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Adapting resilience to a new hazard: oil and oysters in coastal Louisiana

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ADAPTING RESILIENCE TO A NEW HAZARD: OIL AND OYSTERS IN COASTAL LOUISIANA

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Abstract

Inherently resilient practices are one mechanism that communities engage in to cope with disruptive events. A community retains and passes down the practices associated with inherent resilience in their collective memory. The inherent resilience of a community is developed over time, yet the explanation provided by Colten et al. lacks a genesis of how this process developed particularly in relation to the oil industry's entry into Louisiana. The foundations of these practices will be explored through historic court documents to find encounters between oystermen and oil spills. In addition to legal resources, I also investigate newspaper articles and other historic sources to trace legal responses and public perceptions. Through these documents, I link the responses to oil spills that occurred in the 1970s studied by Colten and others with the events that occurred in the 1930s with new economic force of the oil industry. By identifying the emergence of the inherent resilience practices, this work will reveal how social groups cope with new hazards. The initial response will help researchers further understand how cultures have adapted overtime to hazards. The processes employed at the local level in response to a hazard event are critical in understanding and developing policy to mitigate future hazards.

Introduction

Louisiana's coastal residents have endured disruptive events since the settlement of the region. Through the nineteenth century, hurricanes and river floods were the dominant hazards and local society adopted a host of practices to minimize the impact of these powerful events. During the twentieth century, the economy shifted from renewable natural resources such as timber, fish, and fur-bearing animals to the nonrenewable resource of oil. The transition to a nonrenewable resource-based economy began in the early 1900s and created a delicate balance between those workers who harvested from the surface water and those that harvested from below ground. The economic re-orientation forced residents to adopt new livelihoods, and to adapt to a new hazard – oil spills.

These adaptations are part of the larger system of socio-ecological resilience, which provide examples of inherent resilience or the practices used to cope with a storm or oil spill that are passed down from generation to generation and represent learned behaviors (Cutter et al. 2008; Colten, Hay, and Giancarlo 2012). The socio-ecological systems are dependent on the regenerative ecosystem and its ability to respond to these disruptive events (Adger 2000; Adger et. al. 2005). The ability of socio-ecological systems to be resilient in the wake of disruptive events is an especially important concept for the resource-dependent economies in coastal Louisiana. The inherent resilient practices are critical to the survival of a community, which became evident in the wake of the BP Deepwater Horizon oil spill in 2010.

Spurred by the BP Deepwater Horizon oil gusher in the Gulf of Mexico, Colten and others sought to compare inherent resilience with formal resilience (top-town procedures introduced by business and government bodies) in order to refine our understanding of how resilience works at the community level, as part of the National Institute of Environmental

Health Sciences, GC-Harms Project. Additional work is underway conducting interviews. This work will complement the current GC-Harms study by investigating the cultural roots of resilient practices. While this paper and the GC-Harms study focuses on the actual resilient practices and not surrogate measures such as income, education, and other factors.

By tracing coping mechanisms from oil spills during the 1970s and 1980s, they offer a framework for understanding the deployment of certain types of resilient practices shown in a later table on page 30. What is obvious is that inherent and formal resilience operate in different arenas, with different degrees of effectiveness, and during different stages of emergency preparations and responses. This framework drew upon the four elements of community resilience identified by Thomas Wilbanks that enable a community to rebound after a disruptive event (2008). The four elements are the ability to anticipate, to take steps to reduce vulnerability, to respond, and to recover (Wilbanks 2008).

Colten and his collaborators drew on historical documents to identify a range of practices in the 1970s and 1980s that enabled fisherfolk in coastal Louisiana to cope with some of the largest oil spills up to that time. Yet, the sizable spills of the 1970s were not the first encounters shrimpers and oystermen had with the oil industry. From the 1930s, the energy boom caused the construction of an extensive infrastructure near the coast. During the energy boom, there was little concern for the wetland environments or the potential effects that resulted from carving of the coastal wetlands for pipelines to transport petroleum (Theriot 2012).

While we may never be able to document the earliest adaptations to hurricanes, there is a wealth of historical documentation on the community response to oil spills in the 1970s. If inherent resilient practices are indeed retained in social memory and passed from generation to generation, is it possible to uncover the genesis of these practices in the face of this relatively

recent phenomenon? Who first decided not to sell tainted catch, shifted economic pursuits, fished in different waters, or filed a lawsuit? By seeking and uncovering the origins of these practices, the processes by which resilient practices are sustained between events and mobilized in the face of a disruption becomes evident. Exposing resilient practices will highlight how to enhance inherent resilience and how to merge formal and inherent resilience. Furthermore, identifying how these practices began will document community adaptation. This adaptation process could provide additional information for hazard planners and community officials to help fortify community resilience and fortify formal resilience building capabilities.

The framework of the four elements provides a consistent basis to look across time and determine how, or if, these communities modified or improved their first response to oil spills. This paper will attempt to identify the first coping mechanisms of oystermen in response to the oil industry's development in Louisiana through the trial testimony of the Doucet vs. Texas Company civil lawsuit. The identification of the initial processes will allow policy makers and resilience researchers to compare and learn how communities have or have not adapted over time. The initial responses recorded in the first court case between oystermen and a major oil company provides evidence of the genesis of the inherent resilient practices in Louisiana (Doucet vs. Texas Co. 1944).

The genesis of these practices is critical for understanding the process of building resilience and developing policies to deal with disruptive events. The ability to adapt to change signifies how much disruption a community can withstand, as well as, the ability to learn over time (Gunderson and Holling 2002; Nelson, Adger, and Brown 2007; Colten, Kates, and Laska 2008). Adaptation is also dependent on economic and ecological factors (Nelson, Adger, and Brown 2007; Colten, Kates, and Laska 2008; Enfield 2008; Wilbanks and Kates 2010; Cote and

Nightingale 2012). The economic dependence on natural resources makes the coastal residents vulnerable to disruptive events, because despite the ability to adapt a large scale event like the BP Deepwater Horizon oil release. They are tied to the land and resources for their livilihoods. The uncertainity of the large scale events is one of the reasons why identifying the genesis of inherent resilience is so important for coastal Louisiana, because these practices are part of a community regardless of the formal plan in place.

Introduction to Louisiana's Coastal Landscape

The coastal life in Louisiana contains a variety of ecosystems and communities. There are not white sand beaches, rolling hills or rocky cliffs; there are brackish marshes that hold distinctive resources. The coastal marshes represent approximately 40 percent of the marsh ecosystems that exist in the country (Davis 1990). These include oyster habitats, trapping grounds, barrier islands, natural estuary systems, shrimp habitat, family camps, and traditional ways of life, which all have been disappearing at an alarming rate, whether through land loss, pollution, oil exploration, dredging for ship channels, oil spills, hurricanes, or diversion canals (Figure 1). The decline in resources began to occur as the Europeans began to settle the area in the early 1700s and placed increased demands on local resources (Wicker 1979, 60).

The coastal area includes both the Mississippi River delta and approximately 1,000 miles of shoreline, which represents the coastal outline of the state and includes hundreds of bay and bayou areas, which differentiate it from other states (Kniffen 1968, 15; Wicker 1979, 13-14). This coastline is a direct result of the deltaic processes that have been occurring for 7,000 years, which have created the state's shoreline through subdeltas, splays, and Mississippi River crevasses (Kniffen 1968, 53-57; Wicker 1979, 18; Boyer, Harris, and Turner 1997; Gomez 2003; Finkl et al. 2006). The Army Corps of Engineers began improving existing flood protection

levees along the river in the late nineteenth century, which further altered the disrupted path of the river. Levees diverted nutrient-rich sediment and freshwater into the Gulf of Mexico instead of the floodplain and delta (Comeaux 1972; Barry 1997; McGuire 2006). The lack of freshwater became a problem for many oyster fishermen as early as the 1920s, since fresh water is a necessary component in the beginning life stages of oyster larvae (Nelson 1997; McGuire 2006; McGuire 2008).

Figure 1 Oyster Leases and Canals
Source: Louisiana Conservationist 8 (1955): 4.

The Louisiana coastal landscape created a diverse environment with a wealth of habitats and communities. This thesis will look at the interaction of the Terrebonne Parish oystermen community and the oil industry to determine how they first began interacting and responding to one another. First, the thesis will review literature that shaped both the methodical approach as well as the theoretical approach. Next, building on the legal methods section of the literature

review, a discussion of the historical research methods employed will be presented. Then, the paper will provide a historical background on the oyster industry, the oil industry, and pollution regulation in Louisiana. Lastly, an analysis of the Doucet vs. Texas Company testimony will integrate the four principles of resilience into a matrix and compare them with the more recent events (Wilbanks 2008; Colten, Hay, and Giancarlo 2012). Through this paper, the first interaction of the oystermen and oil industry in Terrebonne Parish is identified and explored through the rich legal record, which documents how the community responds to situations of perceived environmental and property damage. The legal record will show the processes and responses that were undertaken to seek redress for the damages.

Chapter 1 – Literature Review

This literature review considers publications from the last twenty years relating to the topics of hazards, resilience, adaptation, research methods using legal documents, public policy pertaining to the Louisiana's coastal resources, and Louisiana's resource-dependent society. The hazards faced by communities prompt the development of resilient coping mechanisms or adaptation, which has recently become a primary focus in coastal Louisiana due to ongoing land loss, Hurricane Katrina in 2005, and the BP Deepwater Horizon oil spill in 2010. In addition to the hazards, Louisiana's coast is particularly susceptible to disruptive events due to the economic dependence on natural resources (Davis 2001). Many of these resources are located in the coastal marsh areas and offshore, and are extremely vulnerable to hurricanes and oil spills due to the geographic location and lack of protection.

Hazards, Resilience, and Adaptation

The interaction between humans and the environment is unavoidable and has been since the evolution of humans. Frequently the interaction of humans with the physical environment results in a negative impact. The examination of hazard events has been undertaken by multiple disciplines, but geography with its desire to fully understand the physical process and the social and environmental effects of these events is well suited to study the human environment interaction (Tobin and Montz 2009, 521). Hazards represent the potential for a negative impact on what society values, while a disaster represents a catastrophic event, such as a major hurricane or oil spill (Tobin and Montz 2009, 521). This section will examine the beginnings of hazard research in geography, the recent work on hazards, and the subfields of resilience and adaption.

The study of human-environment relationships requires a multidisciplinary approach to incorporate both ecological and historical processes (Baker 1994; Turner 2002). Although, the possibility of a multi-faceted study may be challenging due to the difficulty of incorporating "environmental phenomena with cultural and socio-economic change, especially technological change," which are all central to subfields of both geography and environmental studies (Williams 1994, 3). The roots of the human-environmental relationship created a combined approach seen in the work Alexander von Humboldt, who attempted to show "nature's 'unity in diversity'" through utilizing a systematic approach to geography (Turner 2002, 56). Through this approach, Humboldt focused primarily on how order and roles of nature were the result of wide ranging occurrences, including the human impact and interaction (Olwig 1996; Turner 2002). The bulk of his work points toward the "human-environment identity as to a spatial-chronological one" (Turner 2002, 56).

In his 1923 address to the American Association of Geographers, Harlan Barrows suggested that the interactions between the physical environment and societies produce both positive and negative effects, which he explained as a cultural ecology methodology and a systems approach (Barrows 1923). In addition to there being positive and negative effects, the society or the environment also goes through a chain of modifications to respond to both the positive and negative events and interactions (Barrows 1923). The work of Barrows provided an interrelated systems approach to society and environment interactions in geographic thought and the integration of ecological principles into cultural studies and methodologies. Barrow's framework allowed subsequent researchers to situate hazards research within the intersecting realms of the physical and human geography (Tobin and Montz 1997, 8; Cutter 2001, 5; Thomalla et al. 2006).

Geography, associated with environmental science, explores the way environments and cultures interact or influence each other (Porter 1978). The field's roots in the environment resulted from physical geography, the Berkeley School, and the work of Carl Sauer, as well as the Chicago school (Williams 1994; Turner 2002). While the Chicago school was examining the social-economic responses to changes in nature, the Berkeley school was looking at the adaptive nature of both culture and societies and "how adaptions led to ecological success" (Williams 1994, 14). The Berkley method was to integrate environmental history, landscapes, and human impacts, which resulted in the subfield of cultural ecology (Williams 1994; Turner 2002).

The work of Gilbert White in the 1940s and 1950s on floodplains influenced the work of his students, which resulted in Burton and Kates' development of the natural hazards paradigm (Cutter 2001, 5). The natural hazard paradigm addressed five areas of hazard research including: "identification and mapping of the human occupation of the hazard zone, identification of the full range of human adjustments to the hazard, [the] study of how people perceive and estimate the occurrence of hazards, [a] description of the process whereby mitigation measures are adopted, including the social context within which that adoption takes place, [and the] identification of the optimal set of adjustments to hazards and their social consequences" (Cutter 2001, 5). This work led others to follow similar courses of study, which resulted in the recognition that the human dimension of hazards was impossible to ignore (Tobin and Montz 1997, 8; Moser 2005).

