Community & Economic Development Discussion Paper
No. 01-15 • January 2015

Resilience in Planning:

A Review of Comprehensive Plans in Mississippi after Hurricane Katrina

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Resilience in Planning: A Review of Comprehensive Plans in Mississippi after Hurricane Katrina

Abstract: This paper analyzes and compares the decisions communities made in rebuilding after Hurricane Katrina in 2005 to determine to what extent post-Katrina comprehensive plans promote resilience based on built environment factors that have been shown to improve social networking, physical safety, and community building. Levels of recovery are also examined, measured by the current numbers of occupied housing units in each community compared with pre-Katrina numbers.

After Katrina, multiple planning documents were produced by a variety of organizations. Mississippi state statute requires each municipality to have a long-range comprehensive plan adopted by the local governing body. Plans establish goals over a 20- to 25-year period of development and are required to address residential, commercial, and industrial development; parks, open space, and recreation; street and road improvements; and public schools and community facilities. To capture the most significant interests and values, the overarching goals and vision statements of post-Katrina plans were compared and analyzed.

Plans from four Mississippi communities affected by Hurricane Katrina—Biloxi, Ocean Springs, Pascagoula, and Waveland—indicate that communities in the region understand many of the present strengths and weaknesses with respect to disaster resilience and have outlined a strategy to mitigate damage, reduce vulnerability, and create support networks to speed up recovery for a future disaster on the scale of Katrina. Like any plan, how and to what extent these ideals are implemented is a concern. During interviews in these communities, recurring concerns were public participation and, at the least, attention to the needs of residents in the planning process.

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Acknowledgments: The author would like to thank Michael Elliott, John Peponis, Daniel Immergluck, Harley Etienne, and Steve French for their advisement. The views expressed here are the author's and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System. Any remaining errors are the author's responsibility.

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There are many factors that have been shown to increase the resilience of a community. Based on factors determined by research on Hurricane Katrina and other natural disasters, this paper examines to what extent current plans in the disaster-prone Mississippi Gulf of Mexico Coast (Gulf Coast) align with what is known about resilience. Ideally, postdisaster rebuilding should be designed to increase community resilience. However, many rebuilding efforts focus on a speedy short-term recovery, clearly a priority for displaced residents, and long-term resilience is not considered thoroughly. Furthermore, a full recovery can take many years or even decades. In Mississippi, rebuilding is still ongoing after Hurricane Katrina in 2005. Therefore, long-range comprehensive plans are important for guiding growth and, potentially, increasing resilience.

Resilience has been defined as a ''…measure of the persistence of systems and their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables" (Holling, 1973). When applied to disasters, resilience refers to an affected area's ability to rebound after a catastrophic event. This may mean a community returns to its previous state or status quo or that the community stabilizes into a new regime. While the relative resilience of a community can only be fully known after a disaster, there are certain community characteristics known to contribute to resilience.

One factor that is known to improve resilience is the presence of strong social networks. Planners recognize the importance of social networks in planning more resilient communities and in informing the planning process in general (Healey, 1998), but it remains a fuzzy concept in some ways, as networks can be difficult to identify and measure. However, particularly when telephone and electricity services are interrupted, as after Katrina, geographically based social ties are important for household- and community-level disaster resilience.

The built environment has been shown to influence social networks (Entwisle, 2007; Fischer et al., 1977; Rutten, Westlund, & Boekema, 2010). The built environment also matters for resilience, as it is a physical, social, and symbolic anchor to everyday habits, a familiar framework of orientation, and a support system for social networks. In short, the built environment connects residents to a place and can serve as a benchmark for recovery. Therefore, it is possible that urban planning strategies can be harnessed to foster greater resilience by facilitating stronger social networks.

According to related research conducted as part of a larger study,[1] communities with viable public spaces such as parks with walkable street networks, with densities that are conducive to social interaction, with many historic properties and neighborhoods, and with other strong "sense of place" characteristics will produce stronger social networks and, as a result, will exhibit greater resilience (Carpenter, 2013). Conversely, a built environment with certain characteristics, such as disconnected street networks, lack of open space, and concentrations of poverty that are known to produce marginalization and undermine the generation of social ties, will exhibit less resilience.

