In this section of the paper I have identified many of these actors and briefly explain their role in the network. The human actors are as follows: The Army Corps of Engineers who were responsible for the construction and maintenance of the levee and canal system that surrounded and protected parts of New Orleans; Governor Ray Nagin who was responsible for the city at large but mostly the evacuation process and the repopulating scheme that would come into play weeks, months and years after the hurricane hit; FEMA, a government agency that

serves to aid people throughout the entirety of natural disasters; and the Bush administration who held the responsibility of overseeing many of these government agencies and providing funding for them to succeed. (FEMA, 2024)(Vest, J., & Rood, J., 2012; Strohm, C., 2012)(Sylves, R. T., 2006) Similarly, I have identified the non-human (Technical, Natural, and Conceptual) actors that were present within the network. The non-human actors are as follows: the storm surge that posed the initial threat of destruction to the city; the city's geographic placement below sea level that increased the risk of flooding within the city; the levee and canal system which provided the first line of defense in the case of hurricanes or other natural disasters; the racial discrimination that plagued the city before and after the storm. (Moynihan, D. P., 2009)(Lemann, N., 2020) (Ubilla, J., Abdoun, T., Sasanakul, I., Sharp, M., Steedman, S., Vanadit-Ellis, W., & Zimmie, T., 2008)(Link, L. E., 2010)

One of the most important parts of ANT is not only understanding who the actors were but understanding their relation to one another and how they ultimately work together to attempt to engineer societies and solve problems when engineering fails. Many articles provide insight into how we should envision these phases. These articles describe the relationships between the federal government mostly by way of George Bush and the Army Corps of Engineers as well as FEMA (Federal Emergency Management Agency). This is because although both organizations have their own presidents, George Bush's administration oversaw both of them and interacted with them constantly to ensure the health of the nation. (Sylves, R. T., 2006) (Vest, J., & Rood, J., 2012) Similarly, connecting Bush and other network builders to many of the Non-Human actors allows us to describe more holistically how the Network was formed and worked together to cause the issues seen from the protection and response to Hurricane Katrina in New Orleans. This being said, one could argue that Bush was, directly and indirectly, the network

builder in this scenario. Through the process of translation in which Actor Networks are formed and maintained, I will attempt to link the actions and roles of many of the actors within the network described which is outlined by Figure 1 shown below.

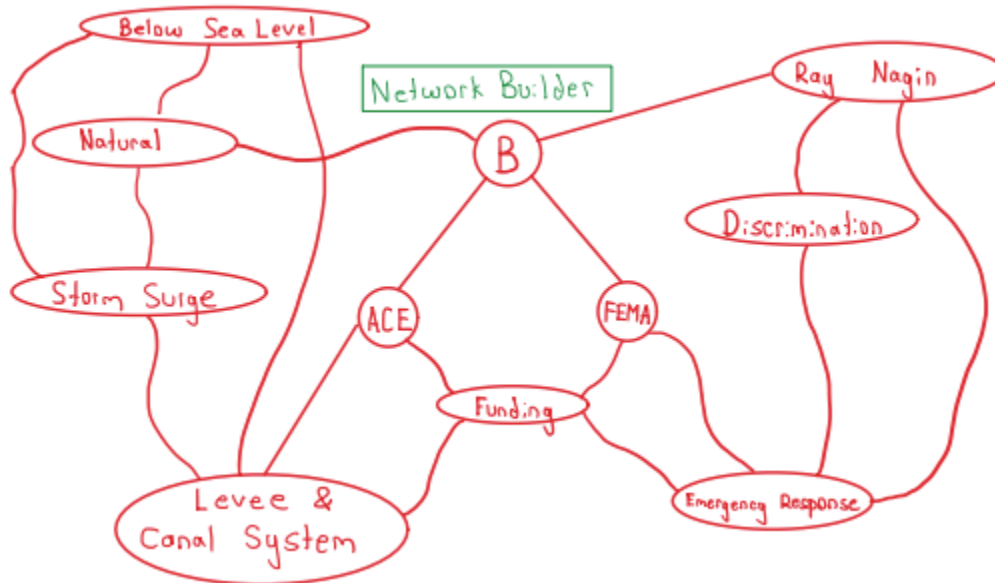


Figure 1.
In the figure, the B stands for president Bush, ACE is the Army Corps of Engineers, and FEMA is the Federal Emergency Response Administration

The first phase is Problemization in which George Bush in being president made many promises to protect this nation and keep us safe. In his First Inaugural Address Bush says “Government has great responsibilities for public safety and public health.” (Bush, G.W. , 2001) With this and other statements alike, Bush declares his ultimate goal of keeping his people safe. In the case of New Orleans, the problem at hand had to do with a city underwater and its increasing vulnerability to the threat of Natural Disasters, most notably Hurricanes.