As a larger quantitative movement was occurring within geography and sociology, hazards researchers were beginning to attempt to quantify the risk a person or group was exposed to through chemical, biological, or physical occurrences (Starr 1969; Cutter 2001, 6; Barnes 2009). This process became the standard for the National Research Council, with a statistical

and probability-based approach, which was predominately focused on public health or ecological impacts (Cutter 2001, 8, 16). There was a slight deviation from this approach by the U.S. Environmental Protection Agency (USEPA) to a rank-ordered approach, which included a movement towards the actual potential for risk and steps undertaken to mitigate the process and approach it in a sustainable method (Cutter 2001, 7). Risk assessments have also influenced vulnerability assessments, which integrate the basic concepts of vulnerability or the level of sensitivity to an environmental hazard (Cutter 2001, 16). Geographic information systems provide a platform for assessments of biophysical and social vulnerability, since much of the work is based on storm surge maps, flood prone areas, the spatial distribution of hurricane strikes, the spatial distribution of hurricane force winds, or other biophysical hazards (Cutter 2001).

Vulnerability represents individual, community, or an ecosystem's sensitivity to potential loss from an environmental hazard (Cutter 2001; Morello-Frosch et al. 2011; Tobin and Montz 2009). The level of vulnerability can be lessened through a community's efforts to mitigate the risk, such as building levees, developing evacuation plans, requiring houses to be built above the Federal Emergency Management Agency's (FEMA) flood levels, or not allowing people to construct homes in flood zones (Tobin and Montz 1997; Cutter 2001; Tobin and Montz 2009). Vulnerability is often linked to social, political, and economic processes that do not affect everyone equally as some people or communities are more sensitive than others (Thomalla et al. 2006; Tobin and Montz 2009, 522; Morello-Frosch et al. 2011). Poverty, poor access to resources and information, and low-wage occupations generally make individuals or communities more vulnerable to hazards (Tobin and Montz 1997; Cutter 2001; Thomalla et al. 2006; Tobin and Montz 2009; Morello-Frosch et al. 2011).

Resilience examines a community's ability to rebound after a disruptive event, perpetuate functions, and restore structures while responding to change (Gunderson and Holling 2002; Nelson, Adger, and Brown 2007). Like many of the human-environment-based concepts, resilience finds its roots in ecology. This concept was originally developed by C.S. Holling as an approach to pollution and landscape ecology while combining resource management principles (Holling 1973; Nelson, Adger, and Brown 2007). The resilience approach, much like other forms of hazard study, suggests that human and ecological systems function as coupled systems, also known as socio-ecological systems (SES), which provide variables at different places in the systems that could provide management and mitigation strategies (Gunderson 2003; Gallopín 2006; Nelson, Adger, and Brown 2007; Cote and Nightingale 2012; Lloyd, Peel, and Duck 2013). Societies do not always respond to change in a resilient way, so it is necessary to consider whether their response to a change is sustainable for the ecological resources (Nelson, Adger, and Brown 2007). The ability to respond and adapt to changes is dependent on economic factors, social processes, biophysical processes, and government systems that are available to a community (Nelson, Adger, and Brown 2007; Colten, Kates, and Laska 2008; Enfield 2008; Wilbanks and Kates 2010; Cote and Nightingale 2012).

Examination of resilience and vulnerability has enabled scholars to analyze the positive and negative effects on a natural resources dependent community (Adger 2000; Enfield 2008). Understanding the resilience of an ecosystem during a disruptive event allows a social institution to cope with the changes and increase social learning by modifying their relationship with the environment based on the changes that occurred (Adger 2000; Cutter and Renwick 2004; Laska et al. 2005; Tierney and Bruneau 2007).

The ability to cope with change is central to the concept of inherent resilience, which suggests that natural resource-dependent communities have known or learned practices that they use to cope with disruptive events (Leong et al. 2007; Cutter et al. 2008; Colten, Hay, and Giancarlo 2012). The concept of inherent resilience is often overlooked, as much of the resilience work considers the broader concept while neglecting the various levels of resilience, which include governmental, private, nonprofit, communities, individual (Cutter 1993; Cutter et al. 2008; Colten, Hay, and Giancarlo 2012; Chan 2013). The various levels of resilience are important in planning and mitigating the hazardous events on both a local and national level (Tierney and Bruneau 2007; Colten, Kates, and Laska 2008; Colten, Hay, and Giancarlo 2012; Chan 2013). Colten and others outline the concept of inherent resilience, but they do not trace the development of the practices they identify. They set forth many resilient practices that occurred in the 1970s and 1980s, but does not address the period when the practice emerged in response to the oil spills that were occurring in 1930s with the introduction of the oil industry into coastal Louisiana.

In addition to inherent resilience, there is the concept of community resilience. Community resilience represents a community or region's ability "to anticipate, prepare for, respond to, and recover from significant multihazard hazard threats" (Wilbanks and Kates 2010, 723). Community resilience acknowledges that as part of a larger system there is a dependency on outside forces of government or economic sources, which can have positive effects during extreme events and the more gradual process of environmental change (Berkes, Colding, and Folke 2003; Tierney and Bruneau 2007; Wilbanks and Kates 2010; Cheong 2012). A community's ability to be resilient is dependent on the ability to adapt to change and learn from past adaptations that did or did not succeed, which sets community resilience apart from

biological resilience (Leong et al. 2007; Colten, Kates, and Laska 2008; Wilbanks and Kates 2010). The prospect of enhancing community resilience is a primary goal for many researchers, which would allow better preparedness and planning for hazard mitigation (Colten, Kates, and Laska 2008; Wilbanks and Kates 2010; Colten, Hay, and Giancarlo 2012).

There has also been an evaluation of resilience and adaptation as coupled processes used to understand social and ecological systems as well as sustainable processes and climate change. Adaptation is a long-term process or set of decisions carried out to maintain a community or ecosystem's capacity to address current or future known change (Nelson, Adger, and Brown 2007; Enfield 2008; Wilbanks and Kates 2010). The adaptation process allows societies to subsist, prosper, and preserve their quality of life, while resilience allows for flexibility during times of disruption and allows for comprehensive utilization of the system (Berkes, Colding, and Folke 2003; Folke 2006; Gallopín 2006; Smit and Wandel 2006; Nelson, Adger, and Brown 2007). The adaptive process allows for a community or society to manage resilience through their intents and the capacity of the social-ecological system accommodate the intents (Berkes, Folke, and Colding 1998; Berkes, Colding, and Folke 2003; Walker et al. 2004; Folke 2006). The adaptive process can be used to increase resilience and decrease risk, but Pielke suggests that there needs to be further research to determine if the adaption actually makes communities less vulnerable to hazards (Pielke 1998).

The work on the concepts of resilience and adaptation within geography on the Gulf Coast is in its infancy, but the current research provides a methodological framework as well as a space for future research and scholarship. A study conducted in Donana, Spain, uses historical evidence of religious ceremonies to reconstruct the community's response to environment events (Erik et al. 2012). It builds upon the concept of resilience as a capacity that evolved over time,

which in turn increases a society's ability to cope and adapt (Berkes, Folke, and Colding 1998; Berkes, Colding, and Folke 2003; Dessai, Lu, and Risbey 2005; Folke 2006; Thomalla et al. 2006; Enfield 2008; Erik et al. 2012). Drawing on the concept that resilience evolves over time provides a context for considering the first major oil spill off the Louisiana coast. Historical evidence from the Ludwig Doucet lawsuit against The Texas Company in 1933 provides a vantage point into the initial social response to an oil spill in an oyster-producing habitat. Further, court testimony documents the oystermen's response and reveals the beginning of the resilient practices in response to oil spills. Tracing the initial response provides a foundation for examining reactions to spills in the 1960s, 1970s, and 1980s as well as the modern responses to the BP Deepwater Horizon spill of 2010 (see Colten, Hay, and Giancarlo 2012).

In addition, the resilience and community adaptation literature provides a framework for classifying the responses to hazard events. Cheong examines the initial responses, early societal impacts, the compensation provided, and the conflicts that occurred after the Hebei-Spirit oil-spill in December of 2007 in Korea, which suggests the dependency on external resources and knowledge for survival as the primary motivators for the lawsuits (Cheong 2012). Her article explains that dependency on external governments, organizations, or communities is a necessary part of adaptation and the process is not possible without some form of dependency on something or a group outside of the community.

Louisiana Natural Resources and Society

Louisiana's coastal residents have used a variety of renewable and nonrenewable natural resources. Coastal brackish marshes provide habitats for finfish, oysters, shrimp, crabs and muskrat, while the freshwater lakes and bayous provide alligators, fishing, and crawfish habitats. Fishermen and trappers have exploited these resources for more than two centuries (Kniffen

1968, 9, 54-55; Padgett 1969; Nelson 1997, 22-23). Geological formations contain oil that has been tapped since the early twentieth century. Economies that are driven by natural resources, like the coastal Louisiana's, often face exhaustion of non-renewable resources, scarcity, over exploitation of renewable resources, and associated boom and bust cycles. In addition, management of these resources must contend with common property issues and changing availability of resources in a given location (Olson 1971, 197; Acheson 1987; Dyer and Leard 1994; Dietz, Ostrom, and Stern 2003; Cutter and Renwick 2004).

Human use has resulted in resource scarcity with almost all the resources common to Louisiana's coastal marshes at some point in the region's history. New settlers thought cypress was an "inexhaustible" resource (Norgress 1947, 10). In 1849, Congress passed a series of acts, which granted ownership of swamps lands to the State of Louisiana access and thereby opened the land to cypress harvesting (Norgress 1947, 10). This was not the first recognition of the value of cypress, which occurred almost as soon as settlement began in Louisiana in the 1700s (Colten 2003). The initial process of cypress harvesting was slow and often impeded by annual floods, so the rapid deforestation that would occur in the mid-1800s was not an initial concern of the Company of the Indies, which exported the harvested timbers (Norgress 1947; Colten 2003). Deforestation of the cypress swamps had occurred by the early 1900s (Norgress 1947).

A similar process of resource depletion also occurred in the oil industry. As drilling exhausted on-shore formations, the platforms and operations moved offshore. Louisiana has faced with multiple declines in production levels during the late twentieth century compared with the rest of the world (Austin 2007). The petroleum industry is no longer a sure source of employment in coastal communities, although fracking has renewed Louisiana's hope for a booming energy economy (Austin 2007).

The oyster industry almost faced a similar fate to the cypress industry, but was able to recover through farming of oysters rather than natural reproduction. The transition to agriculture and conservation approaches occurred in the lumber industry after the deforestation of the old growth forest sand the planting of new stock (Olson 1971, 2-5). The transition of the oyster industry can be rooted in the Marine Resources: Common Property Dilemmas (Cutter and Renwick 2004). The common property dilemma applies to all natural resource based economies. It developed out of Garrett Hardin's Tragedy of the Commons, which suggests that if everyone manages common resources, no one will manage the resources effectively (Hardin 1968). The oyster industry's response to a recognized shortage due to its overharvesting of naturally producing reefs and its shift to cultivation represents an adaptation and a form of resource management. Hardin's concept relates to most common resources and highlights the importance of a socially managed conservation-based approach rather than exploitation into natural resources management. This concept suggests, in terms of Louisiana's coastal resources, that regulation is needed to prevent overfishing or overuse of the resource (Olson 1971, 197; Acheson 1987; Dyer and Leard 1994; Dietz, Ostrom, and Stern 2003; Cutter and Renwick 2004). Dyer suggests that the communities that utilize the resources need to be involved in the planning process since community members commonly have diverse opinions about resource use and management (Dyer and Leard 1994; Burley et al. 2007).

The economy of Terrebonne Parish is predominately dependent on natural resource exports: including oysters, shrimp, finfish, natural gas, and crude oil. There are numerous support industries that provide additional employment, but without the exportation of natural resources, the communities would not have viable economies. The dependence on natural resources makes these communities particularly vulnerable to disruptive events that affect the

coastal area. The recent natural and manmade events have prompted an increased interest in the relationship between culture and environment of Louisiana. The increased interest in Louisiana can be partially attributed to the historical and current bonds with the landscape and the place that is coastal Louisiana, which some attribute to the water resource-based economies of coastal communities (Davis 1990; Burley et al. 2007; Burley 2010). The bond with the landscapes can contribute to the way individuals and communities respond to disruptive events and even how they choose to adapt. A vast majority of shrimpers responded to a survey that if they were unable to shrimp they would attempt to find work in another fisheries related industry (Deseran 2000). These ties to fisheries partially explain how or why individuals adapt the way they do to disruptive events.

Natural resource based economies have a both an economic and emotional connection with the land. This close relationship often creates a deep-rooted sense of place. A society that has developed reliance on local resources faces severe disruption with any interruption to the supply of those resources and often has to determine if legal recourse is the best way to recoup damages and maintain community. Despite somewhat tenuous resource supplies, Louisiana residents have remained in place. Some attribute this to a strong sense of place (Krogman 1996; Burley et al. 2004; Laska et al. 2005; Burley et al. 2007; Burley 2010). The notion of sense of place can be traced to a term introduced to geography by Yi-Fu Tuan, which was topophilia or the emotional ties that occur between people and a geographic location or landscape (1974, 4). Tuan attempted to clarify the differences between place and space, suggesting that "space" eventually through familiarity and benefit becomes "place" (Tuan and Buttimer 1976, 275; Tuan 1977, 6). Tuan's study of the feelings a population has towards "space" and "place," while assessing the various sensory mechanisms people use to observe and construe a place has been

highly influential (Tuan 1977, 6-7; see: Entrikin 1976; Pred 1984, 1983; Agnew 1987; Altman and Low 1992; Harvey 1996; Cantrill 1998; Gieryn 2000; Agnew and Smith 2002; Burley et al. 2004; Burley et al. 2007; Burley 2010). The idea of place became a central concept that can be examined to determine a group's resistance or support of an environmental or social movement that affects the landscape of a place, which a population sees an extension of themselves (Agnew 1987; Greider and Garkovich 1994; Krogman 1996).

