

REGIONAL ECONOMIC RESILIENCE & THE DEEPWATER HORIZON OIL SPILL: THE CASE OF NEW ORLEANS' TOURISM AND FISHING CLUSTERS

RESILIÊNCIA ECONÓMICA REGIONAL E O DERRAME DE PETRÓLEO DA DEEPWATER HORIZON: O CASO DOS CLUSTERS DO TURISMO E DAS PESCAS EM NOVA ORLEÃES

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ABSTRACT

The Deepwater Horizon oil spill dumped almost 5 million barrels of oil into the Gulf of Mexico over a three month period in 2010. This event had a significant economic impact (which compounded the recession effect) on the surrounding regions particularly those with a large marine industry presence. This paper seeks to address the issues that have arisen over the past year as a result of the oil spill, focusing on the capacity of the regional economy to respond to the exogenous shocks of mass pollution and global recession while highlighting any economic recovery efforts as well as any tensions created. To represent both the region and the industry, the coastal tourism and fishing clusters in Southern Louisiana will be used as case studies. Through the analysis of socioeconomic data and secondary source material, including historic economic recovery accounts in the region post-Hurricane Katrina, these issues will be assessed. Recommendations will be made regarding the recovery process which will take into account US government policy.

Keywords: Resilience; Maritime Cluster; Deepwater Horizon; Path Dependence.

RESUMO

O acidente da Deepwater Horizon originou que quase 5 milhões de barris de petróleo fossem derramados no Golfo do México ao longo de um período de três meses em 2010. Este evento teve um impacto económico significativo (e que agravou os efeitos da recessão) nas regiões em torno desta área, em particular aquelas com uma grande presença de indústria marítima. Este artigo procura abordar as questões que surgiram durante o ano passado como resultado deste derrame, focando a capacidade da economia regional para responder aos choques exógenos de poluição em massa e de recessão mundial ao destacar os esforços de recuperação económica, bem como as tensões criadas. Para representar tanto a região como a indústria, os clusters de pesca e do turismo costeiro no sul da Louisiana são utilizados como estudos de caso. Através da análise de dados socioeconómicos e material de fontes secundárias, como o historial de contas económicas na recuperação da região no pós-furacão Katrina, estas questões são avaliadas. Serão ainda efetuadas recomendações sobre o processo de recuperação tendo em conta a política do governo dos EUA.

Palavras-chave: Resiliência; Cluster Marítimo; Deepwater Horizon; Dependência de Trajetória.

JEL Classification: O18

1. INTRODUCTION

From 2005 until July 2011, the New Orleans region experienced several natural disasters and a mass pollution event that have had economic, social and emotional affects on the region and its communities. This paper will focus on the 'mass pollution event' when the Deepwater Horizon (DH) Oil spill, that started on April 20, 2010 when an oil rig in the Gulf of Mexico exploded killing eleven, dumped almost 5 million barrels of oil (200 gallons) into the surrounding ocean over a three month period (IEM, 2010, NC 2011, Upton, 2011). The rig and oil well were owned by British Petroleum (BP). Despite the short term nature of this spill, this event is expected to have economic repercussions in the region for the next decade (NC, 2011). In focusing on this event, the capacity of the region to recover economically will be assessed using examples from the region's previous recovery, specifically post-Hurricane Katrina. This section will highlight the economic attributes of the region both before and after the event, particularly in relation to the regions' fishing and coastal tourism clusters, due to their socioeconomic status within the region, and the impact this event had on their business performance.

The clusters in the New Orleans region have previously endured catastrophic events, largely related to extreme weather. In 2005, Hurricane Katrina hit this region and in the aftermath, resilience experts focused on the ability of the city to recover largely through the utilizing social capital to create community networks (Campanella, 2006). There were concerns at that time with the large displacement of New Orleans natives that the city would not recover. This concern was further exacerbated by the lack of regionalism as there was a disconnect between the city and its suburbs due to competition for regional funding (Lang & Danielsen, 2006). While this type of community resilience will not be addressed in this article, it is important to note that Hurricane Katrina may have lowered the regional resistance to external shocks¹ in its economic impact but it also prepared the local governments and the communities for future events such as the DH oil spill and the global recession. Furthermore, although dealing with a post-disaster region, this case study makes a significant contribution to the literature in the region's ability to recover economically and how that recovery will occur. Will the clusters innovate into a new field, return to their historic role or completely change paths?

