Hurricane Hugo and Shoreline Retreat: Evaluating the Effectiveness of the South Carolina Beachfront Management Act

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Chapter 1: Hurricane Reconstruction and Shoreline Retreat Policy

Increasingly, in recent years there has been a considerable amount of discussion among coastal experts and public officials about the need to promote "strategic retreat" from our nation's coastal shorelines. Coastlines are extremely sensitive and dynamic environments, easily damaged by human development and alteration. Long term shoreline erosion, hurricanes and coastal storms, and the possibility of significant sea level rise, all suggest the importance of gradually reorienting development and settlement patterns away from shorelines, at least along the most dynamic and hazardous of these areas. Moreover, there is a growing recognition that attempts to reinforce the coastline are largely futile and environmentally damaging, and several states have enacted bans on permanent shore-hardening structures such as seawalls and revetments.¹

Long term human retreat from the ocean shoreline can be accomplished in a variety of ways, and through a number of specific planning and management measures.² Increasingly, for example, coastal states are imposing setback requirements for new development, based on long term erosion patterns.³ Hurricanes and major coastal represent in theory a major opportunity to promote shoreline retreat. Where damage is heavy, coastal buildings can be moved landward, and reconstructed on safer sites. Major storms represent discrete opportunities to reorient the built environment and to gradually move people and property out of harms way. A number of coastal states and localities have developed post-disaster recovery and reconstruction plans, and impose restrictions on
rebuilding following such an event. The research reported here examines retreat opportunities following Hurricane Hugo.

More specifically, the study described here focuses on the effectiveness and implementation of one state-level attempt to manage these coastal development pressures and to promote gradual shoreline retreat -- the South Carolina Beachfront Management Act (BMA) -- and its ability to promote retreat and mitigation in the aftermath of Hurricane Hugo. Hugo struck the South Carolina coast on the morning of September 22, 1989. The storm provided the opportunity not only to test the strength of shoreline structures but also the strength and effective implementation of the BMA. The key provisions of the Act prevented heavily damaged structures from rebuilding when in close proximity to the ocean (and specifically when in the twenty foot no construction zone or the so-called "dead zone"), and required structures to be moved further landward. The research reported here examines the extent to which these provisions have actually resulted in shoreline retreat, the problems and impediments encountered along the way, and implications for retreat programs and policies in other coastal states and communities.

Funding of this research effort began with a quick-response grant from the Natural Hazards Research Applications and Information Center, at the University of Colorado. This funding permitted a series of trips to South Carolina shortly after the hurricane, and an extensive set of interviews with state and local officials, and representatives of other important stakeholder groups. A grant from the National Science Foundation has permitted the extension of this monitoring effort and a more detailed and thorough analysis of rebuilding patterns. Specifically, the NSF-funded reconstruction monitoring and evaluation has consisted of
several key components, including: aerial photographic analysis; a coastal propertyowners survey; and a set of local community case studies. Together these research components allow for a fairly thorough and complete evaluation of reconstruction patterns, the extent to which retreat has occurred during reconstruction, and the factors influencing these reconstruction patterns and decisions.

The organization of the chapters to follow correspond roughly to these different research components. Chapter 2 discusses the background and history of the South Carolina law, and provides an overview of its key provisions and requirements. Chapter 3 presents the results of an analysis of pre-Hugo and post-Hugo aerial photography for certain stretches of beachfront and an assessment of the extent to which rebuilding patterns have been modified following the storm. Chapter 4 provides similar kinds of information, collected through a mail questionnaire administered to the owners of heavily-damaged beachfront property. Information is also provided on the various factors influencing reconstruction decisions, as reported by propertyowners. Chapter 5 presents a series of brief case studies of local reconstruction, specifically discussing the experiences of Folly Beach, Pawleys Island, Garden City and Myrtle Beach. Finally, Chapter 6 presents the overall conclusions of the study, discusses implications for coastal policy and offers recommendations for facilitating efforts in other coastal states.
Chapter 1 - Footnotes


2 Ibid, see Chapter 2 especially.

3 e.g., see John M. Houlan, "Comparison of State construction Setbacks to Manage Development in Coastal Hazard Areas," *Coastal Management* Vol. 17, 1989.
Chapter 2: The South Carolina Beachfront Management Act: History, Basic Provisions and Key Implementation Issues