Place attachment combines theories about place and creates a unified term, which includes topophilia, rooted environmental sentiment coupled with community identity (Tuan 1974; Altman and Low 1992, 3). The social, cultural, and psychological assessment of place attachment needs to be integrated with both the economic and political courses of study related to communities and regions (Altman and Low 1992, 183; Sack 1992). Feelings of anguish and mental stress are likely to occur if a community's ties to a specific place are challenged or disrupted through mandatory relocations, economic or social disruptions caused by an oil spill or damage due to a natural hazard (Altman and Low 1992, 260).

In addition to acknowledging that attachments to places exist, attachments at both the global and local scale need to be considered, while exploring the association of nature, meaning, and social functions as a cohesive community structure (Sack 1992). The framework developed by Altman and Low in sociology, and utilized by geographers, has been used to explain the emotional attachments coastal Louisianans' have to the land, which is slowly disappearing due to subsidence, sea level rise, and erosion (Krogman 1996; Burley et al. 2004; Laska et al. 2005; Burley et al. 2007; Burley 2010). As the land disappears, it is possible the some ecosystems will fade away as well, and this environmental transition could lead to a loss of culture and

community. Residents and researchers are mindful of this impending situation (Burley et al. 2004; Laska et al. 2005; Burley et al. 2007; Burley 2010; Lloyd, Peel, and Duck 2013).

As argued by Altman and Low, members of a society pass along their attachment to place through family ties and stories, which suggest that the ties the coastal Louisiana community and environment are taught and passed down from generations to generation. The sense of "uniqueness and fragility" to hazards have always been present on the coast and people are now engaging through research (Burley et al. 2004, 16-17). Davis focuses primarily on the sea-level rise, land loss, and settlement patterns, as well as the hazards of hurricanes the communities have faced in relation to sense of place among these coastal communities (1990).

There has been extensive documentation by environmental sociologists of the development of the oil industry and the community responses to oil industry development offshore, the socioeconomic affects, and the influences the industry has had on cultural patterns and attachment to community (Field 2013; Freudenburg and Gramling 1993a, 1994, 2002a; Gramling and Freudenburg 2006; Gramling and Hagelman 2005). Yet, little work in documenting historic oil spills or disruptive events and the resulting community response or attempts to recoup property damages. The legal response of a community can express not only its inherent resilience, but also the attachment to community and its location. The attachment is to both the natural resource-based economy of oyster harvesting, but also the social attachments to the surrounding community and family ties to the business.

Sociology's focus on human and environmental interactions is rooted in the acknowledgement that human activities have caused extensive coastal damage that has resulted in a negative effect on the people and their economic dependence on coastal resources (Catton and Dunlap 1978; Dunlap and Catton 2001; Murphy and Dunlap 2012). The discipline evolved

from simply looking at human and nature interactions to also incorporating hazards and disaster responses, beyond technological and toxic hazards, through the work of William Freudenburg and Robert Gramling (Freudenburg and Gramling 1993a, 1994, 2002; Freudenburg et al. 2008; Gramling and Freudenburg 1996, 2006; Tierney 2012). They have written prolifically about coastal Louisiana analyzing the intersection of social dimensions of natural hazards and the accessing the long-term affects of hazards on political, historical, and economic developments (Freudenburg and Gramling 1993a, 1994, 2002; Gramling and Freudenburg 1996, 2006; Freudenburg et al. 2008; Tierney 2012).

The occurrence of Hurricane Katrina prompted work on the coastal fishery communities to examine the variation in damage between Venice and Grand Isle, which found that the degree of damage directly affects a community's ability to recover despite fisherfolk and residents desire to rebuild (Ingles and McILvaine-Newsad 2007). It is also suggests that additional work needs to be done on fishing communities to provide information that can be used to improve strategies and methods for a comprehensive community recovery and not simply rebuilding (Ingles and McILvaine-Newsad 2007). The lack of literature relating to how people historically responded to the events suggests that further research is needed in these areas, as well as an attempt to link the more recent place attachment concept with the documented responses of people to oil spills of the past (see Burley et al. 2004 and 2007).

Public Policy and Litigation-based Research

Many rural and coastal communities are economically dependent on natural resources, which are susceptible to disruptions by hazard events. Resources that sustain economies may also support important historical, cultural, and ethnic practices. A reliance on renewable fisheries may be sustainable, but overfishing and hazards can have detrimental effects on a

coastal resource (Harrington 2009). By nature, fisheries are a fluid common resource, which makes them difficult to manage, but innovative approaches have included aquaculture, leasing production areas, and licensing fishermen (Wicker 1979; Harrington 2009). Coastal communities, like many that exist in Louisiana, share a mutual relationship with resources management and social organization, while recognizing that governance of the resources exists at the state level (Brewer 2012). Public policy and litigation are fundamental tools used to manage common resources. The issues of water resources, property rights, and pollution damage are central to coastal Louisiana's resource management.

Water policy represents a research subject that may not fit specifically into the traditional socioeconomic factors or the physical environments that are a focus on geographic investigation, but integration of public policy and litigation into water resource geography can add critical insights (Tobin et al. 1989). The U.S. has implemented water law at different scales across the country due to the value placed on water, the resources it contains, and its mobility (Colten 2010; Davis 2009; Matthews 1992; Tobin et al. 1989). The regulation of resources can vary among states, localities, and communities based on the level of regulation defined through common law, case law, legislation, or administrative regulation (Davis 2009; Emel and Brooks 1988). There were three distinct research approaches to the overlap of geography and law: "(1) legal-impact analysis, (2) legal-system analysis, and (3) legal research methodology for geographic issues" (Tobin et al. 1989, 130).

The legal-impact analysis examines the effects of a law both before and after its creation and the effect it has on the water resource, which enables geographers to determine if the laws are efficient and equal (Tobin et al. 1989). Olen Matthews (1992) using a legal-impact analysis identifies implications of legally mandated allocation on the Arkansas River, while concluding

that there are inevitable conflicts over any resource with multiple users. Craig Colten also addressed the issue of public policy and the impacts it had on both the economy and environment (2010). His article, as well as Kircher's article on the water navigability, also brings up the importance of knowing the basis of the legal system for the area or region a researcher is working in, as that provides the ground work for many rulings (Kirchner 2000; Colten 2010). Kirchner also acknowledges that study of water resources is inseparable from geographical methods, since the resource itself is a spatially distributed one and it naturally evokes a sense of place that a group connects to it (Kirchner 2000).

The legal-system analysis pertains to the evaluating the roles and responsibilities of agencies for governance (Tobin et al. 1989). Emel and Brooks used a legal-system analysis in an attempt to apply a hazard and risk model while focusing on the form and function to explain adjustments made in a stressed or resource scarce environment (1988). The incorporation of form and function into the model occurred through analyzing the changing regulatory environment for groundwater resources that were originally governed by common law (1988). The article compared the regulatory efforts of the states in the 1960s and 1970s with the prior common law practices (Emel and Brooks 1988). Through this analysis the authors determined that the regulations governing the resource had not changed that drastically, but in fact the population's definition of property had evolved and become more specific (Emel and Brooks 1988).

Emel and Brooks again analyze the regulatory effectiveness of community organizations, central state governance, and unmanaged private property based regulation as ways to manage groundwater effectively (1995). By conducting a thorough comparison of each regulatory form and the policies established in each state, they concluded that any level of management was

better than no regulation further, which could contribute to a tragedy of the commons (Emel and Roberts 1995). Their findings suggest that localized efforts and state run efforts provide for better resource allocation and conservation then with the unmanaged private property approach. The shift to state regulated resources is often a result of resource scarcity, which causes a shift from common law to conservation-based regulation. The main difference between localized and state efforts is the incorporation of culture and local practice that is often lost at the centralized state level (Emel and Roberts 1995).

Rosen employs both the legal-system approach when comparing the legal rulings across states, but also links the ruling to the social, political, and economic situation within and among states (Rosen 1993; Rosen 1998). The central theme faced by the judicial decisions she analyzed was reconciling a nineteenth century pollution problem that was becoming prominent with economic growth. Her article provides a specific framework for analyzing historic legal cases by employing the social, economic, and political situations normally researched within geography, while focusing on their interrelatedness to legal matters and conflicts over pollution (Rosen 1998). The article brings to light specific questions considered when looking at legal rulings based on the political affiliations of the judges or the need for employment of an area, which seem to be a necessity for an article attempting to draw conclusion based on historical events (Rosen 1998).

Rosen's later article attempts to bridge the gap between environmental history and nuisance case law history through the examination of litigation prior to the Civil War involving industrial pollution (Rosen 2003). Through this approach, she explores how people made sense of industrial pollution problems, which like in her prior article represented a society unsure of how to deal with pollution problems that had occurred after industrialization (Rosen 2003). The

deviation among rulings were so wide ranging that political or economic reasoning could not be the only influencing factor, which led Rosen to examine the cultural construction of the environment and the preexisting conceptions of normal and polluted (Rosen 2003). The examination beyond a simple concept allows her to examine how the industrial pace of America was growing faster than cultural norms and legal tenants could evolve, which meant that pollution levels could increase to an unacceptable level prior to acknowledging that a problem existed (Rosen 2003).

Rather than looking at industrial pollution in recent historic times, Georgina Enfield examines the legal record as a means to trace how three different regions in colonial Mexico responded to and adapted to climate change over time (Enfield, Tejedo, and O'Hara 2004; Enfield 2008). Her study drew upon the legal record of water resource disputes, tax records, church records, and other sources found in the National Archive in Mexico City, as well as local and privates repositories found in the individual regions (Enfield 2008; Enfield, Tejedo, and O'Hara 2004). Enfield examined the records chronologically and identified references to weather-related events such as floods and storms, general observations of seasonal change indicators such as late or early rainy seasons, and indirect documentation of changes in climate such as gains or losses in harvests (Enfield 2008). Enfield attempted to corroborate evidence found in one document with multiple documents as well as other records of climate change like archaeological and dendrochronological data (Enfield 2008). Enfield acknowledges that the records are subjective, since people facing a crisis are much more likely to record events. These conclusions suggest the importance of historical archives in framing both historic and modern climate change events as well as the ways the societies attempted to make themselves more resilient (Enfield 2008).

Lane found that judges in New Mexico during the early 1900s, as Rosen discovered in the U.S. northeast, encountered little legal precedent to follow and a lack of environmental pollution knowledge (Lane 2011). The settlement of the cases she reviewed focused on the issue of water control and resource management (Lane 2011). Lane suggests that science, meaning resources management, and law are interrelated and it is impossible to address one without addressing the implications for the other one, which echoes the previous concepts of Colten (Lane 2011; Colten 2010). This concept further builds on the work of Rutherford Platt and the relationship between the physical, cultural, and legal spheres as a factor in land-law interactions and ultimately resources management practices (Platt 1996). The environmental perception of resources managers and the social and economic expectations of these managers shape the legal policies that are created to manage a natural resource (Platt 1996), which related directly to the policies created in the Louisiana to manage the cultivation of oysters to allow the industry to remain economically viable.

An extensive literature focuses specifically on water resources while incorporating a legal perspective. Articles reviewed here emphasize the spatial aspect of water and pollution. Though these works may not discuss coastal Louisiana and its fisheries specifically, they do bring into light specific areas of legal doctrine and geographic research methods for a comprehensive examination of a legal approach to resource management. The integration of both the legal and cultural aspects of a pollution event will provide the framework for methodology to evaluate the Doucet vs. Texas Company cases that I will be evaluating. The existing literature points out that it is important to examine the cultural and legal elements together and not as independent factors. Key considerations include the acknowledgement that legal rulings have impacts on the environment; water and its resources is mobile, which make it difficult to regulate and manage;

and the political, social, and economic contexts of the decisions. These factors are necessary to provide a truly geographic perspective on a legal ruling.

Chapter 2 – Arriving at the Genesis of Inherent Resilience

The primary focus of this thesis is resilience among oystermen in the1930s. In the absence of survivors to interview or personal accounts, the research draws on historical sources to illuminate what transpired some seventy years ago. The methods used by Rosen to analyze legal records to determine a community's response to pollution, as well as Enfield's work on court records to expose local accommodations to extreme events, provide a framework for this study (Enfield 2008; Rosen 1993; Rosen 1998). Colten (2005) employed these methods to examine pollution lawsuits across the United States during the first two-thirds of the century which revealed evolution of both the legal matters as well as the cultural understanding of pollution. Court testimony and evidence, along with newspaper articles, yield rich glimpses into past actions taken by individuals impacted by early oil spills. The primary objective of this research is to identify resilient practices documented in trial testimony transcripts. This historical source offers detailed accounts of oystermen's responses to the first major oil spill in Louisiana during the October 1932 to January 1933 season. In addition to the testimony, there are also government reports and surveys, which attorneys entered as evidence. Newspaper articles about the trial are also available which will provide insight into the community and public perception of this new hazard.

To identify the genesis of the inherent resilience among oyster fishermen in coastal Louisiana, historic legal documents have been reviewed for evidence of the utilization of existing common law challenges to pollution to enable oystermen to recoup damages to oyster beds. The research methods employed by Rosen and Enfield influenced the research plan that I developed for this project. Rosen utilized the *West Digest System* and the *American Digest System* to create a complete list of court cases to base the research on.