The built environment can also cause degradation of an area's natural defenses to hurricanes. Discussing a 1962 storm on Long Island, Ian McHarg (1992) noted the storm damage was particularly

[1] Please see https://smartech.gatech.edu/handle/1853/49034 for the full results of this study.

acute due to practices such as dune and grass destruction for houses and beach access and groundwater withdrawal due to paving. The urbanized seashore fared much worse than it might have if its natural protection of sandbars, marshes, and dunes were left intact. This scenario has been revisited in many hurricanes since, despite the warnings of ecologists. Alarmingly, recent 30-year forecasts predict more frequent and intense hurricanes (Webster, Holland, Curry, & Chang, 2005).

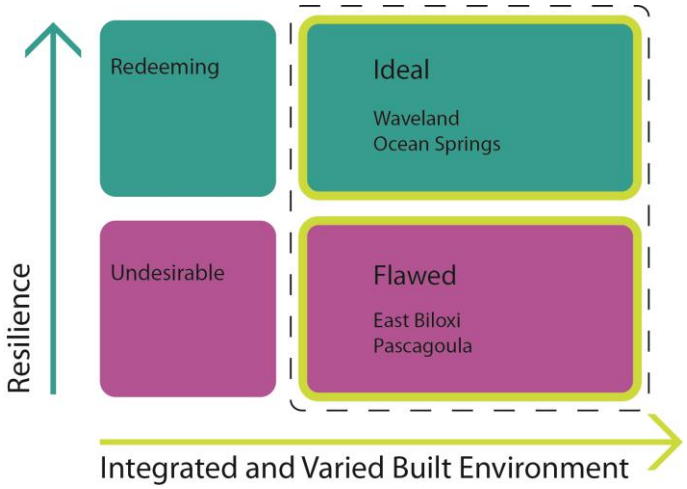
Perhaps the earliest views on planning for natural disasters focused on floodplain development and the protection of property (White, 1936, 1937). Land use planning and zoning were early tools employed by planners to prevent encroachment in waterways in order to protect human property from flood damage. Given this precedent and what is known about the impact of the built environment on social networks and other resilience factors, urban planning can be a powerful tool for mitigating and rebounding from natural disasters.

Method

The Mississippi Gulf Coast was chosen as a case study area due to its experiences after Hurricane Katrina. Hurricane Katrina struck the Gulf Coast in August 2005, with wind and storm surges causing devastating losses of life and property. The landfall location and strength of the storm made it among the deadliest and the most costly hurricane in U.S. history, with more than 1,300 dead, one million people displaced, $80 billion in property damage, and 90,000 square miles of land impacted (Cutter et al., 2006). Social systems in the region were significantly altered for individuals, households, extended families, businesses, entire communities, as well as local, state, and regional agencies and organizations. For months after the storm, the stories and images transmitted from the region were grim. Communities in the area have recovered at varying rates and levels. Therefore, this region provides an opportunity to contrast the long-range plans of higher- and lower-resilience communities and explore resilience factors.

In a recent related study (Carpenter, 2013), a quantitative model was developed in order to address whether there are statistically significant effects on resilience due to the built environment. An index of resilience was the dependent variable and built environment metrics the independent variables in a multivariate linear regression model. Control or test variables, such as sociodemographic variables, were also included. In addition, a qualitative case study analysis of four communities was undertaken using interviews with local residents. The four communities were selected based on data from the aforementioned model, specifically on measures of resilience and built environment configurations. Case study communities were classified by (1) their ability to withstand and recover from the hurricane, or their resilience based on the return of occupied housing units after Katrina and (2) the type of built environment found in the community.