Clusters²

The state of Louisiana relies on a diverse range of clusters that provide employment opportunities, regional economic support and the potential for innovation (Porter, 2011). While many of these clusters are located in science parks throughout the state, the fishing and tourism clusters are located in close proximity to one another, sometimes overlapping in terms of space, engaging in knowledge spillover activity and were directly affected by the oil spill due to their joint use of the Gulf of Mexico and the surrounding coastal areas. The fishing cluster greatly relies on shellfish such as shrimp (most lucrative), crab, oysters, and menhaden as well as commercial fishing and other parts of the supply chain

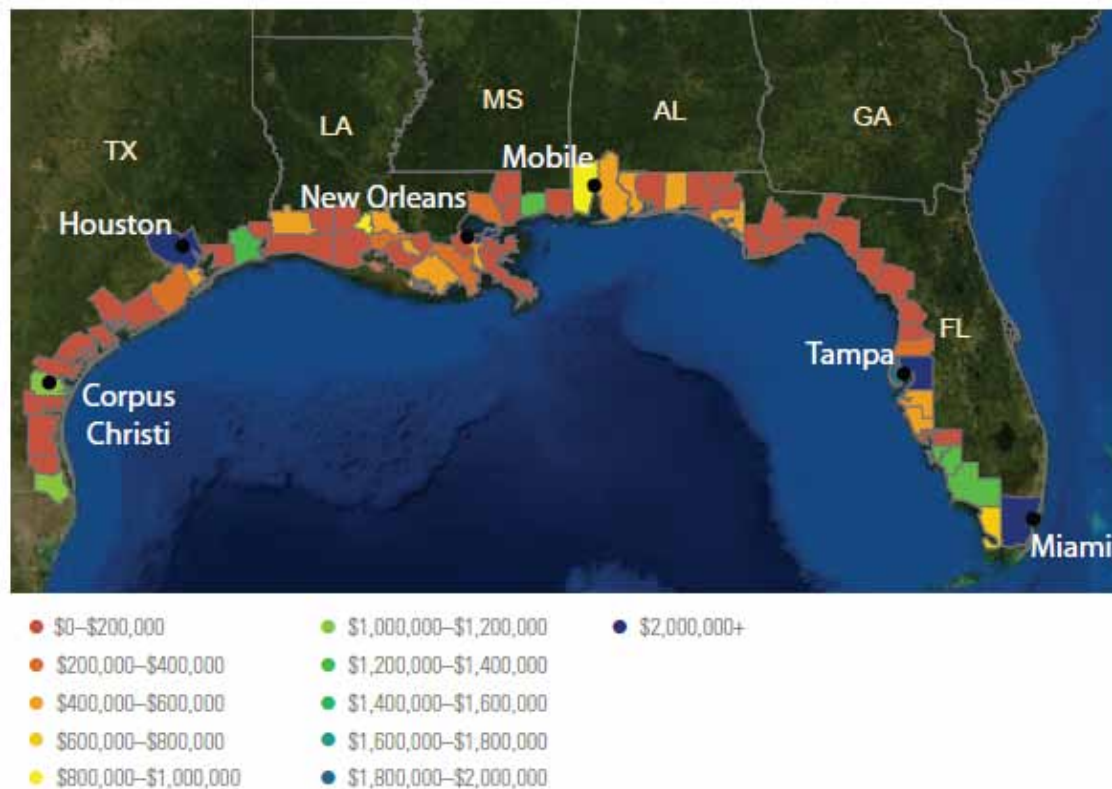
¹ 'Shocks' will refer to sudden shocks that can affect a system, of which there are three kinds: those caused by macroeconomic events such as an economic recession, those caused by industry-specific shocks such as movement of major firms out of the region or increased competitiveness, and those caused by natural disasters in the region (Hill et al, 2008). The first type of shock (macroeconomic) will be considered here.