It is also important to note that civil law provides a referable set of codes for judges and lawyers, while common law bases its decisions on precedent – or previous court decisions (Yiannopoulos 1961). Louisiana civil code recognized oyster lease holders as "owners" of property and enabled them to sue the oil companies based on common law concepts of trespass and negligence.

To identify pertinent cases, I consulted the *American Digest System, Southern Reporter, Federal Reporter,* and *West's Louisiana Digest 2d*, which cite appeals court cases, for topics related to fisheries, oil spills, oysters, and water resources to compile a list of available cases filed in Louisiana. In addition, a key word search of the online legal database Lexis-Nexis on these subjects identified any additional cases not previously recovered in the *American Digest System, Southern Reporter, Federal Reporter,* or *West's Louisiana Digest 2d* (see Table 1). The keywords were sorted by state, narrowing the set of cases to those that took place in Louisiana. The keywords utilized derived from the terminology used by the *American Digest System*, as well as the defendants listed. Each lawsuit cataloged on Lexis-Nexis has core terms identified within each case document, which enable a targeted search on a particular legal issue without knowing the plaintiffs or defendants. The Lexis-Nexis Legal database enables a researcher to search for lawsuits involving similar legal issues and lawsuits that set the legal precedent for a particular case. The Lexis-Nexis database only contains lawsuits that went to the state or federal appeals level, which was problematic because the only record of the Doucet case initially found in this national database was the appeal motion before the Supreme Court of Louisiana in 1944. There could have been additional cases filed at the parish level that are not included in Lexis-Nexis.

Table 1 Key Words Searched for in Lexis-Nexis

Chevron, Inc	Oyster
Exxon Corporation	Oyster Beds
Gulf Refining Co.	Oyster Lease
Humble Oil	Plaquemines Parish
Lafourche Parish	Pollution
Lake Barre	Quality Exploration
Lake Pelto	Shell Company
Louisiana	Signal Petroleum
Louisiana Land and Exploration Company	Superior Oil Co
Louisiana Oil and Gas Company	Terrebonne Parish
Oil	Texaco, Inc
Oil Exploration	Texas Company
Oil Spill	Trahan Drilling Company

Due to the lack of parish-level information, I conducted an index search at the Clerk of Court in Terrebonne Parish. At the clerk's office, I confined my search of the indexes to the late 1920s and early 1930s, the period when oil exploration and development was beginning in coastal Louisiana (Oil and Gas Development 1935). The index books are organized chronologically and then alphabetically by the plaintiff or defendant's name. A page-by-page search of both the plaintiff books for oil companies listed defendants and the defendant books for oil companies. For each case that identified an oil company as a defendant, the case number and date were entered into a spreadsheet, which served as an inventory for cases that I requested to be retrieved by Clerk of Court staff. After creating a comprehensive list from 1933 to 1953, the Clerk of Staff pulled the case files containing trial transcripts. I read the transcripts to determine the basis for the lawsuit. This process eliminated many of the case files unrelated to oil or oysters. There were a remaining twenty-four cases were identified that pertained to lawsuits by fishermen against oil companies, of which sixteen were combined in one lawsuit against the Texas Company under the name of the first plaintiff, Ludwig Doucet.

The Doucet case represents the first major oil pollution case in coastal Louisiana against the oil companies, following the exploration period. The case files contained complete trial testimony and the majority of the evidence is archived at the Louisiana State University Law Library. Given the wealth of information contained within the testimony, I decided to focus primarily on what was contained in the testimony and evidence list and how it could fit into the resilience matrix, see Table 2.

Table 2 Framework Example

Oil spill resilience	**Anticipate**	**Reduce Vulnerability**	**Respond**	**Recover**
Formal Resilience				
Government				
Corporate				
Inherent Resilience				
Community & Family				

Source: Colten, Hay, and Giancarlo 2012

Next, I carried out a historical analysis of the final list of court cases for similarities in motivations or complaints by the oystermen, as well as responses to the disruptive event. In addition, I reviewed court testimony for responses by the oystermen that indicate how they responded to this first major oil spill, both as a community and as individuals. Next, a categorization of inherent resilient practices documented in the testimony based on the resilience matrix. I categorized the technologies and practices previously identified in tables found on page 61 and 62 to determine which practices began as a result of the 1932-1933 oil spills. The practices that I was unsure of I based my decision to classify them as inherently resilient based on the idea that inherent actions help an individual "absorb impacts and cope with an event, as

well as post event" actions that allow adaptation and enable the oystermen to continue fishing (Cutter et al. 2008, 599). The examples of responses sorted into this matrix will determine how the practices have evolved and if there are practices among oystermen, which suggest the genesis of these practices. The utilization of this matrix will determine which practices were established because of this first major oil spill and how they have adapted overtime.

In addition to historic legal documents, I reviewed newspapers and government documents for public and governmental responses to the methods employed by the oystermen through the court cases. The survey of newspapers includes local and national level newspapers to see how widespread the responses to the court cases were. The manual review surveyed the microfilm of the *Houma Courier* and consisted of scanning for headlines related to the trial during the beginning of the trial in 1933 and the final ruling in 1944. The *Time-Picayune* is electronically available through Newsbank's online database using date ranges and key terms, such as oil spill, Ludwig Doucet, Texas Company, Lake Pelto, and Lake Barre. In addition to the trial testimony, I investigated the existence of government reports and communication by state authorities on this matter in the state archives as well as the federal archives. The Department of Conservation, the enforcement agency in the 1930s, is under the Department of Wildlife and Fisheries of present day. According to agency personnel, there are no surviving records of this trial or the oil spill. A prominent opponent of the Department of Conservation shutdown of oil operations after the spill was Lucille May Grace, whose scrapbooks archived at Hill Memorial. I reviewed this archival collection for any commentary on the trial but no pertinent correspondence remains. Nonetheless, a review of her files did provide insight into her support for the oil and gas industry. A survey to locate additional information will include Hill Memorial Library, Louisiana State Archives, Newsbank online database, and Terrebonne Parish

Library. The additional information collected will provide background and corroborate the information provided in the testimony.

Chapter 3 – The Oyster Industry

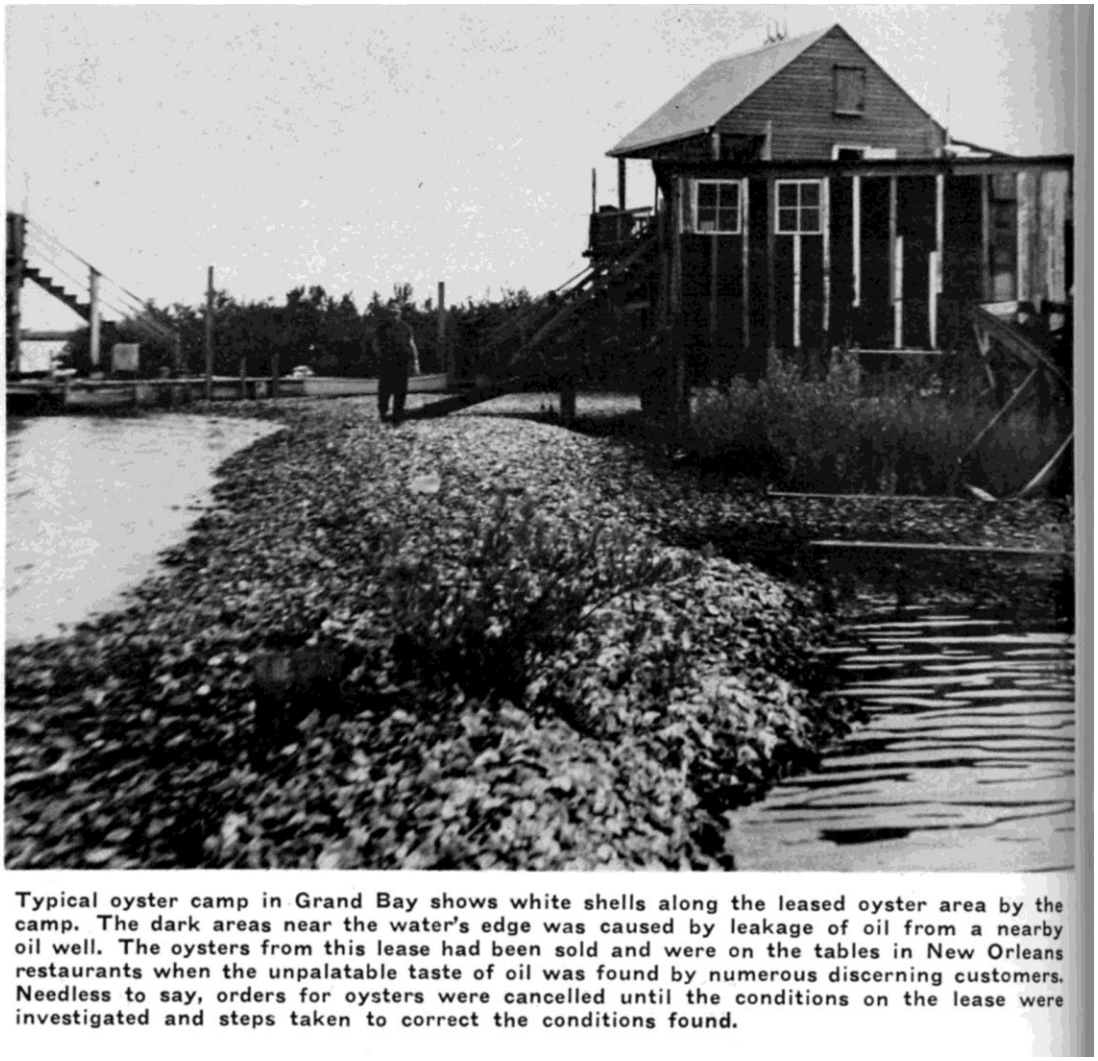
The Beginning of Industrial Oyster Production

In the early 1800s, oyster-harvesting methods relied on hard manual labor, involving either wading or using tongs from a boat to collect the oysters from their beds. Oystermen adopted gloves to protect their hands, a tool to break the clusters apart, and a container to hold the clusters while on the way back to market. The Yugoslavs have received credit for expanding the oyster industry in Louisiana as they began immigrating in the 1820s, drawing their experiences harvesting oysters in the Mediterranean Sea and knowledge of maritime navigation (Wicker 1979; Melancon 1994).

As the nineteenth century continued, the population in New Orleans grew, as did the demand for oysters, which prompted more settlers to embark on this profession and settle further down the bayou to find more oysters to harvest to bring back to the city (Wicker 1979; Melancon 1994; Davis 2012). Plantation residents and an urban market in New Orleans drove demand as oystermen refined their collection and transport techniques. Immigrants who were willing to do the hard labor provided a workforce (Wicker 1979). Many of the oystermen began working together since it was such a rigorous process, and established camps on the bayou near to the oyster harvesting areas (see Figure 2). Established fishermen made claims to the best producing oyster beds. They could lease prime areas to new comers, or force them to work less productive areas (Wicker 1979).

As the industry expanded and employed more people, public agencies established quality standards to safeguard the consuming public, which parallels other natural resource industries across the country (see Cronon 1991). Consumers also began to determine the acceptable quality

for products and set standards, even if they were within the industry and not enforced by public agencies (Cronon 1991).



Typical oyster camp in Grand Bay shows white shells along the leased oyster area by the camp. The dark areas near the water's edge was caused by leakage of oil from a nearby oil well. The oysters from this lease had been sold and were on the tables in New Orleans restaurants when the unpalatable taste of oil was found by numerous discerning customers. Needless to say, orders for oysters were cancelled until the conditions on the lease were investigated and steps taken to correct the conditions found.

Figure 2 Oyster Camp
Source: Louisiana Conservationist 8 (1955): 4.

Oystermen would regularly harvest from the beds and then store the oysters in the fresher waters closer to their camps, which enabled the oysters to plump up and bring a higher price at the market. By storing the oysters near their camps, oystermen could wait until market conditions promised a higher price as well (Wicker 1979).

By the turn of the twentieth century, demand for oysters made this activity a lucrative industry in Louisiana and prompted more intense harvesting from the naturally occurring reefs

(Wicker 1979; Melancon 1994; Davis 2012). Oysters had become one of the most economically valuable natural resources of Louisiana fisheries and they attained a higher value than their counterparts in the northeast (Watkins 1939; Davis 2012). The demand drove intensive harvests which showed little regard for the oyster's ability to reproduce and depleted the reefs and destroyed their ability to replenish the natural supply (Wicker 1979).

Demand expanded further with the advent of the steam canning process, which enabled long-distant transport of oysters to distant markets. It also contributed to more efficient harvesting of all oysters after they reached the legal harvesting size (McConnell 1934; Deseran 1997). Oysters with misshapen shells, odd size, or of lower quality, which raw shops would reject, were still marketable as canned products (McConnell 1934; Wicker 1979). The primary steam canning factories were located in Biloxi, Mississippi, which had seventeen factories for processing. The distance of these processors from the perishable marine organism posed a difficulty (McConnell 1934). Canning factories also operated in Louisiana, in Morgan City and Houma. Despite the ability to process and ship oysters long distances, the local market continued to dominate consumption (Wicker 1979). At the height of the steam canning industry, the Louisiana oyster canned in Biloxi, Mississippi was the "unit of price fixing – all because of its superior quality" for the entire nation (McConnell 1934, 34). The steam canning industry did not last much past the mid-twentieth century, which saw the demand for raw oysters expanded with refrigerated shipping and cheaper imported alternatives entered the market (Deseran 2000). Oyster buyers developed techniques to reduce travel time for oystermen. By stationing their boats at the lower end of bayous, they enabled oystermen to offload their catches without making the long voyage to New Orleans (Wicker 1979).