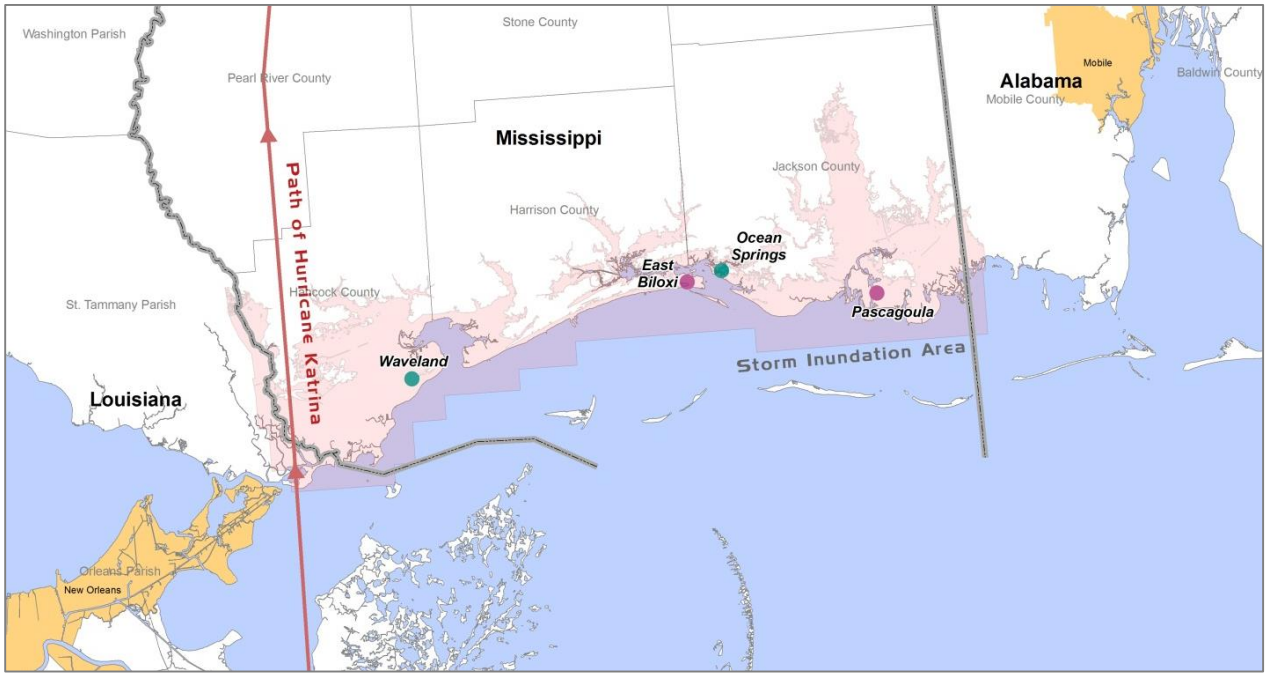
Figure 1. Case study selection criteria



The return of occupied households from 2000 to 2010 (five years before and five years after Hurricane Katrina) was used to determine high or low resilience. Variables used to determine the integration and variation in the built environment included mix of land use, residential density, street connectivity, and density of commercial establishments and other amenities that support social networking, park density, and density of historic sites.