² Porter argues that a cluster is a 'geographically proximate group of interconnected companies and associated institutions in a particular field linked by commonalities and complementarities' (1990). Alternatively Cooke & Morgan's argument reduces the relevance of geographic proximity and adds tacit knowledge transfer and competition, as well as collaboration, amongst those involved in the cluster to the definition (1998). While the clusters used in this case study are geographically proximate, in order to innovate within the respective fields, the actors within each cluster are collaborating both at the intra-cluster and inter-cluster level. Based on these assertions, the definition set forth by Cooke & Morgan will be used for the case of the fishing and tourism clusters in the New Orleans region.

(canning, etc.) (Upton, 2011). The tourism cluster is largely concentrated around coastal tourism as described in the note of map 1:

Tourism includes: sporting goods stores, scenic/sightseeing transport (water), fishing clubs/guides, hunting/fishing reserves, camps, boat rentals, casinos and nature parks. Fishing includes: finfish, shellfish, other seafood, canning, frozen seafood, seafood markets and wholesalers' US Economic Census, 2007

Map 1: Annual Tourism & Fishing Revenue by County



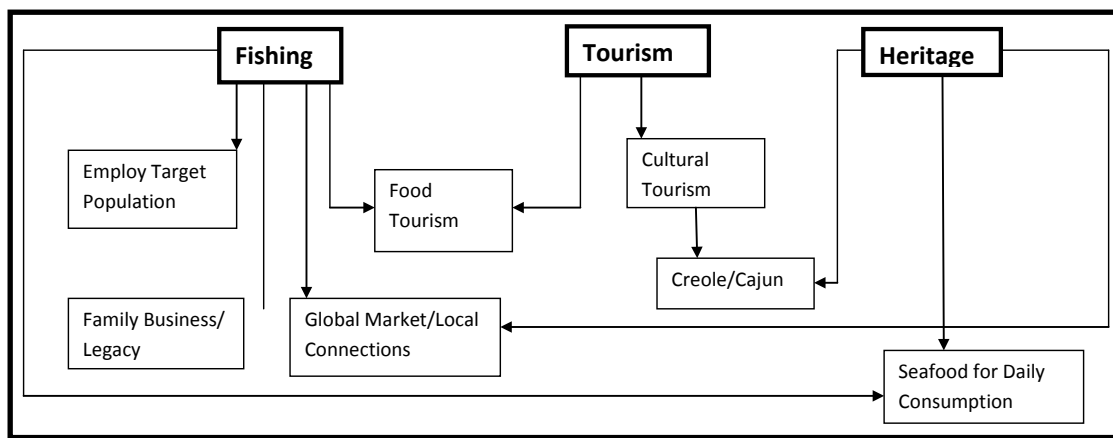
Source: 2007 U.S. Economics Census

Note: Tourism includes: sporting goods stores, scenic/sightseeing transport (water), fishing clubs/guides, hunting/fishing reserves, camps, boat rentals, hotels, casinos, and nature parks. Fishing includes: finfish, shellfish, other seafood, canning, frozen seafood, seafood markets and wholesalers.

In addition to their geographic linkages, these clusters are linked in terms of their supply chain dynamics. The same boat mechanics that fix the fishing boats also fix the speedboats popular with tourists. The clusters are further linked through the economic advantage of combining their industries as well as tourism. For the former, a considerable number of visitors to New Orleans come for the cuisine or for 'food tourism'. The culinary specialties revolve around the local seafood so the close relationship between the fishing and tourism clusters is needed. For the latter, there are historic linkages embedded in the cultural roots within the region. There are two main cultures present in New Orleans: Cajun and Creole. Neither of these cultures are exclusive to the region; however, the populations, along with the specific cuisine and music, are concentrated in the area. This cultural aspect is significant in both clusters but in different ways. In terms