Legislation, Conservation, and Cultivation

In order to conserve the state's oyster resources, in 1870, the Louisiana legislature passed rules to regulate the oyster industry, which included closing the season from April to September and established penalties for harvesting during the closed season (Wicker 1979). The limited season diminished the oyster harvest and the earning of oystermen (Wicker 1979; Melancon 1994). To offset the decrease in oyster access, oyster harvesters transitioned to oyster cultivators, or farmers, which made them much more aware of the environmental influences on the oyster and how different areas within the coastal areas were better suited for the oysters are different stages of their development (Wicker 1979; Nelson 1997).

The transition to cultivation slowly evolved around the Civil War, but was not an established as normal practice until 1885. Louis Esponger, who worked east of the mouth of the Mississippi River in an area known as Whale Bay, led the transition to cultivation (Wicker 1979). The reefs and mud flats previously used as commercial harvesting areas became seed ground for planting oysters and these areas where still rich in nutrients that allowed the oysters to flourish (Wicker 1979; Nelson 1997). Seed grounds were reefs that had been depleted by commercial harvesting or shells returned to the bottoms to catch the oyster spat, or larvae that are drifting in the currents after reproduction (Moore 1898; Wicker 1979). The seed grounds were also places oystermen would bring smaller oysters from the established beds to allow them to grow without the higher salinity that occurred at the beds further out in the Gulf (Moore 1898; Wicker 1979). These seedbeds were often located in areas protected from natural hazards of hurricanes, oyster drills, and conches (Moore 1898; Wicker 1979).

In 1886, the state took additional action to regulate oyster harvesting, which is a process-taking place within most natural resource driven economies as part of an effort to conserve and manage the resource rather than drive them to depletion (Hays 1959; Cronon 1991; Cumbler

2001; Howitt 2001; Cutter and Renwick 2004). The legislature established the water bottoms as state property, which followed the precedent set by the U.S. Supreme Court decision of James W. McCready vs. Commonwealth of Virginia. By establishing water bottoms as property available for lease, the state was able to regulate and conserve the natural resources that extend to the Gulf of Mexico, which were previously unregulated and subject to overfishing (Moore 1898; Doucet v. Texas Co. et al. 1944). State legislators also limited the territory that individual oystermen could lease to three acres. State law also required oystermen had to purchase licenses and pay taxes on their boats, and imposed penalties for those who did comply with the new laws. At this time, the state assigned control of the leases to the individual parish police juries, which effectively passed ownership of water bottoms and the authority to grant leases and fishing rights to local parishes. Parishes commonly restricted access to oyster beds to residents of that parish. In 1892, state legislation attempted to prevent the entitlement to lease areas at the parish level by designating public beds that were open to all residents of the state. This legislation also increased the size of the lease from three acres to ten acres and regulated the size of a harvestable oyster. In 1892, the legislature also outlawed the harvesting of oysters by a means other than tonging, which provided equal competition for everyone, including those who could not have afforded to purchase a dredging machine (Wicker 1979).

Commercial cultivation followed the state's formal recognition in 1897 of the need to regulate and conserve this natural resource, which was the principal economic pursuit in many communities. At this time, the Louisiana government requested a formal survey of the oyster beds by the U.S. Fisheries Commission. The goal of the investigation was to obtain information about the oyster population that would assist in revising laws and regulations on the oyster industry (Smith 1899). The Commission found that many of the reefs were "showing signs of

approaching depletion to an extent that has induced some oystermen to resort to other waters" (Moore 1898, 76-77). H.F. Moore conducted the survey and suggested that state officials take steps to rebuild the population. Among his recommendations were establishing a process to return harvested shells to the reefs to increase potential areas for private leases, providing a means for permanent ownership of areas then under lease, increasing the quantity of acres a leaseholder could have (Moore 1898).

In 1902, Louisiana created an Oyster Commission, later known as the Oyster Task Force, which held the jurisdiction over all oysters and consolidated control with the state. The 1902 Act also required oystermen to have their bedding grounds surveyed/mapped and recorded by a state surveyor in order to obtain a lease. By employing conservation measures, the oyster population was able to rebound and brought success to an industry that seemed to be on its last legs prior to the turn of the century. The survey conducted by H.F. Moore in 1898 suggests both overfishing and coastal land loss were effecting the oyster beds, which made it imperative that the state begin to regulate the industry (Moore 1898). While the parishes were responsible for regulating the oyster leases from 1885 to 1902, 521 leases covering 2,820 acres were available for lease (Moore and Pope 1910, 6). By 1908 through conservation and cultivation regulations, the number of leases had increased to 1,692 encompassing an additional 22,135 acres (Moore and Pope 1910, 6). The legislation underwent further revisions during the early twentieth century but the basics remained the same and allowed the industry to continue to thrive and grow (Wicker 1979).

Commercial cultivation of oysters involved planting small seed oysters in their bedding grounds, which were either fertile mud flats or previously used beds (Wicker 1979). Oystermen would often have leases for both seed grounds and reefs for the maturing oysters. The natural reefs produced seed oysters harvested initially by means of tonging and later by dredging (Figure

3). The seed clumps of oysters were then broken into singular shells and planted in leased water bottoms by the oystermen (Dauenhaur 1930).

The seed oysters grew in the protected areas with a lower salinity, which normally took about one year to reach a size suitable for transplanting to the leased water bottoms. After the initial growth period, oystermen transferred oysters to larger bays and tidal areas where higher greater salinity enabled faster growth (Wicker 1979). As the industry grew to depend on seedbeds and cultivation, the state took a proactive role to ensure that there were adequate seed oysters available in the public grounds for both commercial and recreational oystermen (Dauenhaur 1930; Wicker 1979). In addition to supplying seed oysters, the Louisiana Department of Conservation required that oystermen return all shells harvested from Louisiana beds for commercial purposes to the water, which enabled the young spat to attach to the old shells and reuse them, see Figure 4 (Dauenhaur 1930).

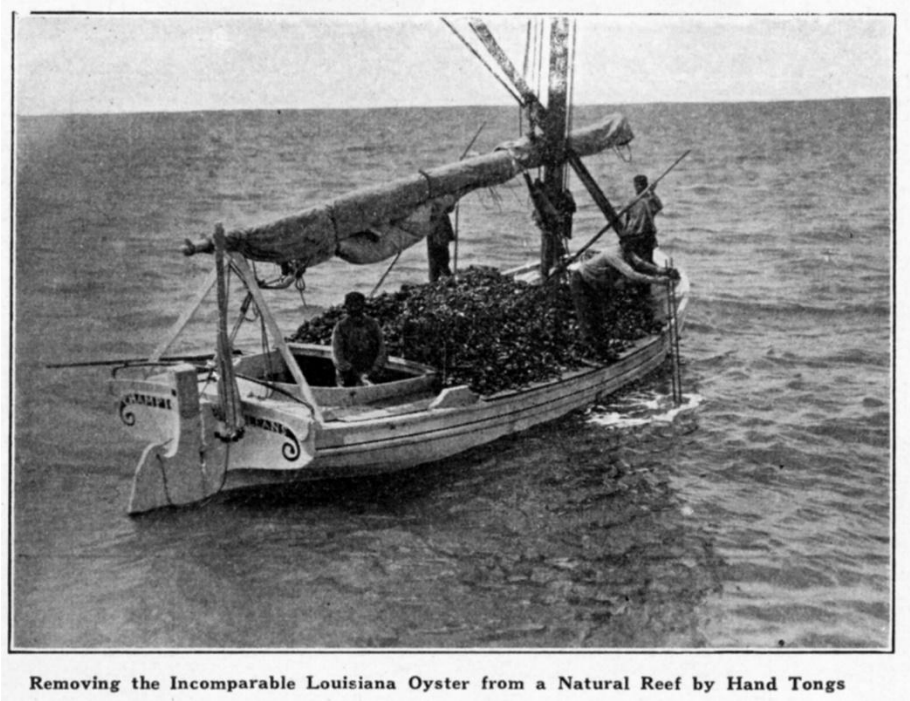


Figure 3 Oyster Lugger Tonging Oysters
Source: Louisiana Conservation Review 3 (1933): 16.

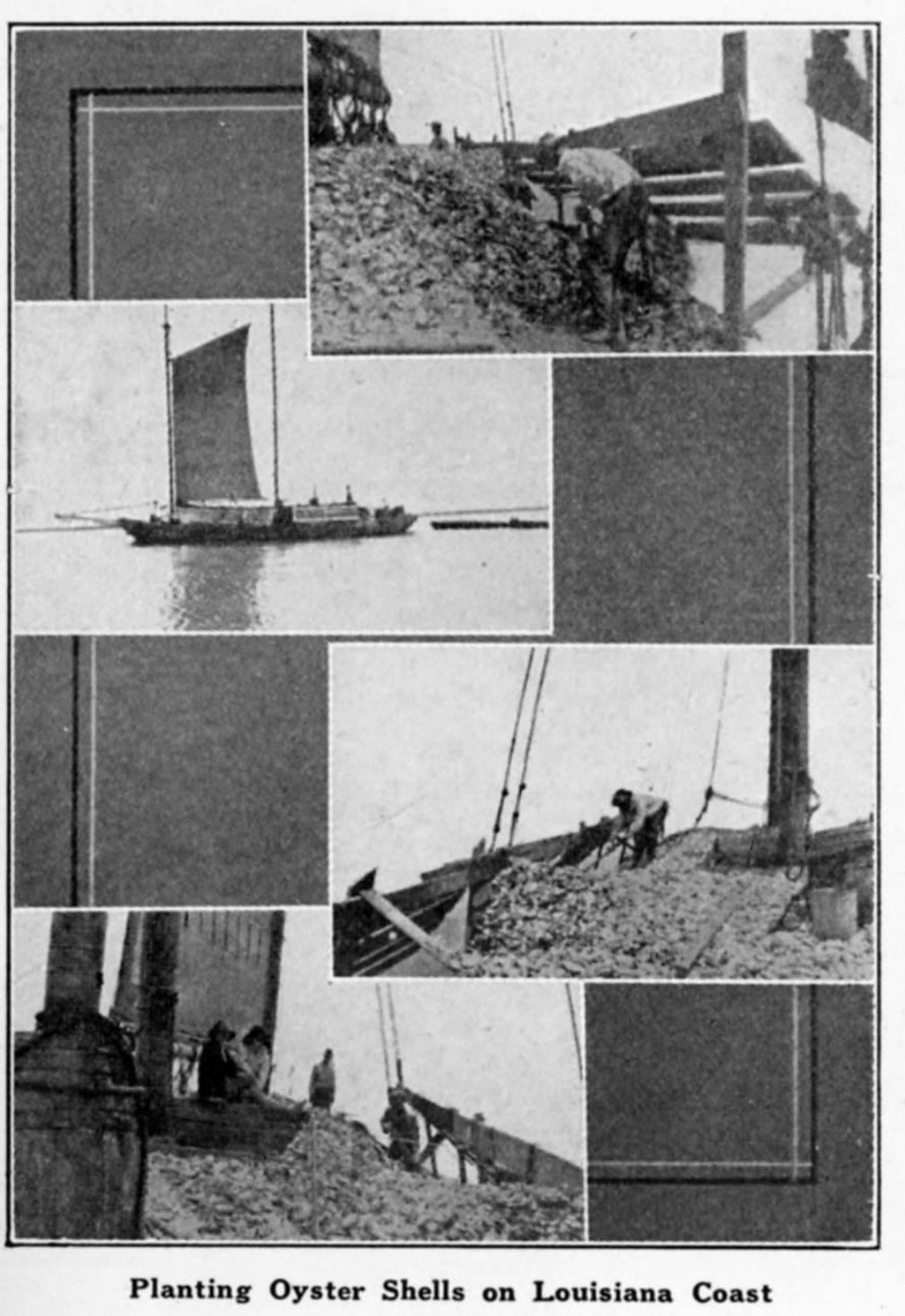


Figure 4 Planting Oyster Shells
Source: Louisiana Department of Conservation. Ninth Biennial Report of the Department of Conservation of the State of Louisiana, 1928-1929. New Orleans: Department of Conservation, 1929.

Evolution in the Twentieth Century

With both the onset of commercial cultivation and state regulation of the early twentieth century, the oyster industry began to thrive. The oyster bars of New Orleans had gained national recognition and were drawing tourists into the city (McConnell 1934). The local newspapers publicized the Louisiana oyster as a treatment for anemia, gotrie, and other ailments associated with poor nutrition and this fueled the demand for oysters (McConnell 1934; Wicker 1979). Marketing oysters beyond the local consumers also increased the demand. With growth, as in other consumer-driven commodities, operations consolidated and rose to a more commercial scale that involved oystermen leasing the maximum amount of acres, hiring lower wage workers, and creating fleets of oyster dredging boats (McConnell 1934; Tickell 1992; Wicker 1979).

The early twentieth century represented the transition and growth of the industrial economy of the nation, and reflected in technological innovations to enable long-distance shipping. The Department of Conservation reported on a new refrigeration system invented by a company in New Zealand that was used to ship oysters frozen in their shells to London. The department reported that this technology had to enter the United States markets, but noted that companies were exporting fresh in-shell oysters via transcontinental railroads to both coasts. The ability to freeze oysters in shell would have made it possible to harvest oysters in season and then sell them in the offseason when the "freshly caught oysters are of inferior quality" (Guillot 1933b, 1). With the advent of new technology, industry experts hoped to extend the season "beyond the 'R' months to every month of the year," (Guillot 1933a, 19).