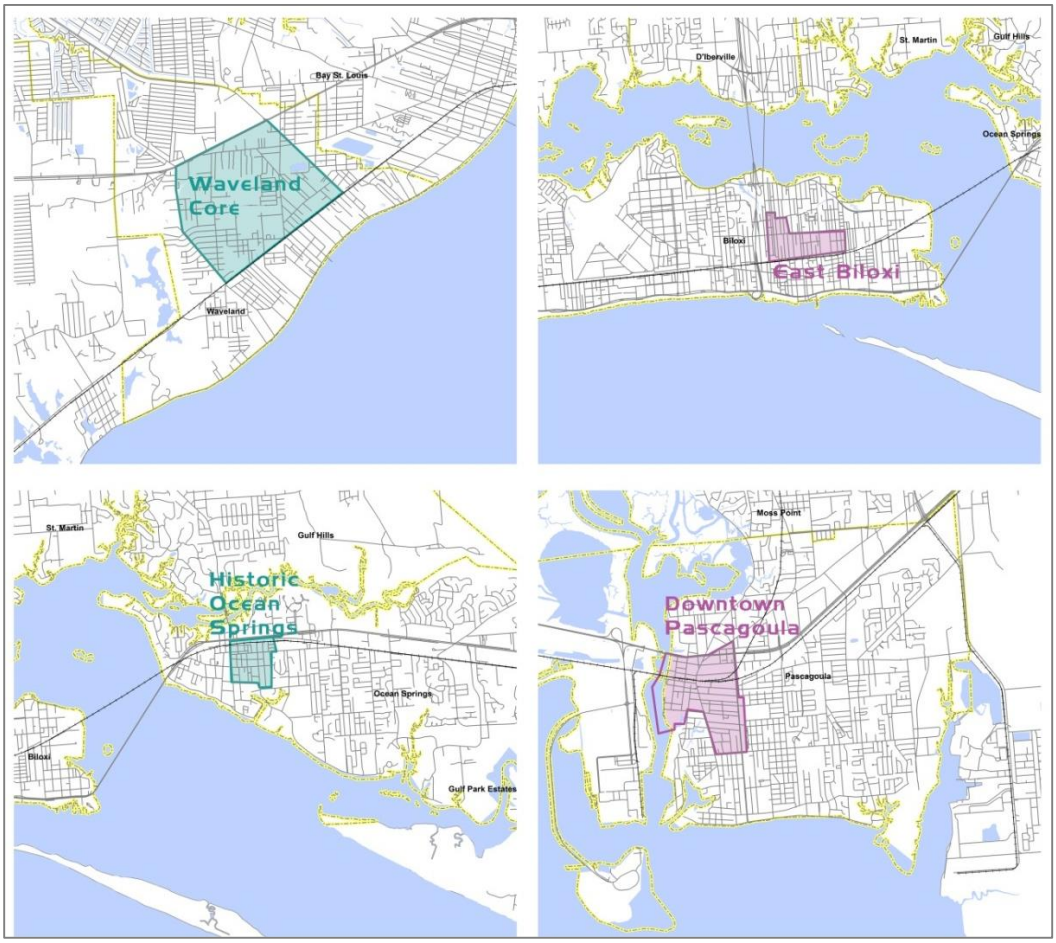
Based on these variables, four communities were chosen from the right two quadrants of the matrix shown above (see Figure 1), the high resilience and high levels of integration and variation in the built environment "ideal" quadrant and the low resilience and high levels of integration and variation in the built environment "flawed" quadrant for a deeper qualitative analysis of community resilience. The case study communities chosen were block groups of Waveland, Ocean Springs, East Biloxi, and downtown Pascagoula. These four communities were used in this analysis of comprehensive plans in order to contrast high- and low-resilience communities with similar built environment features. A map depicting the locations of the four communities is shown below in Figure 2, with detailed views of the case study community boundaries in Figure 3.

Figure 2. Case study communities and Hurricane Katrina-affected areas of Mississippi



Sources: U.S. Decennial Census, FEMA

Figure 3. Case study community detail



Source: U.S. Decennial Census

As seen in Table 1 and Table 2, the four communities were roughly similar when compared across built environment and demographic factors, with some differences. In terms of the built environment, all four case study communities had a relatively high mix of land uses (0.75 to 0.80), although other measures tended to vary more significantly. Waveland and Pascagoula had lower housing densities, social networking location densities, and parks. Ocean Springs and East Biloxi had the highest densities and mixes of amenities. Therefore, there is some variation among the two high-resilience and two low-resilience communities. Overall, Waveland is the least integrated and varied of the four, although among

all block groups on the coast, it is still in the top quintile. The case study communities that were selected had the greatest similarities in built environment metrics along the Mississippi Gulf Coast.

In terms of demographics, some key differences also exist. Waveland and Ocean Springs had higher median incomes, a lower percentage of African-American residents, and higher homeownership rates based on pre-Katrina figures. Being the two high-resilience communities, this was not ideal; however, built environment measures were privileged in the selection of communities.

Table 1. Descriptive pre-Katrina statistics, case study communities

	Waveland Core	Historic Ocean Springs	Downtown Pascagoula	East Biloxi
Population (2000)	2,314	627	1,141	1,366
Acres	1,345	164	585	192
Land use mix (2004, 0–1, with 1 most evenly mixed)	0.77	0.80	0.75	0.80
Net residential density (2000, HU/res acre)	1.01	1.84	0.83	2.62
Intersection density (2000, ints/sq km)	26.82	79.95	54.05	52.83
Number of social networking organizations[2] in area (2004)	38	73	51	91
Number of parks (2004)	1	3	1	2
Number of historic sites (2004)	1	14	5	23
Median age of homes (2000, in years)	26	48	61	47
Median housing value (2004, U.S. dollars)	$55,278	$53,866	$44,053	$35,242
% African-American (2000)	22%	25%	56%	83%
Median income (1999, U.S. dollars)	$34,257	$48,393	$25,682	$19,012
% Multifamily rental housing (2000)	12%	0%	30%	15%
% Living in poverty (2000)	13%	6%	19%	29%
% Population living in region in 1995 (2000)	86%	78%	91%	91%

Sources: U.S. Decennial Census, FEMA, local land use data

[2] Includes eating and drinking places; bookstores; sporting and recreational camps; recreational vehicle parks and campsites; beauty shops and barbers; motion picture theaters; video tape rental outlets; amusement and recreation services; museums, art galleries, and botanical and zoological gardens educational services; social services; membership organizations; and religious organizations.