of tourism, tourists are interested in sampling the cuisine and music that can be identified as Creole and these tourists can be categorized as ‘cultural tourists’ or, more specifically, ‘food tourists’. For the latter, due to the local diet that is rich in seafood, predominantly shellfish, the fish cluster could be integrated. Even without this specialized tourism, the local diet is greatly reliant on the fish cluster, sometimes eating seafood at each meal, and the cluster keeps many locals employed. Furthermore, prior to the oil spill, the locals embraced the economic benefits of both clusters, as well as the energy cluster, through festivals such as the Shrimp & Petroleum Festival (NC, 2011). See map 1 for a better understanding of the region and the geographic interplay between these two clusters. The black circle indicates what this article would consider ‘the region’. See figure 1 for an illustration of the linkages between the clusters and regional heritage.

Figure 1: Linkages between Fishing Cluster, Tourism Cluster & Regional Heritage



Source: Centre for Advanced Studies, Cardiff University, 2011

Impact of Oil Spill

Prior to the DH oil spill, it is estimated that the region brought in approximately \$4m a year in the fishing and tourism clusters as depicted in map 1 (NC, 2011). The regional fishing cluster employs approximately 35,000 people (Upton, 2011). The regional tourism cluster employs approximately 25,000 people. In terms of loss from DH, at the state level³, the fishing industry is expected to lose between \$115m to \$172m until 2013 (IEM, 2010). Again at the state level, the tourism industry is expected to lose \$691m over the next three years as a direct result of the oil spill (Economist, 2011). To put these figures into perspective, the tourism industry in the state of Louisiana has an estimated worth of \$6b and the Louisiana fishing industry has an estimated worth of the \$3b (Eubanks, 2010, Economist, 2011). It is projected that both industries, at the state level, will be in economic decline for at least the next three years for tourism and the next five years for fish which will be enough time to recover from the brand stigma (IEM b, 2010). Looking at the state figures, the economic toll is sizable but recoverable; however, regionally, the economic impact of the oil spill can be catastrophic, particularly due to the only recent resurgence in the post-Katrina period and the low industrial absorption capacity of the unemployed (NC, 2011). Furthermore, while New Orleans may not be as economically decimated from the oil spill as the Houston region, as displayed in Map 1, the natural landscape of New Orleans which positions the city-region below sea level is

³ When possible, regional level statistics were used; however, due to the recent nature of these events, in some cases it was unavailable and state level statistics were referenced.

expected to provide a disproportionate impact on the region from the oil spill in the long term (IEM, 2010).

A year after the oil spill, it is clear that the economic impact will be long term in the region. In the immediate period after the spill, the *US Oil Pollution Act* came into effect which allowed those individuals and businesses harmed by the event to claim from the responsible party, British Petroleum (BP) (NC, 2011). Through this Act, those harmed could claim costs/damages against BP. If BP did not accept liability after 90 days then the claimant could take BP to court or claim directly from the government under the Oil Spill Liability Trust Fund. As of August 23, 2010, BP paid, through the Gulf Coast Claims Facility (GCCF) that now handles the claims, \$395m of which over 33% went to the fisheries industry (Upton, 2011). In February 2011, the emergency payments to individuals and families affected by the oil spill in the fisheries industry was estimated at \$751m (Upton, 2011). The claimants have three years to submit their claims to the GCCF so the total economic impact from the side of BP will not be known until 2013.

In addition to direct funding, BP also established the Vessel of Opportunity program which provided short-term employment to the unemployed fishermen in the Gulf of Mexico as well as showing a renewed effort to clean-up the spill (IEM, 2010). The program trained fishermen to use their vessels to help contain and clean up the spill. Across the Gulf, approximately 3500 fishing boats were employed through this program; however, as of January 2011, the program was only still in place in Louisiana. The total cost for this project was \$594m⁴ (Upton, 2011). In the long term these fishermen, as well as the other people who are unemployed as a direct result of the oil spill, will have difficulties accessing jobs due to a lack of transferrable skills, lack of absorption capacity in the region, and brand stigma that is driving away consumers (IEM, 2010, Upton, 2011).