In 1930, oystermen of the Atlantic and Gulf Coasts were harvesting upwards of 15 million bushels of oysters, with 6 million pounds of these being canned. The primary producer was the Chesapeake Bay area where oystermen landed just over 5 million bushels of oysters. Mississippi was harvesting 2.5 million bushels, while New Jersey and New York were producing

just under 1.5 million bushels. Louisiana trailed with just over one million bushels. In 1933, the Department of Commerce anticipated 17,000 men would be employed in the oyster industry to harvest over $12 million worth of oysters nationwide (Guillot 1933a).

Chapter 4 – The Oil Industry Arrives in Oyster Country

The oyster industry was a prominent portion of Louisiana's coastal economy by the start of the twentieth century, but there was also a powerful economic force emerging. The inland oil field at Jennings, LA marked the first big gusher in the state with many other fields to follow (Austin et al. 2004). In the beginning, the oilmen faced successful surface explorations based on topographic observations due to the belief that salt domes were synonymous with oil reserves (Austin et al. 2004). Overtime, this logic provided not to be the case, and oil explorations were handicapped by the lack of subsurface knowledge and poor drilling technology (Austin et al. 2004). In 1924, the coast saw the introduction of geophysical and seismic technology, which brought renewed interest to the coastal area and its salt domes (Austin et al. 2004).

After several decades tapping inland mineral deposits, the oil and gas industry began drilling in the coastal area in the late 1920s with the assistance of new technology. This extractive industry seemed like an economic solution for a state that lagged behind the nation in industrial development (Parsons 1950; Cobb 1993). The coastal marshlands were new territories for the oil industry. They had to develop different equipment to use in the water and on the wet marshlands, as well as new pumps and drilling equipment (Williams 1934; Posgate 1949; Davis 2012). The Texas Company built a specialty barge modeled after the offshore drilling methods in Venezuela (Williams 1934). The company was able to sink the barge to provide stability while drilling underwater, and when drilling operations were complete, the barge would refloat and move to a new location (Williams 1934). The typical well drilled in Lake Barre utilizing the submersible barge cost about $3,000 per well, which included the pilings, derrick, water and fuel tanks (Figure 5) (Williams 1934). Operators were able to complete a well within eighty-one

days, including time to setup and tear down after either an active was operational or it was a dry well (Williams 1934).

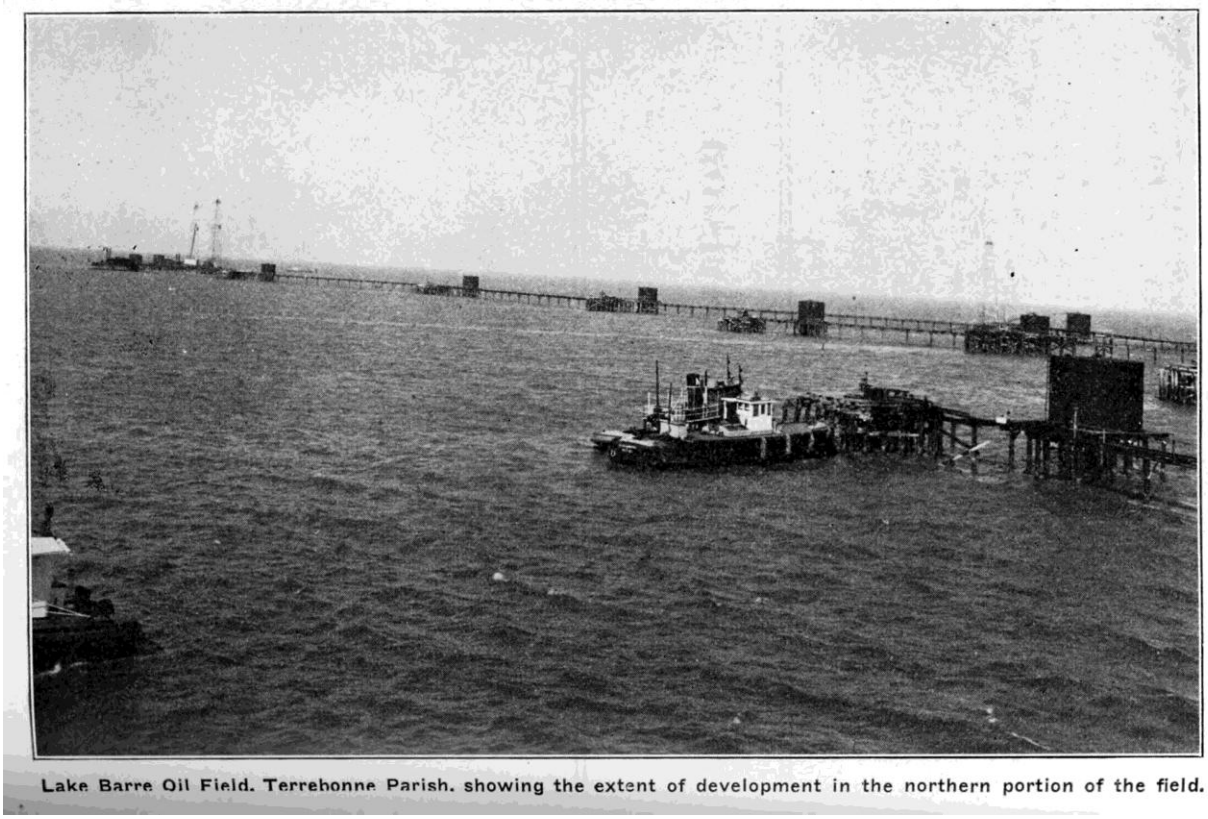


Figure 5 Lake Barre Oil Field
Source: Louisiana Department of Conservation. *Eleventh Biennial Report of the Department of Conservation of the State of Louisiana, 1932-1933*. New Orleans: Department of Conservation, 1933.

Lake Pelto and Lake Barre were the first areas to produce large quantities of oil on the coast by the end of the 1920s. In 1935, wells in Lake Barre produced upwards of 40,000 barrels of oil while drillers extracted some 30,000 barrels of oil at Lake Pelto (Oil and Gas Development 1935). The coastal marsh areas began to compete with the Spindletop salt dome in Texas in terms of production (Posgate 1949; Austin et al. 2008). The industry grabbed land to prevent poachers in the 1930s, and conducted seismic exploration of its new holdings (Austin et al. 2004; Austin et al. 2008; Davis 2012). Even the early exploration posed problems for many oystermen,

since drilling, laying pipelines, and oil spills all could disrupt oyster leases (McGuire 2006; Theriot 2012). By 1941, the Texas Company had drilled 346 wells in coastal Louisiana, and the total number of wells drilled was 2,174 (Davis 2012, 450). In Terrebonne Parish, the Texas Company drilled 172 wells prior to 1941 (Davis 2012, 455). According to Jason Theriot, there were conflicts with pipeline companies that dredged canals through oyster beds and altered salinity that damaged oyster leases. These conflicts prompted oystermen to resist the new industry (Theriot 2014).

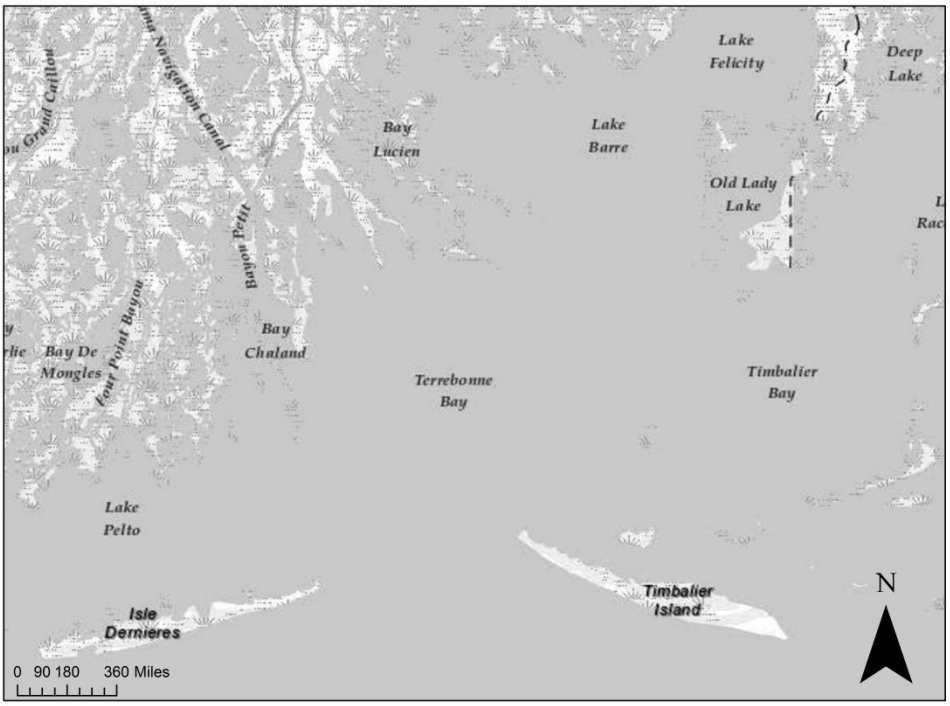
As the industry began to exhaust the onshore oil reserves, the drilling began to move offshore, which brought it under federal regulations and create a new set of hazards (Austin et al. 2002; Austin et al. 2008). By 1949, the industry was drilling wells at depths below 16,000 feet in the offshore waters (Posgate 1949). These offshore rigs needed to be connected to the onshore transportation facilities with extensive pipelines and this infrastructure presented opportunities for oil leaks as well as damage caused by hurricanes (Austin et al. 2008; Davis 2012; Theriot 2012). The technology originally utilized in the marshes slowly evolved as production moved further out on the continental shelf (Austin et al. 2008; Davis 2012).

Ultimately, effects of the oil industry stretched beyond oil spills affecting the oyster industry and contributed to coastal erosion (Davis 1983; Davis 2001). The industry began with platforms and canals' crisscrossing the coastline, with pipelines running in between, to a complex network of pipelines connected to offshore rigs. This network has proven to be detrimental to coastal lands by allowing salt water intrusion into the freshwater marshes. In addition, the diversion of sediment to the deep gulf due to the river control systems on the Mississippi River has contributed to coastal land loss (Barry 1997; Freudenburg et al. 2009). In addition to land loss, the oil industry has created a hazard for the coastal environments and

subsistence economies through oil spills. These releases have been occurring since the development of the industry through the present day with the most recent and memorable spill being the B.P. Deepwater horizon spill in 2010. This oil spill damaged the seafood industry of the Gulf in a way not seen previously, directly due to the huge quantity of oil spilled and indirectly as a result of loss of consumer demand following the media coverage. This spill prompted federal agencies to close the majority of fishing grounds and oyster beds for six months from April 2010 until November 2010 (Upton 2011).

The Meeting of Oystermen and the Oil Industry

Prior to the arrival of the oil industry, oyster farmers had seen losses in harvests due to hurricanes or high floodwaters, but never on the scale that they experienced in the early 1930s (McConnell 1934; Doucet v. Texas Co. et al. 1944). It was during this time that sixteen oystermen discovered their beds suffered devastating losses due to oil spills in Lake Pelto, Lake



Barre, and Timbalier Bay from October 1932 to January 1933 (see Figure 6).

Figure 6 Terrebonne Estuary
Adapted from: ESRI, DeLorme. 2014. ArcGIS Templates.

Soon thereafter, they filed the Doucet v. The Texas Company civil lawsuit in Terrebonne Parish (see Table 3)(Doucet v. Texas Co. et al. 1944). This event brought Louisiana natural resource harvesters into a debate, which had been going on in New England and other parts of the South since industrialization on the issue of pollution.

Table 3 Doucet v. Texas Co. et al. Plaintiffs

Plaintiff	Damages Requested	Location of Leases listed in Petition	Total Acreage listed in Petition	Settlement Amount
Andrew Curole	$5,556	Bayou Toulousse in Timbalier Bay, Lake Felicity	27	
Anecet Autin & John Pitre	$19,375	Lake Pelto, Pitre Bay	37	
Charles Guirdy & Andrew Guidry	$17,480	Timbalier Bay	13	
Cheramie Duet	$18,600	Timbalier Bay	30	
David Cheramie	$5,520	Bay Round, Racreaux Kiam Bogue	28	
Duard Eymard	$12,000	Lake Pelto	32	
Ecland Pitre & Pierre Pitre	$13,950	Bayou L'eclat, Lake Pelto	24	
Hypolite Eymard	$15,500	Lake Pelto	8	
Jockin St. Pierre	$6,000	Bay Racket, Pass Barre	57	
Levy, Alceste, Roselus and Julien Charpentier	$7,360	Timbalier Bay, Terrebonne Bay	6	
Ludiwg Doucet	$10,650	Lake Pelto, Bay East of Old Camp	23	$10,650
Olezime Duet	$11,500	Timbalier Bay	8	
Pierre Toups	$12,400	Timbalier Bay	12	
Ramo Pitre & Marshall Pitre	$29,062	Lake Pelto, Terrebonne Bay	29	
Richard Lafont	$8,205	Pass Jacko, Bayou Jacko, Bayou Latasse, Bay Mal Nomme, Bayou LaFleur	50	
Roosevelt Cheramie	$7,820	Lake Pelto	25	
Victor Rebstock	$4,500	Devil's Bay, Bay Du Diable, Bayou Panama	21	

Source: Doucet v. Texas Company, 1944, Volume II & XVII

The core question in pollution law suits was whether water was best used as a sink for industrial wastes or common resource that needed protecting for fishermen and trappers' livelihoods (Cobb 1984; McCay and Acheson 1987; Rosen 1993; Tarr 1996; Rosen 2003; Cumbler 2001; Dietz, Ostrom, and Stern 2003; Colten 2006; Brewer 2012; Davis 2012). State regulations which granted lease holders "the exclusive right to exploit the states' water bottoms" and granted them the possession of oysters within the boundaries of their leases provided the basis for their suit (see the Louisiana Oyster Statue La. R.S. 56421 for additional information; McGuire 2006).