Table 2. Descriptive post-Katrina statistics, case study communities

	Waveland Core	Historic Ocean Springs	Downtown Pascagoula	East Biloxi
Population (2010)	2,977	532	870	991
Post-Katrina resilience (based on return of occupied housing units normalized by area)	High (0.22 HU/ac)	High (-0.09 HU/ac)	Low (-0.79 HU/ac)	Low (-0.21 HU/ac)
Percent land damage (FEMA parcel survey, 2006)	26%	13%	19%	48%

Sources: U.S. Decennial Census, FEMA, local land use data

In interviews in these four communities, local post-Katrina planning activities and processes were a common topic. Some residents found the process in their community inclusive and were impressed with the plans and implemented projects. These comments came primarily from residents of Ocean Springs. Others, particularly residents of East Biloxi, thought their community had excluded entire segments of the population and had focused on the wrong types of projects (such as beautification instead of social services). The review of the four communities' comprehensive plans draws on previous literature in addition to findings from the quantitative model of resilience factors in the aforementioned study.

Data and results

For some communities on the Gulf Coast, multiple planning documents were produced by different organizations after Katrina. For example, rebuilding plans were created by the governor's Mississippi Renewal Forum, the Congress for New Urbanism (CNU), the American Planning Association-American Institute of Certified Planners Planning (APA-AICP) Assistance Team, the Gulf Coast Community Design Studio (GCCDS) of Mississippi State University's College of Architecture, and several nonprofits (such as community development corporations). Because these plans differed in scope and in intent, only the adopted comprehensive plans for each community were examined for consistency.

Mississippi state statute section 17-1-1 requires each municipality to have a long-range comprehensive plan adopted by the local governing body. Plans include goals over a 20- to 25-year period of development and are required to address (at a minimum) residential, commercial, and industrial development; parks, open space, and recreation; street and road improvements; and public schools and community facilities. In order to capture the most significant interests and values, the overarching goals and vision statements of each plan were compared and analyzed.

Comprehensive plans were acquired for the city of Biloxi (Beckman, Rouse, O'Neill, & Kim, 2009), city of Pascagoula (Pascagoula Comprehensive Plan, 2010), city of Ocean Springs (Peshoff & Humphrey, 2010), and city of Waveland (Slaughter and Associates, 2010). The neighborhoods of Waveland Core, historic Ocean Springs, and downtown Pascagoula fell under each respective municipal plan. The neighborhood of East Biloxi fell under the Biloxi comprehensive plan, although a separate 19-page section was devoted to East Biloxi, which is one of four designated neighborhood planning areas in Biloxi. The Pascagoula, Ocean Springs, and Waveland plans were adopted in 2010 and the Biloxi plan was adopted in 2009. The plans were drafted by city staff and consulting firms. In Biloxi, four city

departments and boards, a citizen council, and three consulting firms are listed on the credits page. Ocean Springs listed one consulting firm and five city departments and boards. Waveland listed one consulting firm. Pascagoula's 2009 plan does not have a credits page, although an earlier, similar 2006 Pascagoula plan credits six city departments and boards, a citizen committee, and one consulting firm.

Table 1 includes items found in vision statements for each case study community. Business development and employment opportunities was the only element found in all four vision statements. Natural resources, disaster protection and mitigation of vulnerability design and character, and community building were part of plan visions in three communities. Diverse transportation options, parks and recreation, and the needs of low-income populations were found in only two plans. Other items that were found in only one vision statement were diverse housing, city services, coastal resources, growth management, regionalism, public participation, and tourism. Three additional categories related to resilience were not found in the goals, each appeared in at least one vision statement. Those categories were resilience, providing for future generations, and low-income populations.