Outside of BP's efforts to support those who became unemployed as a result of the oil spill, BP has also assisted the Louisiana fishing industry as a whole with \$48m for seafood safety testing (Upton, 2011). The 'brand stigma' that has been discussed thus far is directly related to the health and safety of those consuming seafood (IEM (b), 2010). On the surface this fund looks to only help the fishing cluster; however, when taking into account the significance of commercial fishing as a form of tourism as well as food tourism, the fund really helps both clusters. It is unclear how much of this fund was set aside specifically for the New Orleans region; however, even with the scientific approval, the general public is concerned about the long-term health implications of eating the fish and swimming in the coastal waters. This is directly related to the aforementioned three and five year projections for the clusters as that is the estimated time to turn the brand around. Given the number of events that have caused the economic decline of the region particularly over the last 8 years, would it be realistic to consider alternative paths for these clusters to provide a sustainable future for the region?

The article will continue as follows. The next section will focus on analyzing the regional resilience literature highlighting any instances where New Orleans has been used as a case study for previous events such as Hurricane Katrina. This will be followed by a brief description of the methods used in conducting this research. After this, there will be a discussion on the findings from this research predominantly applying the theory in the literature review to this actual case. This section will also seek to identify ways in which New Orleans can recover from this shock. The final section will discuss the role of policy in this recovery, the BP response and provide a summary of the main points.

⁴ Through damage claims and cleanup, the cost to BP as of April 2011 was \$16b (Barker, 2011).

2. LITERATURE REVIEW

By assessing the economic impact of the oil spill on the clusters in the region, major themes have arisen predominantly focusing on the regional cultural and economic linkages to the clusters, the inter-cluster collaboration and the ability of the region and the clusters to recover to previous external shocks like Hurricane Katrina. All of these themes have implications for the region's resilience which will be discussed in this section.

Due to the history of these clusters in the region, the regional economic resilience literature will be discussed in relation to its evolutionary capacity focusing on evolutionary economic geography concepts. Using this perspective, the evolutionary aspect may be at odds with the equilibrium-based analysis of the New Orleans regional economic system. Christopherson et al, note that post-Hurricane Katrina, the resilience of the New Orleans region was measured through the tourist expenditure and employment as the system was returning to a state of equilibrium (2010). This is referred to as engineering resilience and considers resilience as the capacity of the system to return to or resume a state of equilibrium after an external shock (Simmie & Martin, 2010). The faster the system returns to a state of equilibrium, the more resilient it is to external shocks. Alternatively, ecological equilibrium is considered by some scholars to be an extension of engineering resilience; but, it differs due to the system's ability to have multiple equilibria which is more conducive to the ecological sciences (Holling, 1973, Simmie & Martin, 2010). In having multiple equilibria, ecological resilience is the ability of a system to absorb the shock before it is destabilised and transitions to another regime of behaviour (Holling, 1973). In Swanstrom's critical examination of the ecological framework, he argues that the ecological concept, with multiple equilibria, is more suitable when discussing regional resilience as it takes into account the ability of the industries in the region to adapt (2008). However, Simmie & Martin aptly note that the resilience of this system is measured by its ability to remain the same or 'absorb' an extreme shock (2010). This elasticity aspect of ecological resilience ties it closer to engineering resilience than any evolutionary-based theories.

The conflict between system equilibrium and system evolution in addressing resilience is widely disputed as 'returning to a state of equilibrium' implies that there is no change or evolution. Boschma & Martin, describe evolutionary economics in the ability of the economy to *self-transform from within* (2010). This transformation has three specific characteristics: dynamical, irreversible process and novelty. The first characteristic, dynamical, refers to the constant state of change the economy is in, ie. it is not static. The second characteristic, irreversible process, refers to the forward moving nature of the economy. The final characteristic, novelty, refers to the innovative emphasis in evolutionary economics to drive markets. In combining the first and second characteristic, where the economy needs to be changing and moving forward, it can be assumed that equilibrium-based economic notions can be abandoned. Using this evolutionary economics (EE) platform, evolutionary economic geography (EEG) is possible as the EE aspect deals with the transformation of the economy and the geography aspect deals with the space in which these transformations occur (Boschma & Martin, 2010). In understanding EEG, path dependence, as an evolution-based theories which addresses the aforementioned equilibrium question, will be discussed in its relevance to the adaptation of resilient regions.