Chapter 5 – Pollution Regulation in Louisiana

As the oil industry began exploration and extraction across Louisiana, the state Legislature faced with the problem of regulating pollution. The issue of water pollution began inland with the exploration and discovery of the Jennings field, and became an issue amongst farmers, who were dealing with oil and brine discharges into local stream and water bodies used for rice irrigation (Colten 2000). In the early 1900s, Louisiana had no formal pollution regulation process, and common-law property damage lawsuits resulting from industrial pollution appeared before Louisiana courts (Colten 2000). Local courts repeatedly awarded damages to the plaintiffs (Colten 2000). The monetary awards of these early legal actions were often small because, as one judge reasoned, if the state gave industry a chance to flourish the entire state would prosper. This same judge indicated that property damages that resulted from industrial pollution were a necessary evil that residents and other industries needed to accept in order for the state's economy to thrive (Colten 2000).

In 1910, the Louisiana legislature attempted to address industrial pollution by passing an act that prohibited oil field pollution of streams used by farmers for irrigation only during the prime irrigation months, March to September (Colten 2000). As a follow-up to its 1910 action, the legislature, in 1924, expanded the act to include year round protection from the release of oil and brine (Colten 2000). The modified act placed enforcement responsibility with the Department of Conservation and allowed a misdemeanor fine for fish kills, but left out provisions protecting agricultural interests (Colten 2000, 2006). These laws focused, as so many other attempts at pollution control, on singular issues, and lacked foresight to the future development of the industry. These laws primarily focused on land and fresh water and did not

recognize the need to protect the salt waters of the Gulf of Mexico where the oil industry was beginning exploration and development.

In 1936, the Legislature passed Act 225 to conserve oil, natural gas, and sulphur while also preventing the discharge of surface or underground waste from producing wells (Act No. 225 1936). This act took effect three years after the original investigation brought by the Department of Conservation against the Texas Company in following complaints by Terrebonne Parish oystermen. The act's primarily emphasis was the mismanagement and wasting of state mineral resources that result in pollution, but did not specifically mention oyster beds or leases (Act No. 225 1936).

In 1940, the creation of the Stream Control Commission (SCC) granted the SCC the ability to develop rules and regulations centering on fish kills and public health concerns for pollution discharged into state waters (Colten 2000). The main goal of the Commission was to develop and implement rules and regulations to prevent the damage to fish and public health issues (Colten 2000). The creation of the SCC began Louisiana's slow transition toward regulating the oil industry. Next, the legislature passed Act 203 in 1950, which created fines for polluting waters used for irrigation, but also for emitting amounts of brine, oil processing waste, blood water, or other byproducts of the production process that could cause fish kills. Despite the legislation's focus on navigable water and stream pollution, oystermen who filed suit after the legislation's passage could apply these laws as a reason for their claim of damages

Chapter 6 - The Doucet Case

The collision of oil pollution and oyster beds brought the issue of common property rights to the forefront of the issue, since the oyster leases and mineral leases often shared boundaries. The Department of Conservation was responsible for leasing oil and oyster beds. The mineral leaseholders had the rights to the minerals, while the oyster bed leaseholders had property rights to the oysters and the monetary value they generate (see Figure 7). Under common property rights, oystermen have the ability to utilize trespass, negligence, and nuisance common law provisions to address pollution damages to their beds even if there are no specific pollution laws addressing the issue ("Oil and Oysters Don't Mix: Private Remedies for Pollution Damages to Shellfish" 1970).

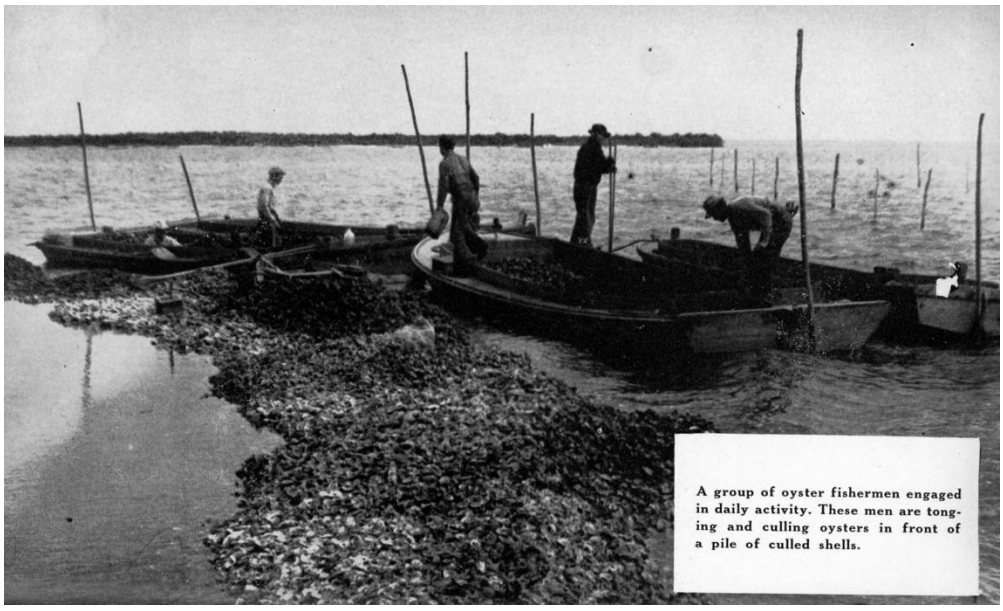


Figure 7 Oyster Harvesters
Source: Louisiana Conservation Review 7 (1937): 45.

Attorneys representing Doucet cited the damages caused by Texas Company oil pollution as negligent action because the company improperly disposed of waste, inadequately maintained the oil rigs, pipelines, and did not shut off pipelines swiftly after discovering leaks. The

improper disposal of waste had been occurring for much of 1932 and continued into January 1933. An example of this improper disposal of waste occurred while Doucet was helping a fellow fishermen. Doucet stayed the night on Lake Barre and woke up to it "full of oil as far as my eye could see" (Ludwig Doucet, Doucet v. Texas Co. et al. 1944, Volume II, 246). The company's improper disposal ceased only after the State Department of Conservation demanded that Texas Company halt drilling operations for two months due to oyster mortality in January 1933 (Doucet v. Texas Co. et al. 1944). The oystermen acknowledged that there was not a single event, but rather it was the accumulation of pollution over the year that caused the massive die off in the fall and winter of 1932 to 1933 (Doucet v. Texas Co. et al. 1944). The Department of Conservation and the National Fish and Wildlife Service began to conduct experiments on the oyster beds and surrounding waters and concluded that pollution adversely affected the oysters (Doucet v. Texas Co. et al. 1944, see Gowanloch 1933).

In the course of the legal proceedings, sixteen oystermen requested $144,830 in damages. The basis for this amount was fair market value of oysters and the quantities they estimated losing in the 1932-1933 season. Texas Company challenged the validity of the value, and the oystermen faced difficulty verifying their estimates since many did not keep formal books. Ludwig Doucet testified during trial that he did not file taxes or keep financial records because he had very little reading and writing skills, and most of the trial testimony was in French and translated into English (Doucet v. Texas Co. et al. 1944, Volume III, 66).

Ludwig Doucet was the only one of the plaintiffs to appeal the lower court's decision to the federal level. His persistence paid off with a judgment of $10,650 in February 1944. The total included interest from the date of the petition until the judge's decision (Doucet v. Texas Co. et al. 1944).

Ludwig Doucet was an oysterman who had worked/leased oyster beds in Lake Pelto since 1925. Before obtaining his own leases, Doucet learned the trade in the employ of other oystermen. In early November of 1932 he discovered his oyster beds in poor condition after the "winds started to blow from the north and northeast…and they [the oysters] started dying" (Doucet v. Texas Co. et al. 1944, Volume II, 185). After harvesting, he brought the oysters to his normal buyer, Charles Boudreax, who refused to buy them because they were dying. The buyer testified that his refusal to buy the oysters distressed Doucet and that he cried. Doucet next attempted to sell them to a packinghouse, which did not require high quality oysters, but they also refused to buy them. By January of 1933, Doucet's beds did not have any marketable oysters. After the damages to his beds, Doucet abandoned the leases in Lake Pelto and bought leases in Plaquemine and Jefferson parishes (Doucet v. Texas Co. et al. 1944, Volume II, 195).

Other oystermen were also discovering oysters in their leases either dead or damaged to the extent that they were unmarketable. As the oystermen realized that the oil was the problem, they contacted the Louisiana Department of Conservation to investigate the pollution. The preliminary inquiry led the agency to shut down the oil wells and conduct an in-depth study through the assistance of the federal government (Doucet v. Texas Co. et al. 1944). In January 1933, the Commissioner of the Department of Conservation ordered the shutdown of all the Texas companies' wells under the Pollution Act of the Department of Conservation, which allows them to close any sources of pollution into any stream (Doucet v. Texas Co. et al. 1944, Volume III, 114). The defense questioned whether the bayous and coastal Gulf waters could be classified as streams, which reflects the larger debate of pollution of waterways and the definitions associated with terms used written in these laws (Doucet v. Texas Co. et al. 1944, Volume II, 115). The Department of Conservation "believed that…[the oil pollution]…was so

suspicious that something had to be done to stop putting oil on those waters even if the wells had to be closed" (James N. McConnell, Doucet v. Texas Co. et al. 1944, Volume III, 114). The state's studies did not improve conditions in the bays, and there were no specific pollution regulations or protocols to compel the Texas Company eliminate its pollution. The Louisiana Board of Health also got involved by issuing letters to oyster buyers telling them to refuse to buy oysters from beds within 10 miles of oil wells (Doucet v. Texas Co. et al. 1944, Volume IV, 167).

Responses and Resilient Practices Employed

The responses by the oystermen to the pollution and destruction of their oyster beds appear be the adaptation of practices previously utilized during hurricanes or large fresh water influxes (see Table 4). These practices represent the ability of the communities to respond and adapt to changing disruptive events, while still maintaining their livelihoods. The pollution caused some oystermen to leave the business. Cheramie Duet, for example, had been in in the oyster industry for thirty years. Cheramie decided to abandon his beds since "there was no future to remain there working, because of the oil that was always going to be coming on them" (Doucet v. Texas Co. et al. 1944, Volume IV, 44, Cheramie Duet).

Other oystermen switched occupations. Constant Henry, who had been an oyster buyer, but shifted to buying and marketing shrimp after the poor oyster crop in 1932 (Doucet v. Texas Co. et al. 1944, Volume V, 179, Constant Henry). Onezime Hebert, laid off by Cheramie Duet, turned to trapping and shrimping (Doucet v. Texas Co. et al. 1944, Volume V, 89, Onezime Hebert). Hubert Lafont also pursued to shrimping in order to support himself (Doucet v. Texas Co. et al. 1944, Volume V, 24, Hubert Lafont). Still another strategy among oystermen was to

try to salvage the oysters that remained and move them into other portions of Terrebonne estuary free of oil pollution (Doucet v. Texas Co. et al. 1944).

Table 4 1930s – Oil Spill Resilience

1930s – oil spill resilience	Anticipate	Reduce Vulnerability	Respond	Recover
Formal Resilience				
Government	Legislature thought the mineral lease holders would conduct drilling operations in a responsible manner		Board of Health issued letter to buyers to refuse oysters from beds within 10 miles of oil well	Allowed the oysters on the beds to be property of oystermen so eligible for damages and negligence lawsuits
			Department of Conservation contacts federal government for assistance in the investigation	Post-spill pollution control legislation
			Close beds for 2 months	
			Conducted in-depth study that found oil damaged oysters	
Inherent Resilience				
Community & Family			Attempt to sell to oyster buyers that take lower quality oysters	Sell boat because the beds were destroyed
			Contact the Department of Conservation for investigation	Ludwig Doucet appealed and received the original claim of $10,650 in 1944
			Economic flexibility - work with other oystermen, change to trapping, change to shrimping	
			Sued the Texas Company for $144,830 in damages based on negligence and trespassing (not a statue designed for oyster beds)	
			Attempt to move oysters to locations not affected by oil pollution	

Source: Doucet 1944

The Relation of the 1930s Resilient Practices to the 1970s

The responses taken by the oystermen set the framework for later responses to oil spills and the incident exposed a need to regulate the new industry. A Department of Conservation representative testified the agency believed that mineral leaseholders would conduct drilling operations in a responsible manner (Doucet v. Texas Co. et al. 1944). The pollution that resulted undermined their faith in the industry, and prompted the legislature and oil industry to begin to anticipate an event or acknowledge that similar events were possible. Preparation for future events by government and industry represent examples of formal resilience. The formal practices included developing contingency plans, safety inspections, and improved drilling technology (see tables on pages 57 and 59). The Doucet case testimony did not provide any examples of anticipation of an event by the government, industry, or the community.

