AN APPROACH TO IMPROVE COASTAL COMMUNITY RESILIENCE THROUGH PLANNING AND DESIGN OF A RECREATIONAL TRAIL: A MASTER PLAN FOR THE MISSISSIPPI COASTAL HERITAGE TRAIL

PARFENOVA, TATIANA
NBBJ, United States, tatiana.v.parfenova@gmail.com

BOSWELL, JACOB
Ohio State University, United States, boswell.33@osu.edu

1 ABSTRACT
As coastal populations are growing and the number of coastal disasters is escalating, communities are starting to look for ways to increase coastal community resilience following catastrophic events. This is especially true in places where hard infrastructural barriers have failed in the midst of disaster, e.g. New Orleans’ flood wall during Katrina. While greenways are known to connect communities, ecosystems, and destinations, and boost the local economy, their influence on coastal community resilience has not been discussed in the literature. Greenways, being long linear connective tissue, could act as a landscape infrastructure and help promote symbiotic relationships between ecological and social systems and become catalysts for building stronger community.

Using the Mississippi Coastal Heritage Trail (MCHT) master plan as a model, the study attempts to bridge the gap, presently observed in the literature, between the theory of coastal community resilience and coastal recreational trail planning. It focuses on developing a methodology for greenway planning with the main goal to stimulate coastal community resilience. To achieve this goal, the study first employs review of community resilience focused planning literature to aid in formulation of the goals and objectives for the master plan. Secondly, the identified objectives guide all the phases of MCHT planning and design process, from suitability analysis to design proposals. The methodology, explored in the study, can provide an efficient way for landscape architects and planners to account for larger regional interests in the stimulation of coastal resilience during the design phase of a multi-jurisdictional trail.

1.1 Keywords
resilience, community, coastal, trails, green infrastructure.

2 INTRODUCTION & BACKGROUND
The edge of water and land seems to attract people both emotionally and economically. At the moment 52% of the total population of the United States lives in coastal counties, while coastal counties only account for 14% of land in the country (NOAA, 2012). Furthermore, over 43% of people in the U.S. take part in marine recreation (NOAA, 2010). However, coastal areas face a diverse range of threats from natural disasters and failing constructed systems. Beatley (2009, p.14) identifies the three main categories of coastal natural hazards as meteorological (nor’easters, hurricanes, etc.), geological (landslides, tsunamis, etc.), and hydrological (flood events, El Nino, etc.). Recent failures in infrastructural and industrial systems such as the levee failure during Hurricane Katrina in 2005 and the Deepwater Horizon oil spill of 2010 have resulted in tremendous social, economic and ecological harm (FEMA, 2008; NOAA, 2013).

New approaches in reaction to these catastrophic events have shifted from hard infrastructural barriers to responses that promote resilience. For the purpose of this research, resilience is understood as the capacity of a community to adapt and improve following catastrophic events (Beatley, 2009, p.3-5).

Holling (1973, p.17) introduces the term of resilience in 1973 in relation to natural systems, such as the budworm forest community. “Resilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables, and parameters, and still persist.” Importantly, Holling concludes that resilient system can “capitalize on change opportunities” (p.18).

Currently, community resilience is viewed as an important part of resilient city. Godschalk (2003, p.137-138) states that communities are the social and institutional components of the city. “...
[T]he communities act as the brain of the city, directing its activities, responding to its needs, and learning from its experience. During a disaster, the communities must be able to survive and function under extreme and unique conditions ... A city without resilient communities will be extremely vulnerable to disasters.” Moreover, Godschalk proposes that mitigation programs in addition to physical systems, like infrastructure, to focus on teaching the city’s social communities and institutions to reduce hazard risks and respond effectively to disasters, since they will be the ones most responsible for building ultimate urban resilience.

Similarly, Berke and Campanella (2006, p.206) consider efforts “to repair a community’s torn social fabric - a process that fundamentally entails reconnecting severed familial, social, and religious networks of survivors at a grass roots level” an essential component of post disaster recovery. The authors underscore “that cities, towns, and villages are more than the sum of their buildings and infrastructure. They are a tapestry of human lives and social networks that are essential to the heart and soul of the place.”