Key Provisions of the Original BMA

While South Carolina had a limited coastal management capability prior to the 1988 Beachfront Management Act (BMA), the passage of this legislation represented a major and significant expansion of the state's control over coastal development. The Act grew largely out of the recommendations of the Blue Ribbon Committee on Beachfront Management. The Committee's report, issued in March of 1987, strongly condemned the practice of armoring the shoreline and called for a thirty-year retreat policy, coupled with selective beach renourishment. In the words of the final report: "A retreat implemented over thirty years will allow owners of structures sited too close to the beach to realize the economic life of their structures and adjust their plans over a reasonable 30-year time period."2

The Beachfront Management Act as finally adopted embraced a forty-year retreat concept. To achieve this long-term objective, the Act included both restrictions to new construction along the shorefront and reconstruction in the event of a damaging hurricane or other severe coastal storm. Under the original law, two types of erosion zones were identified: standard erosion zones, and inlet erosion zones. As Diagram 1 indicates, within standard erosion zones, a "baseline" was first to be established, located along the "ideal" duneline (i.e. where the actual dune crest would be if the shoreline had not been altered by man).3 In the case of inlet zones, the baseline was established at the furthest landward point during the last forty years. A "setback zone" was established landward of the
baseline in each of these zones a distance equal to forty times the average annual erosion rate for that particular stretch of coast. Finally, a "no construction zone" was delineated a distance extending twenty feet landward of the baseline. These three lines formed the basis of the South Carolina regulatory system. (see figure 1)

New construction within these regulatory zones was then significantly restricted. No new habitable structures were permitted in the twenty-foot no construction zone (or "dead zone"), nor seaward of the baseline. New habitable structures were, however, permitted within the setback zone, but they were not to exceed 5000 square feet in size (inclusive of porches, decks, patios, and garages) and must be located as far landward as practicable. New erosion control devices and recreational amenities (e.g. swimming pools) were prohibited seaward of the setback line. All real estate transfers involving property seaward of of the setback line were to contain disclosure statements which indicated the relative location of the regulatory lines and the latest local erosion rates.

Some of the most stringent provisions of the Beachfront Management Act applied to reconstruction of damaged shorefront structures following hurricanes and other similar events (see Table 2-1). These restrictions to rebuilding were seen by many as a necessary component of the retreat policy. The most controversial of the reconstruction provisions was the prohibition on the rebuilding of habitable structures in the "damaged beyond repair" 20-foot dead zone. Under the Act, structures damaged beyond repair could be rebuilt in the setback zone, but they had to be located landward of the dead zone, could not exceed the total square footage of the original structure, could not exceed the linear square footage along the coastline of the original structure, and had to be located as far
landward as possible (preferably behind the setback line). The owner of the damaged structure was also required to renourish the beach in front of the structure on a yearly basis "with an amount and type of sand to be approved by the council, but which must not be less than one and one-half times the yearly volume of sand lost due to erosion". This requirement was not to apply if the beach was already covered by an ongoing federal, state or local renourishment program. "Destroyed beyond repair" was defined in Coastal Council administrative rulings to mean 66 and \( \frac{2}{3} \% \) destroyed.

Figure 1
Restrictions on rebuilding erosion control devices and recreational amenities were also included in the original Act (see Table 2-1). If an erosion control device was more than 50 percent damaged, it could not be repaired, but could be replaced by a sloping revetment if it served to protect a habitable structure and was moved as far landward as possible. Where a seawall or erosion control device protected undeveloped property it could be replaced in its original location only if needed to provide continuity to an existing seawall or erosion control device. Where such erosion control devices were allowed to be replaced, the property owner was required to undertake the same beach renourishment requirements mentioned above for habitable structures. Also, where recreational amenities (e.g. pools) in the setback zone were damaged beyond 50%, they were prevented from rebuilding as well.

Damage to shorefront property from hurricane Hugo was substantial. Much of this property -- homes, commercial structures, seawalls and recreational amenities such as pools -- was damaged to such a degree that the Beachfront Management Act's restrictions on rebuilding became applicable. It was initially estimated by the Coastal Council that 213 structures, located at least partially in the dead zone, were damaged beyond repair. This figure was later adjusted to 159 structures. Many more seawalls and pools were also damaged beyond the Act's damage thresholds. The types of damages along the South Carolina coast differed considerably between the Myrtle Beach/Grand Stand area to the north, and the Charleston area to the South. In the Charleston area, most beachfront damage occurred in the Towns of Folly Beach, Isle of Palms and Sullivan's Island and consisted of damage primarily to single family beach homes. To the north, beachfront damages were heaviest on Pawleys Island and
Garden City (with the Horry County portion of Garden City receiving much greater Shorefront damage than the Georgetown County portion). Substantial damages were incurred by hotels and motels in the Grand Strand area (and their accompanying pools and seawalls), as well as to single family beach homes. (For a more detailed discussion of damages at the community level, see Chapter 5.)