As stated above, many of the presidents' responsibilities come from the organizations in which they oversee and how their services are implemented. During the Interestment stage, President Bush being the network builder in this scenario made strategic moves in recruiting actors to fulfill his goals of protecting his people. In this, he appointed Michael Brown as FEMA director and also oversaw the Army Corps of Engineers in many of their projects including the

construction of the levee systems in New Orleans as seen through their direct connections in Figure 1. From there, both FEMA and the Corps of Engineers employ groups of people and ensure their goals and aspirations align with those of their respective agencies. Furthermore, non-human actors join the network including the levee and canal system mentioned above amongst others. These systems come into play a lot when considering the geographic location of New Orleans and most notably the fact that it is often referred to as “A city built below sea level” since less than half of the city sits above sea level and is “Inhabitable by traditional definitions.” (Moynihan, D. P., 2009) From figure 1 it is seen how the cities elevation is connected as a natural actor to other actors such as the storm surge and the need for a levee and canal system surrounding the city.

During the enrollment phase, the actors are assigned roles that they are expected to perform effectively. In a hypothetical scenario the Corps of Engineers, President Bush, FEMA, and Governor Ray Nagin will accept their roles and work together to achieve a common goal of protecting New Orleans. In this scenario, President Bush develops a plan to ensure the safety of many of the cities in America that are at severe risk of damage and loss of life due to natural disasters such as hurricanes. In doing this he would effectively pull multiple other human actors into the network, most immediately FEMA and the Army Corps of Engineers. In doing this he would indirectly recruit many of the non-human actors into the picture as well as he instructs the Corps of Engineers to design the levee system and FEMA to design a plan of action in case of emergency that has direct links to FEMA and the funding provided by the president, as well as discriminatory factors and Governor Ray Nagin as illustrated in Figure 1. Many of the actions described are what qualify President Bush as one of the most important actors in the actor-network and also what allows us to label him as one of the primary network builders. As

mentioned above, in this theoretical scenario, The Army Corps of Engineers spends years funding, designing, planning, and implementing a levee and canal system to protect the city from hurricanes and flooding. The system would involve pumping stations designed to maintain groundwater levels and canals where the water would be pumped and eventually end in Lake Pontchartrain and the bayous nearby. These systems would also include levees combined with sheet piles designed to anchor floodwalls that were exposed at the surface and designed to “protect the region from a category 3 storm or below” (Ubilla, J., Abdoun, T., Sasanakul, I., Sharp, M., Steedman, S., Vanadit-Ellis, W., & Zimmie, T., 2008) (Pruitt, S.,2020). FEMA takes on its assigned role as well which involves designing a federal disaster management plan to protect and serve places like New Orleans which were at known severe risk of Natural Disasters. FEMA develops multiple situational plans to evacuate cities and provides advice to locals on what to do before during and after disaster strikes. The president oversees these operations but ultimately leaves the planning to director Micheal Brown whom he appointed (FEMA, 2024) (Sylves, R. T. , 2006) Ray Nagin, while not closely linked to the federal government, is involved in the betterment of the city as a whole which involves being prepared for disasters and knowing how to combat them. Governor Nagin has direct links to many of the non-human actors one of which involves race and discrimination factors in the response to the disaster. (Lemann, N.,2020). Under these circumstances, the actor network works to solidify relationships between the actors involved and allows for effective communication that not only prepares the city for, and protects the city from, disaster but allows it to heal and return in all of its glory should a disaster be so brutal to wipe it out.

Cost Factors:

An important part of scrutinizing the shortcomings within the actor network is considering the financial factors that may have influenced decision-making processes. As previously mentioned, Bush and his administration's oversight of various organizations implied significant control over their funding allocations or lack thereof. A notable issue emerged concerning the financial support provided to the Army Corps of Engineers as they attempted to devise and implement their levee and canal system. Jason Vest and Justin Rood write "The Corps of Engineers handles many of the nation's largest infrastructure projects such as draining...and preparing for and responding to natural disaster." They also note that "the Corps' construction budget for the district (New Orleans) has gone from \$147 million in fiscal 2001 to \$82 million in fiscal 2005." This decline in funding is particularly alarming given the escalating risk of flooding. The article continues to relay the message that budgetary constraints significantly contributed to the failure of the levee systems, illustrating the intricate relationship between the Bush administration, the Corps, and their interconnectedness with the levee system and existing flooding challenges in the city (Vest, J., & Rood, J., 2012). Similarly, Chris Strohm draws on former FEMA director Michael Brown's remarks saying that "his budget requests never made it past the Homeland Security Department" and that his agency did not have enough money to implement "lessons learned" from a previous project that predicted flooding in New Orleans. (Strohm, C.,2012) In other words, FEMA knew what they had to do to improve emergency responses to natural disaster, but lacked the funding to implement sufficient plans. This failure to allocate sufficient funds underscores the overarching challenge posed by the Bush administration's stance on funding projects and organizations aimed at safeguarding vulnerable

cities. This issue reverberates across both human actors and the extensive networks of non-human actors involved in disaster preparedness and response efforts.