Table 1. Elements found in vision statements of plans

	Biloxi	Pascagoula	Ocean Springs	Waveland
Natural resources	x	x	x	
Diverse housing		x		
Business development/employment	x	x	x	x
City services		x		
Diverse transportation options		x	x	
Historic and cultural resources	x		x	
Protecting residents/reducing vulnerability	x	x		x
Design and character	x		x	x
Coastal and riparian resources			x	
Parks/recreation		x		x
Growth management				x
Regionalism		x		
Community building	x	x		x
Public participation		x		
Tourism	x			
Future generations		x		
Resilience	x			
Low-income populations	x	x		

Sources: Beckman et al., 2009; Pascagoula Comprehensive Plan, 2010; Peshoff & Humphrey, 2010; Slaughter and Associates, 2010

When the stated goals of each plan were compared, there were many more references to the elements found in Table 1 and many additional elements that were common to more than one community (see Table 2). The number of goals in each community varied, with 10 in Biloxi, 52 in Pascagoula, six in Ocean Springs, and 33 in Waveland. Those plans with fewer stated goals tended to include more high-level and comprehensive goals (such as "Promote a healthy, diversified, and sustainable economy that provides a strong tax base, needed goods and services, and employment opportunities for Biloxi's residents"), while those plans with a greater number of goals tended to list more specific types of activities ("A local airport with minimal off-site impacts" in Pascagoula).

Table 2. Elements found in goals of plans

	Biloxi	Pascagoula	Ocean Springs	Waveland
Natural resources	x	x	x	x
Diverse housing	x	x	x	x
Business development/employment	x	x	x	x
City services	x	x	x	x
Diverse transportation options	x	x	x	x
Historic and cultural resources	x	x	x	x
Protecting residents/reducing vulnerability	x	x	x	x
Design and character	x	x	x	x
Coastal and riparian resources		x	x	x
Parks/recreation		x	x	x
Growth management	x		x	x
Downtown		x	x	x
Regionalism		x		x
Community building		x		x
Public participation		x		
Tourism				x

Sources: Beckman et al., 2009; Pascagoula Comprehensive Plan, 2010; Peshoff & Humphrey, 2010; Slaughter and Associates, 2010

Natural resources, diverse housing, business development, city services, and transportation options were included in all four plans. Given the state mandate to include open space, housing, economic development, municipal facilities, and transportation in local comprehensive plans, this is to be expected.

Protecting and supporting historic and cultural resources were found in the goals of all four plans. Historic site density had a positive impact on resilience in the related quantitative model of resilience factors and the importance of high-priority historic and cultural sites was noteworthy in interviews (Carpenter, 2013). Although many historic structures were lost in Katrina, there have been efforts to rebuild in a locally and historically sensitive manner. An example is the new library in East Biloxi. The library was designed to recall late 19th- and early 20th-century resort hotels from the area, which have almost completely vanished over time due to hurricane damage and economic changes. The library also houses a climate-controlled, hurricane-resistant archive and displays various local artifacts.

The importance of historic resources to the community was adequately reflected in the comprehensive plans.

Protecting citizens and reducing vulnerability of households was found in all four communities as well. In Waveland, the focus was on public safety and emergency response while in Ocean Springs, the focus was on mitigation by understanding risks. In general, the plans did not focus on disaster protection, which was a surprising finding. The concept of resilience was not included in the entire body of the plans of Ocean Springs and Pascagoula and only infrastructure resilience was mentioned in Waveland (as it pertained to water and wastewater systems). In contrast, the plan for Biloxi uses the term "resilient" or "resilience" in 35 places in the body of the plan, and in describing the population, the vision, and the natural and built environment of the area. While not part of the goals section of the plan, fostering resilience was present throughout the Biloxi plan in subsections of the document. Given the problems associated with vulnerable populations revealed during interviews in the area, citizen protection is necessary. However, the plans lack rigor in identifying and supporting the most vulnerable, such as functional needs and very low-income households.

Design and character was also included in the goals of all four communities. This included statements such as retaining the character, specifically the "small-town character," "historic character," or the "distinct character" of existing spaces and promoting high-quality design. The unique character of the region was an important aspect of resilience noted in interviews with residents in that it promoted place attachment and increased the likelihood of residents returning to the area, particularly in Ocean Springs. Fostering and maintaining these qualities is therefore likely to improve resilience.