In its truest form, path dependence focuses on the regional economy to be 'locked in' to a particular path. To further explain, the region is locked-into a certain method of economic development which is reinforced by significant returns to the local economy. If the regional economy, that is locked-in to a specific path, is impacted by a shock

then the resilience of the region can be gauged in the region's capacity to return to that path. Although some words have changed (regional economy instead of system, lock-in instead of equilibrium), this account of path dependence theory appears to be in line with engineering resilience (Simmie & Martin, 2010). If path dependence, through lock-in, is related to equilibrium-based resilience theories then how does it apply to adaptation and evolution? This question is particularly pertinent as the aforementioned definition of evolutionary economic geography specifically discounts the use of equilibrium based theories (Witt as cited in Boschma & Martin, 2010). Simmie and Martin consider the relationship between path dependence and evolution through theorising new path creation (2010). In creating the new path, which could be based on the old paths as they provide the skills and competences for development, the system (regional economy) demonstrates the evolutionary side to path dependence theory and also shows how the system can adapt or 'break free' from lock-in in response to the shock (Martin & Sunley, 2006, Simmie & Martin, 2010).

Substantial research has been completed focusing on path creation with contradictory findings that paths are created at random or they are shaped by old paths (Martin & Sunley, 2006). Using the evolutionary perspective, the latter finding will be explored further as a form of regional adaptation which could promote post-shock recovery. According to Martin & Sunley, possible EEG-based scenarios for escaping path lock-in include: branching and related variety (2006). 'Branching' or 'regional branching' is when industries, both mature/going into decline and new/ developing, work together to innovate another, technologically-based industry (Boschma & Frenken, 2011). This takes into account the related variety of industries already present in the region as well as the capacity for technological relatedness. Through the utilisation of knowledge transfer methods, the new industries can connect with existing industries to support innovation and growth. Regions that evolve in this way are traditionally characterised by being highly path dependent, usually referred to in an equilibrium capacity and experience incremental change (Cooke, 2010). An example of this would be the Pembrokeshire region of Wales where the co-evolving paths of non-renewable energy and maritime industries branched to create a non-renewable energy industry.

'Related variety' or 'relatedness' was mentioned in relation to branching and can be defined as the diverse agents present in a region that allow for knowledge spillover to occur amongst clusters, industries, or firms (Boschma et al, 2010). This related variety could be based on technology that can be applied in several different industries in the region initiating knowledge spillover. Basically, it is a common point (technology, innovation) that more than one agent can utilise which drives innovation. In relation to branching, related variety is a predecessor as it provides the foundation within the region for branching to occur. As related variety has already been found between the two clusters in the New Orleans region and entrepreneurs have already innovated to fill some of the demand created from this spillover, eg. Food tourism firms, branching will be discussed further below in regards to the region.

3. DISCUSSION & FINDINGS

Unlike previous events where the system only had to recover from one shock at a time, the situation in the New Orleans region at the current time, where there are four external shocks affecting the system simultaneously and the region has only recently recovered from the last major shock, is exceptional. While it may be the case that the system has traditionally gauged resilience as returning to a state of equilibrium, due to the growth

in both number of shocks and the intensity of the shocks, the system needs to change its recovery strategy focusing less on path lock-in and more on path evolution. The multiple shocks the region is currently encountering are illustrated in Figure 2.