Walker and Salt (2006, p.145-148) describe a “resilient world” through values of diversity (biological, landscape, social, and economic), ecological variability, modularity (in order to reduce transmitting shocks), slow variables associated with thresholds, tight feedbacks (strength and rapidity of effects of change), social capital, innovation, overlap in governance, and ecosystem services. They understand social capital “as well-developed social networks and leadership. Resilience … is very strongly connected to capacity of people in that system to respond, together and effectively, to change any disturbance” (p.147).

Recreational trails have the potential to connect communities, ecosystems, and destinations (Hellmund and Smith, 2006), assisting in strengthening the coastal environment. The positive effects of trails have been the subject of several studies. These studies have shown that recreational trails make large contributions to strengthening economic (NPS, 1995), social and environmental conditions (Flink, 2001, p.5-8; Forman, 1995, p.147-153; Schasberger et al., 2009, p.343).

This research argues that the design of a recreational trail has the potential to foster coastal community resilience, adapting seven of the nine physical characteristics of a resilient coast identified by Beatley (2009, p.73-93) as objectives of a trail master plan. These characteristics are: pedestrian and bicycling connectivity between and inside community centers; protection, preservation and the restoration of ecological systems; direct access to nature and natural systems; public awareness of natural and man-made disasters; green infrastructure over conventional infrastructure; social and community interaction spaces, public gathering spaces and links between them; growth patterns based on historic patterns of towns and villages.

2.1 Study Area

The study area is located in three coastal counties of Mississippi. The Coastal Mississippi region is characterized by a flat topography, a warm to hot, humid maritime climate, and its proximity to the ocean. This last peculiarity endows the area with rich surface water resources, diverse estuarine and tidal systems, and extensive wetlands. Due to these unique landscape features, the area has various ecological systems, many of which are home to a variety of endemic species (The Nature Conservancy, 2001). In the past decade, this area has been subjected to two major disasters, Hurricane Katrina and the Deepwater Horizon Oil Spill. Both of these disasters have significantly undermined the economic, social, and ecological resources of the coast. (FEMA, 2008; NOAA, 2011). Currently the region is trying to formulate new ways to respond to disasters, to strengthen the regional economy, to improve the quality of life for residents, and to create a more sustainable regional future (Mississippi Gulf Coast Sustainable Communities Initiative, n.d.).

Jim Foster, the president of the Gulf Coast Heritage Trails Partnership, and Liz Smith-Incer, Rivers, Trails and Conservation Coordinator in Mississippi with the National Parks Service, identified the Mississippi Coastal Heritage Trail (MCHT) as the number one priority in trail development on the Mississippi Gulf Coast (Personal interviews, 2012). The Gulf Coast Heritage Trails Partnership (GCHTP) (2010) envisions the trail as a 101 mile long connection from the Alabama boundary to the Louisiana Boundary following the coast line. (GCHTP is a non-profit group that strives for a safe, coast-wide network of diverse trails that connect neighborhoods to businesses, schools, green spaces, and blue spaces where everyone can enjoy scenic, historic, educational and natural areas. The group helps to organize the community efforts, and makes the needs of the community known.) The trail is designated as a national trail by U.S. Department of Interior. A portion of the trail is currently approved as a part of the Sand Beach Master plan. Other parts are planned to be shared-
use paths and or “share the road” segments. A shared-use path is a paved, off-street travel way designed to serve nonmotorized travelers (U.S. Department of Transportation Highway Administration, 2006). “Share the road” segments are planned to consist of a shoulder addition to existing roads.