Coastal and riparian protection was included in the goals of Pascagoula, Ocean Springs, and Waveland. While protection of natural resources was included in the goals of all four communities, water resources, in particular, were also mentioned in these communities. Many area industries and residents are reliant on these resources. The coast and inland waters are commonly used for recreation and are an asset for the tourism industry, according to interview subjects. The area's hydrologic features are incredibly important to the vitality of the area. Katrina and the 2010 BP *Deep Horizon* oil spill demonstrated the negative impact that interruptions in the seafood and tourism industries have on economic and social conditions in the area.

Parks were included in the goals of Pascagoula, Ocean Springs, and Waveland. In interviews, the presence of parks was found to be an important factor for resilience and social networking. In its plans, Ocean Springs further stated the goal to provide parks that meet the needs of all the residents. Parks that are not functional or inclusive were found to be almost detrimental to vitality and resilience during the interview process. Ball fields, playgrounds, and neighborhood parks were the most common types of park spaces used for gathering; however, the area has a wide variety of parks, such as neighborhood parks, state parks with camping facilities, and an historic national seashore park. The parks and open spaces in the area highlight the natural features and contribute to the livability of the area. Immediately after the storm, parks were one type of area used as a distribution point (for example, the Jackson County Fairgrounds in Pascagoula was a drop point for the National Guard). The goal of providing parks that specifically meet the needs of residents is beneficial for resilience.

Growth management was included in the goals of Biloxi, Ocean Springs, and Waveland. Based on results from the quantitative model and interviews, resilient development should be of an appropriate scale and sited properly. Therefore, a strong growth management program is likely to

improve resilience. Growth management in tandem with hazard mitigation is also critical in protecting the region from the next hurricane, particularly in preventing overdevelopment of flood-prone areas. In addition to growth management strategies, Ocean Springs also adopted form-based codes to develop standards for intensity and character in disparate zones.

Creating a vibrant downtown or business center was included in the goals of Pascagoula, Ocean Springs, and Waveland. A strong core or central business district was seen as an advantage to resilience in the interviews. Significantly, interviewees spoke of downtown core areas as the "heart" of their community and as features crucial to resilience. Comments were also made about the relative amount of damage to the core. Communities that sustained major damage to the core were considered less resilient by those interviewed. Ocean Springs was seen as more resilient and Waveland was seen as less resilient by interviewees due to the amount of damage it sustained downtown. Biloxi's downtown area has been in decline since at least the 1970s. While not in the goals and visions, Biloxi's comprehensive plan devotes a full chapter to reestablishing downtown. Given the importance of downtown districts for social networking and for resilience, retaining a strong business district is important to each community and, if implemented effectively, will have positive effects on resilience.

Regionalism was included in the plans of Waveland and Ocean Springs, the two communities with the smallest populations, as well as Pascagoula. Waveland and neighboring Bay St. Louis are the largest cities in Hancock County, a fairly isolated region, and after Katrina the two communities have merged some services, such as the school district. Ocean Springs recognized the need to consider a similar strategy of regional infrastructure provision and development decisions with other providers to increase efficiency and maximize investments. Ocean Springs is located near other population centers with a more suburban pattern of growth, including Gulf Hills to the north. In its plan, Ocean Springs demonstrates the need to coordinate with Harrison County and surrounding communities to preserve the character of the community and the natural resources of the area. Regionalism was surprisingly absent from the plan of Biloxi, perhaps because it is a more established and self-sufficient population and employment center. Despite this, regional coordination should be a part of any resilience strategy in order to ensure that any one city or neighborhood is not overly vulnerable or lacking resources to recover from a disaster. Stronger formal ties between communities in the region can only improve social networks by adding redundancies. As stated by one interviewee, a community is only as resilient as its weakest link, which became painfully obvious in communities like East Biloxi following Katrina.

Community building was found in the goals of the plans of Pascagoula and Waveland. Biloxi and Ocean Springs did not specifically mention community building as a goal, although other goals such as community viability were related or peripheral goals. Community building was the goal most evocative of creating informal social networks, an important factor for resilience. Comprehensive plans tend to focus on physical development, however, the plans of Pascagoula and Ocean Springs acknowledged the importance of fostering livable neighborhoods that illicit pride and neighborliness. Sense of community was an extremely important factor for resilience based on the interviews. The inclusion of community building in Pascagoula and Waveland is beneficial to creating future resilience through stronger social networks.