**Key Reconstruction Issues and Difficulties**

*Problems in Implementing an Emerging Regulatory System*

Following Hugo the South Carolina Coastal Council faced the Herculean task of implementing a fairly complex reconstruction permitting system even before many of the most basic underpinnings of the system were fully in place. When the storm hit the coast some of the most basic prerequisites for implementation were not present, including even the final ortho-quad maps necessary for determining the location of buildings relative to regulatory lines. These maps were received, however, within a few days following the storm and did not seem to substantially slow the Council’s progress.

To the Coastal Council’s credit many of the specific administrative rules and procedures used in managing reconstruction had already been established prior to the Hurricane. For instance, the Council had devised in advance a point system to be used by damage appraisers in determining the extent of structural damage (e.g. whether or not a home was damaged beyond repair). Table 2-2 presents the system developed by council staff to be used in evaluating damage to habitable structures. For instance, if the appraiser finds that the foundation or pilings for the structure have remained intact and functional, then 25% of the points are assigned for
that particular building component. If a structure received more than 33 1/3% points under this system it is deemed to be repairable. Despite this attempt to lay out a fairly rational methodology for damage assessment, problems in its application did arise (discussed below).

Table 2-2: The Coastal Council Damage Assessment Methodology

<table>
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<tr>
<th>Building Components</th>
<th>Percentage of Total Structure</th>
<th>Percentage Structure Undamaged</th>
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<tbody>
<tr>
<td>Foundation or pilings</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Exterior and interior load bearing walls and beams</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Roof system - joists (rafters, decking and coverings)</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Flooring</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Doors and windows</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Decks, porches or stairs</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Electrical, plumbing, heating and air systems</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Septic tank, drain fields or</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>100% Total</td>
<td>Total</td>
<td></td>
</tr>
</tbody>
</table>

Furthermore, after Hugo struck, the Coastal Council did act quickly to adopt certain general permits and emergency orders to facilitate and expedite the rebuilding process. These were brought before the Council within five days of the storm, and council staff have indicated that their experiences following the January 1987 winter storm were helpful in preparing them for Hugo. The rationale behind the issuance of general permits was the need to relieve the relatively small council staff from having to review hundreds of rebuilding requests that would ultimately be
approved anyway. The Council also instituted a special emergency permit process designed to expedite the processing of reconstruction permits.

Despite the efforts of the Coastal Council to establish certain administrative interpretations and procedures prior to this disaster event, when Hugo hit the administration of the act was clearly still in its infancy and there were many things that were not yet settled. This resulted in substantial confusion on the part of property owners about what they could and could not do with their beachfront property, and considerable frustration with a system perceived by many to be very much a "moving target." Some of the specific elements contributing to this confusion are discussed in more detail below. The occurrence of a major hurricane only a few months after the effective date of the Beachfront Management Act was the cause of much of the post-disaster confusion. If the storm had occurred four or five years later many of the enforcement difficulties faced by the Coastal Council might have been avoided. There were many specific situations concerning reconstruction that the Coastal Council did not, and probably could not, contemplate prior to the actual storm event. Consequently it was forced to address these questions and issues along the way with administrative interpretations and case-by-case decision making. A number of these situations are described below.

Promoting Flexibility in Reconstruction Decisions

There has been a considerable difference of opinion among observers about how aggressively and stridently the provisions of the Beachfront Act were enforced in the months following the storm. The hurricane clearly put the Coastal Council in the position of implementing certain provisions of the Act -- the "dead zone" restrictions in particular -- which were
unpopular with many coastal factions (oceanfront landowners, beachfront commercial establishments, local public officials, among others). Shortly after the hurricane there were calls to suspend or even repeal the Act. One legislator for the Grand Strand called for a special session of the S.C. General Assembly to consider such actions. Largely because of support expressed for the Act by Governor Campbell these proposals were not seriously considered. However, the Coastal Council was faced with enforcing regulatory provisions which the state legislature has already been in the process of modifying; indeed, essentially eliminating, in the case the dead zone restrictions. A bill proposed by Sen. Waddell and others (Senate Bill 391) had actually passed the Senate in May 1989, just prior to Hugo -- a bill which would have essentially eliminated the 20 foot no construction zone, and would have changed the 40-year setback zone to a 30-year setback zone. Coastal Council staff interviewed in the weeks immediately following the storm, indicated that they did not believe they could "second guess" what the State legislature would do, but rather could only enforce the law as it was currently on the books. Most council staff did not believe that the stringency of their enforcement was in any way affected by the knowledge that the law was in the process of being amended.