2.2 The Purpose of the Study

The purpose of this study is to test the hypothesis that the design of a recreational trail, given comprehensive analysis and physical assessment, can provide a way to improve coastal community resilience. The study debates that the master plan of a trail can improve cultural, ecological, and economic aspects of coastal community resilience. The design attempts to ensure connectivity between and inside community centers. It also aspires to include social and community interaction spaces, public gathering spaces, and sustainable stormwater management strategies. Furthermore, the master plan tries to integrate interpretive design/art components in order to stimulate public awareness of natural and man-made disasters, provide direct access to nature and natural systems, highlight historic patterns of towns and villages, and incorporate the restoration of connectivity between natural systems.

2.3 Limitations

The major limitation of the study results from distant research and restricted opportunities to conduct on the ground site analysis and stakeholder engagement. Another limitation relates to the narrow timeframe of six months to complete this study as the Master’s thesis research.

2.4 Delimitations

Due to limited time and resources the study did not attempt to accomplish an initial community engagement and survey of opinions to evaluate output of the GIS analysis and Master Plan by collecting feedback from stakeholders. This study did not focus on the introduction of hard storm barriers, nor did it explore the physical resilience of the trail itself and the durability of materials in a catastrophic event.

3 Methodology

In an effort to improve resilience of the Mississippi Gulf Coast, this study employs a qualitative approach. The methodology consists of literature review and application of the resilience theory to a greenway master plan. The review of resilience related planning literature helped to identify characteristics of resilient community, which are applicable in greenways planning. The characteristics of resilient communities can help formulate the goals of the planning process. Additionally, some of the impacts of built trails correlate with resilience principles. At the same time the literature review revealed no current overlap between greenways planning and resilience theory literature.

The study applies the theory of the community resilience to the MCHT master plan. The master plan uses characteristics of a resilient coast identified by Beatley (2009, p.73-93) in all phases of plan development, from analysis to design proposals, and utilizes them as objectives, see Table 1. The planning process started with spatial data gathering and analysis using GIS software and physical site assessment. Jennifer Evans Cowley, thesis committee member, provided a completed coastal Mississippi regional GIS database. The database was assembled during 3 years of work on regional plans, sponsored by HUD and included data regarding environmental and socio-economic conditions. Karen Clark, Mississippi Planning and Development District GIS coordinator, provided the data regarding existing and proposed recreational trails, both pedestrian and water trails, as well as access points to water recreation. All spatial data is imported into a vector-based GIS system with projected MCHT location for display and analysis. Analysis of data helped to assess whether the alignment of the trail, proposed by Mississippi Gulf Heritage Trails, has a potential to incorporate identified objectives, i.e., whether the proposed trail alignment is able to connect communities and provide access to socially and ecologically significant for those communities sites. On-the-ground site analysis, possible due to a generous Ohio State University Alumni Grant for Graduate Research and Scholarship, allowed to understand the types of conditions that the trail goes through and explore significant for community locations in order to identify potential sites for design interventions.

The planning process concluded with a design master plan based on previous research. The design proposes possible ways to implement the trail with considerations to context with a goal to increase coastal community resilience. The design phase included a series of physical hypotheses that were consequently tested and explored through three-dimensional modeling, design drawings, and orthographic projections. Parallel to the design phase the study undertook simplification of data representation and transferred key data aspects.
from GIS using Adobe Creative Suite, simplifying the configuration of the trail to maximize understanding of accomplishments relative to the resilience concept.

Finally, the design was evaluated by experts from the Ohio State University: Jacob Boswell, thesis committee chair, Assistant Professor and Undergraduate Chair in Landscape Architecture Section, and Jennifer Evans-Cowley, committee member, Associate Dean of Academic Affairs and the Administration at Ohio State University, College of Engineering, who has ten years of planning experience in the Mississippi Gulf Coast. The experts were asked to evaluate the master plan and preceding analysis with regard to improvement of coastal resilience. The study was also presented to local officials and advocates of trail development: Jim Foster, the president of the GCHTP; Liz Smith-Incer, Rivers, Trails and Conservation Coordinator in Mississippi with the National Parks Service; Geneva Dummer, administrator with the GCHTP; David Taylor, Planning Director, Gulf Regional Planning Commission; and Jeff Loftus with the Gulf Regional Planning Commission. The master plan is shared with these regional representatives for use in community engagement, acquiring funds, and following implementation.