Figure 2: External Shocks Affecting the Fishing & Tourism Clusters in the New Orleans Region



Source: Centre for Advanced Studies, Cardiff University, 2011

In terms of external shocks, the top left shock is the Deepwater Horizon Oil Spill which, although it has been a year since it occurred, will provide long-term economic decline in these regional clusters as discussed in the Introduction. Moving to the right, the global recession starting in 2007 originally only affected the demand in the region as fewer tourists went on holiday and more people chose less expensive options to seafood. However, four years on, the recession has led to high rates of unemployment across all traditional sectors, more part-time jobs for those searching for full-time employment, as well as higher rates of housing foreclosure which have disproportionately affected the low-income native population of the New Orleans region. In addition, there is recent speculation of a double-dip recession due to the stagnant economy. The next theme on the bottom right is peak oil. This is not to be confused with DH even though the oil spill and the global recession could have an impact on the price of oil. 'Peak Oil' could be considered the high price for filling the tank which can also be related to government foreign relations, war, and taxes. Regionally, this equates to less tourists due to increased petrol prices and potentially a higher price on fish due to the increased price of diesel for fishing boats. The last theme on the bottom left deals with extreme weather which some experts attribute to climate change. Through attributing it to climate change, experts can easily explain the increased frequency of the major weather events, the increased intensity of these events and the extension of the 'hurricane season' that is particularly relevant in the region. Given the current nature of the other three themes, the extreme weather external shock would not take into account Hurricane Katrina; however, it would take

into account the more recent flooding of the Mississippi River and the extreme tornadoes experienced in April 2011 in the region.

Due to the continuous introduction of new external shocks over the last 8 years, this is the time to assess the potential of the region to change or for the clusters to change paths through innovation as the regional economy may not be able to recover over time with the increased pressure. Adaptation is essential at this phase and, if considering food tourism, the spillover associated with related variety has already started; however, this fledgling industry could be considered a combination of existing firms as opposed to an innovation to move the region forward. While recombination can be successful, due to the multiple shocks the region is experiencing which directly influence these industries; a recombination of the industries will not enhance the economy. As mentioned in the last section, due to the low resistance because of the previous shocks, including the on-going global recession, the regional economy has not been able to support itself since the oil spill. This was noted in the Introduction in terms of the economic impact of the spill on the clusters. Beyond the resistance aspect is the recovery aspect. While this paper only seeks to examine the DH oil spill effects on the economy, it is difficult to separate it from the other external shocks. Ecologically, the DH oil spill has been cleaned up in the Gulf of Mexico, the fish have been tested and can be eaten and there is no oil washing up on the shore. Unfortunately, it takes more than a year and some tests to allow such demand-driven industries to recover economically. Due to the historic significance of the clusters to the region and the inter-dependence of the clusters themselves, branching to a significantly different path may be the best long-term option for regional growth.

According to Hudson as cited in Christopherson et al, 'the intersection of economic crisis and environmental crisis has enhanced the perceived sense of vulnerability and, hence, stimulated the search for new paths of resilience' (2010). The branching of existing paths provides limited opportunities for growth, particularly relating to the above issue where combining industries is an insufficient outlet. Nonetheless, there is sufficient overlap within the existing clusters to warrant knowledge spillover and innovation that can provide the regional economic growth needed to resist exogenous shocks. For example, a large portion of the fishing cluster revenue comes from commercial fishing which could easily also fit into coastal tourism. See map 1. Similarly, coastal tourism encompasses 'fishing clubs/guides' and 'sightseeing transport (water)' which could also be related to the fishing cluster. From this comparison, the fishing and tourism clusters could have firms focusing on eco-tourism. In the short-term, eco-tourism can relate to taking tourists into the Gulf of Mexico on boats to show them the effects of the DH oil spill and the way in which the ecosystem is resilient. This could bring tourists, if only inter-regional, back to the region. In the long term, this can equate to an eco-tourism micro-cluster within the tourism cluster, characterized by sustainably sourced, locally emphasized restaurants and low-carbon emitting hotels. It is a way of retaining the historic relevance of the region and the clusters while introducing something new to the usual visitors. While combining the interests of the two clusters, the ecotourism concept would be consistent branching through re- focusing the region on the green economy. Nonetheless, this is a possible future scenario based on the historical relevance of the clusters to the region as well as the need to adapt to increase resistance to future shocks. Currently, the resilience of the regional clusters to the oil spill has been gauged unemployment figures and a 'resumption of the norm' ie. Equilibrium-based arguments, as was the case post-Katrina.