The Response Elements

In the 1930s, coastal residents including oystermen pursued different economic activities based on the seasonal availability of natural resources economically (Comeaux 1972). When the oystermen began to lose income due to the damaged oysters, they were able to switch to other occupations that they would normally pursue outside the regular oyster season (Table 5) (Doucet v. Texas Co. et al. 1944). Relying on fmultiple income sources, is not be limited to oystermen, and was already a common practice that provided inherent resilience in Louisiana's coastal region and in many and rural settlements. The resilient practices deployed in the 1930s specifically in the response and recover stages of responding to a disruption, were already established seasonal adjustments to seasonal availability to natural resources.

In the absence of adequate formal anticipation, the formal response phase during the September 1932 to January 1933 season was not as robustly developed as in later years. The

state and federal officials had not dealt with a large-scale oyster die off due to an oil release and did not have plans for dealing with them. The state did not have dedicated personnel or funds to carry out a biological study to assess the damage (Table 5) (Doucet v. Texas Co. et al. 1944; Mackin and Hopkins 1961). This lack of preparedness that was exposed during subsequent spills led the states, as well as corporations, to develop contingency plans and specific equipment to deal or prevent future spills (Colten, Hay, and Giancarlo 2012).

Table 5 Pre-1972 Oil Spill Resilience

Pre-1972 Oil Spill Resilience	Anticipation	Reduced Vulnerability	Response	Recovery
Formal Resilience				
Government	safety inspections		biological analysis	postspill legislation
			close fields	legal inquiry
			dispatch officials to observe	
Corporate	organization with response capabilities	containment devices	control fire and leak	petition government to reopen leasing
	oil spill drill		surface skimming	
	"chokes" (blowout preventers)		burning, dispersant, booms	
Inherent Resilience				
Community & Family			buyers refuse oysters from contaminated areas	law suits
			fish elsewhere	regulate harvest
			personal economic diversification	local funds for restoring oyster beds
			family aid	family aid
				file for unemployment

Source: Colten et al. 2012

Community and family support is an important coping mechanism and for individuals in areas like coastal Louisiana that have a strong sense of place (Burley 2010). The community networks allow for the economic flexibility as well as direct family aid and monetary support, which was not document by testimony in the Doucet (Doucet v. Texas Co. et al. 1944; Colten, Hay, and Giancarlo 2012). Although there was not direct monetary support from family members reported in the Doucet case, Doucet did hire other oystermen to work for him when their beds were damaged, which can be attributed to the sense of community that exists in coastal Louisiana (Doucet v. Texas Co. et al. 1944, Volume 5, 27). The response element of inherent resilience before 1972 included buyers refusing to purchase contaminated oysters, moving their fishing locations, and switching to another occupation while the waters were contaminated (Tables 6)(Colten, Hay, and Giancarlo 2012).

The Recovery Elements

The recovery elements of inherent resilience that existed before 1972 included lawsuits, regulations of the harvests, local investment in restoring oyster beds, utilizing the unemployment system, and receiving family aid (Colten, Hay, and Giancarlo 2012). The passage of the federal Clean Water Act of 1972 required the corporations develop oil spill contingency plans and contain response efforts from the local, state, regional, and federal level to create a coordinated process to respond to oil spill occurrences (Colten, Hay, and Giancarlo 2012). The post-1972 inherent resilience response elements were similar to the pre-1972 (Colten, Hay, and Giancarlo 2012). The post-1972 recovery methods were limited to lawsuits and compensation through the unemployment system that were documented in the historical sources (Colten, Hay, and Giancarlo 2012).

Table 6 Post-1972 Oil Spill Resilience

Post-1972 Oil Spill Resilience	Anticipation	Reduced Vulnerability	Response	Recovery
Formal Resilience				
Government	contingency plans	close fisheries	biological analysis	post-spill legislation
			alternative employment programs	NRDA (hold responsible parties liable for costs)
			oversight of response	compensation programs
Corporate	organization with response capabilities	containment devices	surface skimming	beach clean up
	blowout preventers		burning, dispersant, booms	
Inherent Resilience				
Community & Family			family aid	unemployment compensation
			fish elsewhere	lawsuits
			personal economic diversification	
			move up the bayou	

Source: Colten et al. 2012

Recent oil spill recovery practices followed a similar pattern to the 1930s events. The Doucet case and the ensuing government recognition that there was improper waste disposal prompted the legislature to pass Act 225 in 1936 to address pollution of waterways. The Act conserved oil, natural gas, and sulphur while also seeking to prevent or prohibiting the discharge of surface or underground waste from producing wells. Legislative responses followed spills that are more recent and reflect a reactive governmental approach. Over time legislation has included more extensive preparation and compensation procedures (Colten, Hay, and Giancarlo 2012; Doucet v. Texas Co et al. 1944).

The Doucet case represents the first case taken before the courts of Louisiana to seek compensation for property damage to oyster beds. In that case, the court faced the difficult challenge of determining which litigant's legal rights took precedence. Oil companies had legal title to mineral rights beneath the surface, while oystermen effectively had property rights tied to their leases. Attorneys in the 1930s and in the 1970s and 1980s utilized common law to recover the damages. Common-law practices of trespass and negligence claims were more likely to provide favorable results for the oystermen, rather than riparian rights ("Oil and Oysters Don't Mix: Private Remedies for Pollution Damages to Shellfish" 1970). Decades after Doucet, oystermen still employed common-law practices, despite having oil spill specific legal policies or contingency plans (Colten, Hay, and Giancarlo 2012; Doucet v. Texas Co. et al. 1944). This suggests that legal policies in both time periods time were not sufficiently developed to address the needs that would arise with oil spills and do not take into the account the needs of the local community, since policies are often created in a top-down fashion, rather than community level up. This lack of explicit regulations forced the oystermen to use common-law concepts of negligence and trespassing to recoup damages not protected by a state or federal law.

Responses to the Lawsuits

In the period following the Doucet case until 1953, there were eighty-six cases filed in parish courts, and sixty-five resulted in settlements, while lacking the lengthy appeal process the Doucet case went through (Table 7) (Mackin and Hopkins 1961). These lawsuits were discovered during the initial research trip to the parish Clerk of Court records. The only case that went to federal appeals court is the Doucet case (Doucet vs. Texas Co. 1944).

In response to this case, as well as the later cases below, distributed across the coastal parishes, the oil industry implemented a study by the Department of Oceanography and

Meteorology at A & M College of Texas in 1952. The study funded by the Texas A & M Research Foundation, sponsored by Texaco Incorporated (previously the Texas Company), Humble Oil and Refining Company, The California Company, Gulf Refining Company, Phillips Petroleum Company and Shell Oil Company (Mackin and Hopkins 1961).

Table 7 Total Lawsuits Inventoried

Year	Parish	Number of Suits	Amount Requested	Settlement Amount
1933	Terrebonne	12	$170,567	$10,650
1934	Terrebonne	4	$20,925	0
1943	Terrebonne	1	$12,799	0
1947	Terrebonne	5	$1,328,692	$10,119
1948	Terrebonne	1	$9,500	0
1949	Terrebonne	1	$412,500	0
1941	Plaquemines	2	$29,000	0
1947	Plaquemines	39	$14,168,075	$11,0671
1948	Plaquemines	3	$246,824	$2,255
1947	LaFourche	16	$6,201,379	$54,635
1948	LaFourche	1	$24,422	223
1953	LaFourche	1	$16,000	0

This study specifically attempted to recreate the experiments originally carried out as part of the Doucet case, but failed to duplicate the study results (Mackin and Hopkins 1961). The study also specifically looked at the area of Lake Barre, which had the largest oilfield in the area and received the largest volume of wastewater (Mackin and Hopkins 1961). The scientists determined wastewater discharged from the oil field was only lethal to oysters for a distance of approximately 50 to 75 feet from the discharge location (Mackin and Hopkins 1961). The study also concluded that the oil operations were not the cause of high oyster mortality, but were the result of higher than normal temperatures and salinity levels in the waters (Mackin and Hopkins 1961).

In addition to the privately funded study, the Humble Oil Company published articles in its magazine for stock holders and employees explaining that oil did not cause mortality in oysters ("Oysters and Oil (Part II)" 1956; "Scientists Stalk Oyster Killers" 1956). The articles and the study present the issue of increased oyster mortality as a normal situation faced by oystermen and that multiple factors, in addition to oil field wastes, can contribute to poor harvests. This added nuance to the unexplained oyster kills and undermined the testimony presented in the Doucet case ("Oysters and Oil (Part II)" 1956; "Scientists Stalk Oyster Killers" 1956; Mackin and Hopkins 1961). The articles also point out that the Louisiana Department of Conservation did not ask for a scientific study in its response to the 1930s oyster kill, but this is contrary to the court room testimony presented at the time of the initial trial ("Oysters and Oil (Part II)" 1956; "Scientists Stalk Oyster Killers" 1956).

The articles state that lawsuits against oil companies began to accumulate as companies became the “scapegoat” for losses that the oystermen were experiencing ("Oysters and Oil (Part II)" 1956, 10). While claiming that the oil companies had become a “scapegoat,” the articles blame the damages to a bacteria that can cause mortality in adult oysters, as well as the lack of fresh water from the Mississippi River ("Oysters and Oil (Part II)" 1956, 10). The articles written for company personnel and stockholders understandably take a position sympathetic to the company and its effects on the coastal landscape and ecology. The articles also conclude that Humble had done the oystermen a favor by providing them with the information about the bacteria as well as providing them with methods to mitigate the effects of the bacteria ("Oysters and Oil (Part II)" 1956).

Chapter 7 - Conclusion

Inherent resilience is important factor in a community's ability to respond to and recover from a disruptive event response. Its significance lies within communities and individuals. Governments and corporations tend to rely on more formal resilient practices that focus on anticipating and mitigating disruption. The value of distinguishing between these two types of resilience is that seldom does the more substantially funded formal resilience mesh with/interact with on the pre-existing inherent resilience. These two types of resilience are one of many links to the environment and a component in the larger socio-ecological system that allows a community to sustain itself. The link to the larger system is important because these two systems are dependent on each other and if the social system is not able to respond and recover the ecology of the area could be changed. The natural resource dependent communities in coastal Louisiana have a stake in the ecology of the area, as well as the attachment to the coastal region.

The responses by oystermen in Louisiana from 1930 through recent events indicate that the inherent responses by oystermen are a part of the system to conserve the oyster beds, perpetuate the resource, and continue their way of life. The Doucet case represents the initial discovery of oil field damage to oysters and the genesis of practices that sought to help oystermen cope with this type of disruption. The responses were adapted from the methods used to cope with hurricanes and freshwater floods, which had been the primary hazard prior to oil spills. The identification of the processes was possible through historical legal research and rich testimony provided by the Doucet case.

Through learning how the oyster community adapted to the oil industry, this enables scholars to learn how a community responds when the formal pollution regulations are not

available and when both parties have property rights to a specific area. The Louisiana Oyster Statue enabled the oystermen to seek monetary damages, which prompted the Doucet case and later suits. In an attempt to deny the monetary damages, the oil companies funded a study by Texas A&M researchers to prove oil did not damage oysters, but this attempt did not stop oystermen from claiming monetary damages to their property. A legal response to the damages of oil occurred in both the 1970s spills and the BP Deepwater Horizon spill. Utilizing the legal system shows the oystermen's ingenuity and perseverance, as well as a determination to stay and continue working the land and its resources.

The legal conflicts over property rights of state regulated resources brings into question management of common resources and how each lease holder has the right to a harvest without disruption from a third party. The right to the resource is central to this case because both parties had state issued leases, but one was operating under negligent circumstances. The negligence of the Texas Company was not something the state perceived as an effect of granting both mineral and oyster leases within the same bayou, lakes and bays. The oyster leases and mineral leases were issued under the assumption that the two could operate independently within the same areas, but made apparent that a third party responsible for trespassing or negligence would be considered liable (see Oyster Statue La. R.S. 56:421).

The wealth of information provided in the Doucet case file points toward future research directions and opportunities. The ethnographic work underway will triangulate these historical practices with current activities. Identification of ancestors of the original sixteen oystermen and carrying out interviews with them could add another dimension to our understanding of their actions. Review of transcripts and case files from litigation filed in the 1950s would enable tracking practices forward during the oil boom. Additional resources on file with the Louisiana

Department of Environmental Quality could possibly reveal additional acts of resistance to the intrusion of oil field activities in the coastal wetlands.

Prior to the development of the coastal oil fields, the primary hazard was hurricanes, which the coastal population had adapted to and coped with. The oil industry brought a new type of disruptive event that oystermen had to learn to respond and anticipate. The responses to the 1930s suggest that the recovery practices are seldom sufficient to protect against future events. Legislators, regulators, and corporations realized this inadequacy and made adjustments in their formal practices, but did not include procedures to intersect with inherent resilient practices.

The similarity of community responses and corporate and government preparations between the 1930s and the 1980s illustrates the absence of integration between inherent and formal practices and suggests that more community resilience could be strengthened through integration of the two. Blending inherent with formal resilient practices would allow for improvement of the mitigation and planning efforts amongst state and local officials, while also recognizing the needs of the local communities in response and recovery. The ability to identify how people previously coped with disruptive events enables better planning for all hazards and can be used to develop for the appropriate structure and policies to mitigate disastrous effects of future events. These inherent practices shape how communities respond and anticipate disruptive events, as well as their relationship with the natural resources.

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Vita

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