4 MISSISSIPPI COASTAL HERITAGE TRAIL MASTER PLAN

4.1 Goals and Objectives

The master plan for the MCHT attempts to stimulate coastal community resilience by achieving three goals: ensuring connectivity; providing continuity and identity for the trail; and utilizing the trail as a landscape infrastructure. These three goals incorporate objectives derived from Beatley’s principles of coastal community resilience: pedestrian and cycling connectivity between and inside community centers; protection, preservation and restoration of ecological systems; direct access to nature and natural systems; public awareness of natural and man-made disasters; green Infrastructure over conventional infrastructure; social and community interaction spaces, public gathering spaces and links between them; growth patterns based on historic patterns of towns and villages.

4.2 Chapter 6: Stages of the Project

The master plan resulting from this study divides the project into three main stages: planning and layout; measures for the initial phase of implementation; and actions for the final phase of implementation. These stages correspond to the goals of the master plan. The planning and layout stage intends to ensure connectivity, measures for initial phase of implementation focus on establishing continuity and identity of the trail, while actions for the final phase of implementation build upon the linear and continuous nature of the trail and utilize it as a landscape infrastructure.

4.2.1 Ensuring Connectivity: Planning and Layout

The first phase of this project focuses on mapping and trail alignment, more specifically on ensuring that the trail achieves the connectivity goal of the master plan. This phase attains the following objectives: pedestrian and cycling connectivity between and inside community centers; direct access to natural resources; links between community interaction spaces and public gathering places; and emphasis on historic patterns of towns and villages.

Initially the study undertakes analysis of the existing trail alignment, proposed by GCHTP. Existing trail layout is tested via GIS analysis on whether or not it connects the coastal cities, provides access to a variety of ecological conditions, and links important community, ecological, and historical sites. For clarity, the results of GIS analysis are summarized in diagrams generated with Adobe Creative Suite.

This analysis confirmed that the trail as proposed succeeds in connecting all coastal cities and towns, and diverse coastal ecosystems. These ecosystems form distinct character zones along the trail, see Figures 1-2. (For more information on ecosystems of the coastal counties that the trail enables access to see The Nature Conservancy (2001). Additionally, the trail as proposed connects an array of sites important to nearby communities as social, ecological and educational assets. These sites already have lots of value for communities and are already significant destinations that the trail will link together when implemented. These existing destinations are represented with white circles on the map in Figure 2. Moreover, the trail is successful in highlighting and linking important historical and cultural sites.
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<td>Pedestrian and bicycling connectivity between and inside community centers</td>
<td>Connections to city centers along the coast</td>
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<td>Connections to important community areas/organizations</td>
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<td>Social and community interaction spaces, public gathering spaces and links between them</td>
<td>Physical links between existing community interaction spaces, public gathering spaces</td>
<td>Site design that accommodates, stimulates public gathering and interaction</td>
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<td>Green infrastructure over conventional infrastructure, e.g. sustainable stormwater management strategies</td>
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<td>Restore wetlands along sand beach at large storm outlets/Courthouse Rd.</td>
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<td>Establish shore buffer through dunes cultivation along the beach segments of the trail</td>
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<td>Incorporating sustainable stormwater management strategies into the built trail where possible</td>
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<td>Growth patterns based on historic patterns of towns and villages</td>
<td>Trail connections to historic sites/town centers</td>
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<td>Restore wetlands along sand beach at large storm outlets</td>
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<td>Public awareness of natural and man-made disasters</td>
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<td>Direct access to nature and natural systems</td>
<td>Connections to existing water recreation access points</td>
<td>Road marking highlighting specificity of the trail segment character</td>
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<td>Connections to various types of ecological systems, wetlands types and habitats</td>
<td>Amenities for bike parking/storage at points of intersections with blueways, pedestrian trails</td>
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<td>Take trail off road where the land is community owned and there are natural settings/interest points</td>
<td>Interpretation sites in various ecological conditions</td>
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<td>Connections to important birding sites, identified by Audubon Society</td>
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<td>Protect, preserve and restore ecological systems</td>
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<td>Restore wetlands along sand beach at large storm outlets/Courthouse Rd.</td>
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<td>Planting strategy along sand beach to protect dunes</td>
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<td>Restore connectivity between natural systems at trail and road crossing</td>
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For example, just in the Gautier Loop segment the trail traverses through 13 historic sites dating from 400 AD to early 1900 BC. Overall, the analysis of the trail concludes that the proposed alignment of the trail is successful in ensuring connectivity for coastal community resilience.