Public participation was included in the goals of Pascagoula but not in the plans of the three other case study communities. This is unfortunate, as public participation could produce creative ideas for the community, increase trust and transparency in the planning process, improve community buy-in,

and build formal and informal social networks. In interviews, public participation in the rebuilding process was regarded as beneficial for resilience in communities that engaged the public. In particular, participation was necessary to understand and respond to the needs of the community. This was also witnessed in New Orleans after Katrina, when participation of the public as well as communication with the public were crucial for effective recovery, and also seen after the Kobe (Japan) and Northridge (Los Angeles) earthquakes (Olshansky & Johnson, 2010; Olshansky, Johnson, & Topping, 2006).

By increasing transparency and accountability, public participation can also improve trust in leadership, which is also important for resilience. Some Gulf Coast residents lacked trust in the government before the storm, and trust continued to erode after promised funding and aid was delayed or did not arrive. Furthermore, the initial response, particularly evacuation rates, may have been hindered by this lack of trust. According to a recent study (Brodie, Weltzien, Altman, Blendon, & Benson, 2006), households are significantly more likely to evacuate if they trust the source of evacuation information and are given clear instructions as well as options. When the information initiates from a government that the population feels is detached and apathetic, this becomes problematic. By interfacing directly with local residents through participatory planning processes, planners are uniquely able to foster transparent government.

Tourism was included in the goals of Waveland as part of its economic development strategy. The stated goals included diversifying the tourism economy without sacrificing the serenity of the beachfront district. Waveland's tourism was particularly hard-hit, perhaps because it lacked the large-scale hotels and casinos that had the resources to rebuild quickly. The city also has a higher percentage of summer homes than other case study communities. Historically, Waveland's summer population came via train from New Orleans. With many beachfront homes razed and properties vacant nine years after Katrina, many former summer residents appear to have abandoned the area. Creating new tourism opportunities is important for the area's economy. Oddly, Biloxi, with its numerous casinos and attractions, did not include tourism in the comprehensive plan. Ocean Springs and Pascagoula are notably short of hotel space and, while they welcome the tourists who visit, these areas have not relied as heavily on revenue from tourists beyond day-trippers. While the communities should move away from reliance on tourism dollars alone, many projects would also benefit local resilience, such as creation of additional recreational features and other built environment features that foster social networks.

Based on the comprehensive planning documents produced after Katrina in the four case study communities, the region understands many of its present strengths and weaknesses with respect to disaster resilience and has outlined a strategy to mitigate damage, reduce vulnerability, and create support networks to speed up recovery for a future disaster on the scale of Katrina. Like any plan, how and to what extent these ideals are implemented is a concern. Several projects have been completed, such as the new libraries in Waveland and East Biloxi and beachfront improvements in all four communities. Other projects are in progress, such as planned mixed-use riverfront development to augment downtown Pascagoula. During interviews with area residents, recurring concerns were public participation and, at the least, attention to the needs of residents in the planning process.

Including mitigation in either standalone hazard plans or comprehensive plans has been shown to be a potential strategy for encouraging safer development and garnering public support for mitigation (Burby et al., 1999). In fact, high-quality plans informed by local interest groups were found

to have the greatest impact on environmental problems, and natural hazards, in particular, and to increase levels of commitment in elected officials (Burby & May, 1998).

The comprehensive plans created after Katrina by the communities of Waveland, Ocean Springs, Pascagoula, and East Biloxi encompass many known resilience factors. Specifically, these include such projects as increasing street network connections in Ocean Springs and creating a “town center” around the casinos in East Biloxi. Plans varied in robustness in certain areas, but overall each displayed a commitment to creating a diverse and equitable community. The most troubling omissions were the goals of public participation in the planning process in three of the four communities and community building in two of the four communities. Given the enormous importance of social networks in forming resilient communities, these activities are critical. Overall, the inclusion of resilience factors can save lives and reduce costs postdisaster. Given the increasing shocks of natural disasters, resilience must be embraced by planners as well as community leaders and residents in order to create safer, more sustainable communities.

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