Race and its role:

While many attribute the devastation of New Orleans during Hurricane Katrina solely to the failure of the levee and canal system amongst other factors, it is imperative to acknowledge the role of racial factors within the actor network and their contribution to the city's destruction and the upheaval of its communities. In his article titled "Survival and Death in New Orleans: An Empirical Look at the Human Impact of Katrina," Patrick Sharkey argues that race significantly exacerbated the disaster's impact, particularly in lower-class minority areas. He contends, "Although such disasters may be triggered by environmental sources, their impact is felt differentially by individuals and groups based on their position in the social structure," highlighting the intertwined relationship between natural events and societal inequalities. Sharkey further supports this argument by demonstrating that African Americans were disproportionately affected by Katrina, both in terms of fatalities and the number of individuals who remain missing (Sharkey, P.,2007). The neighborhoods most devastated by flooding were predominantly black, with the Lower Ninth Ward bearing the brunt of the catastrophe. Juliette Landphair, in her article, argues that "the Lower Ninth Ward came to represent the convergence of destructive forces on society: the hurricane itself, the geographical vulnerability of New Orleans, government neglect, and urban poverty compounded by racial polarization." (Landphair, J. ,2007). In this she intends to relay the point that multiple factors including discrimination played a significant role in the destruction of lower class minority communities. These insights underscore how racial disparities intertwined with governmental policies,

officials' actions, and geographical factors exacerbate the disaster's toll on marginalized communities.

As mentioned earlier, the challenges in preparing for and responding to the hurricane are often associated with racial discrimination among the human actors responsible for safeguarding New Orleans communities. Nonetheless, some scholars argue that the disproportionate impact was primarily driven by economic status rather than race (Masozera, M., Bailey, M., & Kerchner, C., 2007). While this perspective holds validity to some extent, it is crucial to recognize that racial factors significantly contribute to the vulnerability of minority groups, particularly in the context of natural disasters. Shirley Laska in her article says “Recurring patterns of racial and/or ethnic discrimination increase the chances that minority communities are located in hazardous areas, lack political power, and are disadvantaged at all stages of response.” (Laska, S., & Morrow, B. H., 2006) Thus, it becomes evident that race, independent of socioeconomic status, played a central role in the disproportionate devastation experienced by black and other minority communities.

Technical and Natural Actors:

In light of actor-network theory, it is imperative to delve into the various physical actors, both technical and natural, that played pivotal roles in the failed actor-network and subsequent destruction of New Orleans during Hurricane Katrina. Despite facing financial constraints, the Army Corps of Engineers was tasked with addressing the city's vulnerabilities and implementing solutions (Vest, J., & Rood, J., 2012; Strohm, C., 2012). This underscores the agency's role as a key actor within the network, navigating both financial limitations and technical challenges in their efforts to protect the city. As the primary natural actor in this scenario, it is crucial to analyze how Hurricane Katrina could cause such destruction. Despite being a category 2

hurricane, Katrina was not typical of its type. Lewis Link mentions in his article “Katrina created a record storm surge because of its unique combination of relatively high intensity and relatively large physical size.” As a result of the surge, Katrina also set record-breaking wave conditions in Lake Ponchartrain and the surrounding bodies of water that were “significantly higher” than many of the structures within the levee system. These waves were analyzed as being very energetic waves with long periods capable of powerful forces. They caused overtopping of the levee systems in multiple places along with “catastrophic breaches” that obliterated entire sections of the system. In most cases the damage was caused by waves overtopping the levees, however, there were still multiple failures that occurred before the water reached the top of the levees' high walls (Link, L. E.,2010) This is important because it demonstrates not that the walls were designed too short or for a smaller storm, but that there were significant structural and other design issues that caused the foundation of the walls to fail. Erosion and deflection of the walls allowed for hydrostatic pressure to reach the base of the wall causing the subsequent failures. Moreover, it is essential to recognize that the destruction witnessed during Hurricane Katrina was not solely attributable to technical or natural factors. Rather, it resulted from a complex interplay between human and non-human actors, whose combined actions and negligence contributed to the devastating outcomes observed in the city. Therefore, understanding the actor-network dynamics is crucial for comprehending the multifaceted nature of the disaster and its implications for future resilience efforts.

Conclusion:

In the preceding paper, I claimed that the devastation wrought by Hurricane Katrina in New Orleans cannot be attributed to a single individual or group, but rather to a multitude of social, natural, conceptual, and technical actors whose collective contributions led to failures

before, during, and after the hurricane struck. This assertion is corroborated by evidence illustrating the interconnectedness of these actors and their impact on the eventual outcomes. By comprehending the roles played by each actor-network in the disaster, we gain insights into how to prevent similar catastrophes in the future and how to reform these networks for more effective utilization in all engineering endeavors to come.

Word Count: 3846

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