This study proposes additional extensions from the main spine of the trail to connect to other important points for community social functions and access to natural resources. On the map in Figure 2 the proposed additions to the trail are highlighted in blue. The proposed destinations that refer to social gathering points and educational opportunities are identified by yellow circles. The points significant for direct access to nature are identified by red.

4.2.2 Providing Continuity and Identity: Initial Phase for Implementation

The next large step that this master plan calls for is ensuring continuity and identity on the ground. Currently, the trail is a concept, a map on paper. But how is it experienced on the ground? The trail is proposed to go through the existing road infrastructure in different conditions, identified during site analysis: rural areas, narrow and wide urban streets, urban beaches, and bridge overlooks. A multiuse trail is already in place in beach segments and bridge overlook segments. The GCHTP proposes that the remaining segments of the trail, where the trail is nonexistent now, share the existing roads with vehicular traffic, as an economic solution. Presently those three conditions pose safety issues, where the user of the trail has to compete with vehicles on the road.

The plan suggests using road marking, as a cost-effective short-term measure to delineate sub functions of the road: bike lanes and drive lanes. See an example of a current condition and suggested road marking of a rural road segment in figure 3. In addition to making shared use roads safer, the road marking system will highlight the trails’ identity and ensure that the user knows he is on the Mississippi Heritage Trail. Moreover, the markings could carry educational messages that correspond to the trail character zones and call attention to its important components (see top left corner on Figure 2).

Another way to enhance the trail’s identity on the ground is using existing infrastructure to signal the trails’ course. For instance, electric poles located all along the trail could be incorporated into manifesting the presence of the trail. Bases of the poles can be colored into bright colors to accentuate the trail experience. Moreover, this measure could serve as a means of increasing awareness of coastal disasters. Beatley (2009, p.83-84) considers building awareness of coastal disasters an important characteristic of resilient coastal community. The level of the previous high water marks during floods could be represented by colored designs on the electric poles, as seen in a section of Figure 3. The painting process could become a community art activity.

Moreover, in order to allow stops and destinations along the trail to be accessible for cyclists (the destinations are identified by white, yellow, and red circles with black outline on Figure 2), there needs to be bicycle parking at all the trail destination points.

Additionally, spaces for pauses should be located not less than 2.8 miles apart. Dill et al. (2012) found 2.8 miles to be the median single bike trip distance. This means that average people are unlikely to bike more than 2.8 miles without a stop. Hatch marks on the map in Figure 2 show the approximate spacing of the resting points. At those rest locations there is no necessity for bike parking facilities, but there needs to be basic seating and signage for educational purposes, as seen in Figure 4.

The simple and cost-effective measures of using road marking, registering the height of previous flood levels on existing infrastructure, including bike parking in destinations, and adding rest areas could become the first phase of implementing the trail on the ground and insure the continuity and identity of the trail.

4.2.3 Landscape Infrastructure: Final Phase of Implementation

Once the trail gains support and popularity the next phase in strengthening coastal community resilience is to elaborate and utilize the long linear nature of the trail as green infrastructure. At the same time this final step in trail implementation will also enhance user experience.

One of the proposed measures of this stage is moving the trail off-road to improve the experience of the rider and to allow for the incorporation of stormwater runoff treatment from the road surface, see Figure 4.