4. REGIONAL INFRASTRUCTURE FACILITATING CHANGE

Thus far, the exogenous shocks affecting the system have been identified, the discussion on the regional economic landscape in the New Orleans region was addressed and the potential path change was proposed; however, little mention was given to the infrastructure that could make this change possible. While this last issue could be an article on its own, it will be briefly discussed to highlight the recovery work that has been completed in the region in the last year since the DH spill.

According to Wolfe, the regional factors influencing regional resilience outcomes are: 'the ability of regional and local governments to build on specialised regional assets, including public and private research infrastructure as well as unique concentrations of occupational and labour market skills, the presence or absence of 'civic capital' at the regional and local level and the ability of regional networks to work within and across associational boundaries to support the formulation and reinforcement of strategic management policies in response to external shocks' (2010, pg. 140). While this infrastructure may not have been present to help in the recovery effort after Hurricane Katrina given the specific attributes of that disaster, the current resilience infrastructure is a result of that turmoil. This infrastructure is characterised by the connectedness of several levels of government- national, state, regional & local- as well as regional Universities devoting more attention, by way of research centres, on resilience research. Examples of this institutional connectedness for resilience purposes are substantial.

The US Commerce Department, has provided New Orleans businesses the extra help they need to recover through a \$2.34m grant to aid the oil spill economic recovery effort which is comprised of public-private funds for the State of Louisiana to:

- Enhance the creative and bioscience industries through the 'Downtown Development District' of New Orleans,
- Fund marketing, rebranding and workforce training for the fishing-based industries in the State,
- Fund regional Universities to prepare a feasibility analysis for seafood processing in the New Orleans region,
- Establish a business incubator on wheels with state universities bringing it to the coastal communities affected by the DH spill. (Atwood, 2011)

This is in addition to the BP payouts through the GCCF campaign and any additional investment in the region. Beyond the government support, the Universities and individual communities are also encouraging recovery through devoting more time and attention to community resilience and its effect on regional resilience. See the Community and Regional Resilience Institute website for further details.

5. CONCLUSION

Sudden shocks affect maritime-based regions throughout the world and, as demonstrated by this case, there can be several shocks making an impact simultaneously. To a varying degree, these shocks have made an impact on industries throughout history. In some cases, the region flourished as a result of adaptation through diversifying the industry in an effort to provide more options in the event of an industry-specific shock. Other cases were less successful and the region, instead of adapting, went through a phase of decline characterised by high unemployment, low absorptive capacity and high crime. The case of the New Orleans region, along with many others, has demonstrated that the recovery

from a shock is not as black & white as the aforementioned 'adapt or decline' regional assessment has depicted.

In researching the resilience of the New Orleans regional clusters *ex post*, the co-evolution of the fishing and tourism clusters is obvious with several small firms starting on the basis of getting into this combined market; however, because of the number of shocks that have impacted the region, there is no way to link the result of the oil spill to the entrepreneurial activity. In addition, the ideal scenario for eco-based firms to grow would be with a drastic change of consciousness at all levels – government, general public & consumers- toward sustainable, fossil-free, living. To some extent, this change may be occurring, particularly with the oil spill obviously causing so many economic problems, but, if it is happening, it is to a much smaller degree than what is needed to trickle down to create a new path at the cluster level. This is evident in the way in which the regional and national governments have responded to the oil spill, focusing on 'equilibrium-based responses': to have the recently unemployed back in their old jobs (largely fishermen) and through providing funding into research on recovering the problematic industries. While this is a viable short term solution, if the shocks keep occurring at the current rate, there will again be long-term problems associated with these clusters.

Due to the demand-driven nature of these clusters, they will recover from the current shocks they are experiencing, albeit slower than in past situations due to the global nature of the economic crisis, and through non-evolutionary means. As a result of the latter, the region as a whole must begin to consider how to increase its resistance to shocks, possibly focusing on less demand-driven industries and more science-based industries, and how to construct recovery plans that focus more on adaptation in the future.

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