Another way the trail could perform functions of green infrastructure is by reestablishing a connection between natural systems, where the connection has been lost. An intersection of the trail and highway I-90 is a good example of this measure, see Figures 5-6.
Figure 1. Habitat Types along the Trail. GIS Map by the Author

Figure 2. Mississippi Heritage Trail. Map by the Author
The trail could act as a traffic calming device, a speed bump, and at the same time provide a connection between disrupted wetlands of the Escatawpa River drainage area. The underpass for amphibians and reptiles could stimulate the health of the ecosystem and decrease road kill (Speckhardt, 2012).

Additionally, within the extensive urban beach segments the trail construction could incorporate vegetated shore buffer strategies. Integration of sand dunes and a restored marshy shoreline could help treat stormwater and provide wind barriers (Beatley, 2009, p.84-85). Natural systems of marshes and dunes help absorb floods, provide coastal protection from waves, storm surge, and coastal erosion (Barbier et al., 2011, p.179, 183). This intervention can be viewed as restoration of a natural condition of marshy shoreline prior to development. Originally the shoreline had a soft marshy edge. In 1928, the US Corps of Engineers first built a floodwall and later, in 1950-1951 added a sand buffer (Sullivan, 2009, p.51, 82), creating the present sand beach. In the selected location at the Courthouse road pier, see Figure 7, softening and strengthening the edge of the water could take place. The diagrams show how vertical sand walls and gabion walls are positioned to capture the prevailing summer and winter winds sand deposition, as well as, how they can aid in accumulation of sand for sand dunes. Sediment collected from culverted tributaries and drains can form a new wetland edge.

5 CONCLUSIONS

This study illustrates that the MCHT has a high potential to strengthen coastal community resilience. The trail incorporates Beatley’s principles of coastal community resilience (2009, p.73-93) by establishing three main goals of the project (guaranteeing connectivity through trail alignment, ensuring continuity and trails’ identity, and, finally, taking advantage of the trail as green landscape infrastructure). More specifically, the trail will help to provide: pedestrian and bicycling connectivity between and inside community centers; protection, preservation and restoration of ecological systems; direct access to nature and natural systems; public awareness of natural and man-made disasters; green Infrastructure over conventional infrastructure; social and community interaction spaces, public gathering spaces and links between them; growth patterns based on historic patterns of towns and villages. The relationships between interventions and community resilience principles are shown in Table 1.

Socially, the master plan, first of all, attempts to strengthen the social capital, and formulate “social and cultural matter” of the Coast, the matter “defining the essence and identity” (Campanella, 2006, p.142) of the region as one community. This master plan focuses on building a sense of place – Mississippi Coast – with its vast ecological, historical, and cultural resources. The trail attempts to bring together and define residents of multiple cities and towns as one coastal community with common wealth and common threats.
Figure 4. Trail as Green Infrastructure: Stormwater Filtration. Section by the Author

Figure 5. Trail as Green Infrastructure: Intersection of Trail and I-90. Aerial Copyright by Google 2013, Overlaid with GIS Wetlands Map by the Author

Figure 6. Trail as Green Infrastructure: Intersection of Trail and I-90. Speed Bump Combined with Reptiles and Amphibians Underpath. Photos: River Frog from Public Domain fl.biology.usgs.gov; Pascagoula Map Turtle from commons.wikimedia.org, Diagram by the Author
Additionally, provisions for connections between multiple urban centers and important community destinations facilitate the use of the trail as a mode of transportation, which encourages a healthy lifestyle (Schasberger et al., 2009, p.343). Moreover, the trail incorporates measures to increase disaster awareness, e.g. light posts with flood elevation marks. Consequently, physically and emotionally healthy residents will be able to cope much better with any adverse events, be it a hurricane or a rapid decline in fossil fuels supply.

Economic impacts of the trails have been studied and quantified (NPS, 1995). Just like numerous case studies in this report, the MCHT has potential to increase real property values, support recreation-oriented businesses and employment, attract visitors and increase cultural and ecological tourism. Walkability and biking opportunities increased by the trail can help the community better adapt to declining oil supplies. State-long MCHT can expand the narrow tourism base, mostly focused on casino gambling at the moment (Mississippi Development Authority/Tourism Division, 2011) and create diversity in a tourist economy. The trail will provide expanded opportunities for nature and culture based tourism, which in turn can diversify and widen sources of income for the residents, making economy more resilient. Additional and existing destinations with water recreation access have potential to spur new interactions between locally owned small recreational businesses, prompting new partnerships between water equipment renters and bike renters.

Ecologically, the trail seeks to raise protection of natural resources through providing access and framing the natural beauty, increasing awareness of breadths and functions of ecological systems. Beyond higher appreciation of the natural environment, the trail can act as landscape infrastructure. The master plan illustrates integration of stormwater treatment into trail profile. MCHT includes provisions to restore connections between ecosystems, previously disrupted. This measure will result in stronger more functional ecosystems, like in an example of an underpath for amphibians and reptiles across I-90. Restored coastal marshes and constructed dunes along the beach segments will help clean stormwater water, protect the shoreline from waves, storm surges, and erosion, and moreover act as a natural sponge for floods.

Therefore the trail does not attempt to physically stop a hurricane or an oil spill. The trail will help build Community; Community that is healthier and less dependent on vehicular transport, Community that is proud of its heritage and wealth of its natural resources. This Community will have more internal capacity to withstand adverse effects of catastrophic events or economic changes.

5.1 Limitations of the MCHT Master Plan and Trail Design for Community Resilience

Trail design for stimulating coastal community resilience has several major limitations, as can be illustrated on the MCHT. First of all, during the design phase the impacts of the trail can only be estimated. Furthermore, even upon installation of all the proposed measures of the MCHT master plan registering its impact on resilience could be very difficult. Secondly, the study is largely based on a single approach to community resilience building formulated by Beatley (2009). Additionally, two out of nine characteristics of a resilient coast, from Beatley’s definition, are not incorporated into the MCHT master plan. The first one has to do with placement of critical facilities, e.g. hospitals, and infrastructure
outside of high-risk locations. This measure is simply outside of the scope of trail planning. Second characteristic that is not integrated into MCHT master plan calls for development outside of high-risk zones. This measure is also outside of the trail planning capacity. Moreover, since the trail follows the coastline, at times it is situated in a flood zone, which can possibly stimulate development near it, since the trail is an amenity. This raises a question of whether trail planning is sufficient as a single measure to stimulate resilience. While the potential of the positive impact of trails on resilience is high, trail planning should be a part of a comprehensive strategy for resilience building, not its only measure.

5.2 Significance to the Field and Expected Outcomes
This research has theoretical, methodological, and empirical contributions to the field and the region. In theoretical discourse Hellmund and Smith (2006, p.xii) describe the design of trails as a key stage in bridging the gap between theory and practice. The trail design in their opinion aids in protecting landscapes, allowing wildlife connectivity, and finding ways to bring people into nature. Currently, there is no overlap in the literature between the theory of coastal community resilience and coastal recreational trail planning. This study argues that trail design has the potential to incorporate the essential function of stimulating coastal community resilience. The methodology, explored in the study, can provide an efficient way for landscape architects and planners to consider the larger regional interests around stimulating coastal resilience. The methodology, explored in the study, can provide an efficient way for landscape architects and planners to consider the larger regional interests around stimulating coastal resilience during the design phase of a trail, without complicating the process, and thus could serve as an example for trail designers in a coastal context. Therefore, this study merges two theoretical topics important in landscape architecture – coastal resilience and recreational trail functions. This study also suggests a methodology for a practical application in coastal regions.

Additionally, the master plan is helpful for the region in acquiring funding and support of local officials in creating trails in other communities that perform on multiple levels.

6 REFERENCES


Mississippi Gulf Coast Sustainable Communities Initiative. (n.d.) About the plan for...