Most outside observers have a somewhat different view of the Council's actions in the post-Hugo period. Both supporters (e.g. members of the environmental community) and detractors of the Act (e.g. beachfront propertyowners) appear to agree that the Council and its staff sought to be as lenient and flexible as possible in regulating reconstruction -- what the Myrtle Beach Sun News aptly described as an "elasticizing" of the intentions of the Act. Members of the environmental community accused
the council and staff of caving-in to propertyowners, and of failing to enforce the letter of the law. They believed that this intentional loosening of restrictions on rebuilding reflected the belief by Council officials that if they were too stringent in their enforcement of the Act that this would further galvanize opposition to beachfront management in general, and that the entire program might be jeopardized. Property owners and representatives of beachfront businesses, on the other hand, generally applauded the flexibility of the Council, believing this stance to be entirely reasonable given the financial hardships and trauma that beachfront owners have been subjected to.

Some of this tendency to be as lenient as possible, perhaps a great deal of it, was likely a reflection of the fact that this high level of damage happened so soon following the adoption of the new beachfront rules. Clearly the Beachfront Management Act represented a fairly significant "changing of the rules," but did not, as it turned out, allow the thirty-years or so amortization period contemplated by the Blue Ribbon Committee (see earlier quote). There also appears to have been genuine surprise on the part of many coastal residents -- public officials and the general public alike -- about the requirements of the Beachfront Management Act, the dead zone prohibitions in particular.

A number of post-disaster examples might be cited as evidence of this loosening of reconstruction restrictions. One major example is the Council's decision concerning the Kingfisher pier seawall. In January of 1990 the Coastal Council voted to allow the reconstruction of a damaged seawall (damaged beyond 50%) at the Kingfisher pier in Garden City. The seawall did not protect a structure but rather protected only a parking lot. Critics of this action argued that the Coastal Council directly violated the
intentions of the Act of allowing beach areas to return to a natural and unarmored state. The Council, while deciding that indeed the seawall did not protect "developed" property, approved its reconstruction based on the argument that it was simply a segment of an otherwise continuous seawall (see earlier discussion of the restrictions to rebuilding seawalls). To many who are familiar with the seawall this seemed a contrived argument, as the Kingfisher segment was not situated between an unbroken line of seawalls, but rather comprised the southern end of a seawall which itself did not extend very far north. Coastal Council staff recommended against the permit, and council member Wes Jones later described the action as a "dangerous precedent."  

Replacement of Structures Not Damaged Beyond Repair

Another example to some of the Coastal Council's leniency, involved property owners who wished to replace structures located in the dead zone, but which had not been damaged beyond repair. Specifically, the Council was initially faced with a request from the owner of a 3000 square foot apartment building located in the dead zone, who wished to replace it with a 1500 square foot house. Council staff supported a policy which would allow the owner to replace the damaged building with a smaller structure, arguing that if approval was not given the owner would simply repair the existing structure, and perhaps even reinforce it -- a result seen to be contrary to the retreat emphasis of the Act. The Coastal Council adopted in January 1990 an emergency order which allowed replacement of structures in the dead zone which were not damaged beyond repair, if they met certain conditions: they were to be no further seaward than the original structure; were to be no wider along the oceanfront than the
original structure; were to be located as far landward as possible; and the replaced building was to be one-third smaller in square footage than the original, or no more than 2000 square feet, whichever was greater.

To some this "replacement building" emergency order represented another example of the relaxing of rebuilding restrictions. It was evident that there were many structures that had received damage very close to the two-thirds standard used to define "damaged beyond repair." In those cases, it often made more financial sense for the propertyowner to build a new structure than to repair the existing one. While the Council and its staff have supported allowing such propertyowners to build these new structures, a strict interpretation of the original Act would appear to prohibit this. Council staff have argued that the outcome is a positive one because it results in smaller structures located further from the ocean. Opponents of this policy could argue that in many cases if the council prevented replacement, existing heavily damaged structures would be abandoned under the original act. In any event, if in many cases it is more economical to replace a structure than to repair it, this suggests to some observers that either a two-thirds damage threshold was too high, or there is considerable leniency provided in such damage assessments. (e.g. a structure assigned a 65% damage rating rather than the 75% or 80% it perhaps deserved).

Allowing Additions to Beachfront Homes

Another issue which has arisen in more recent months is whether beachfront propertyowners ought to be allowed to add onto their homes, up to the 5,000 square foot limitation set for the forty year setback zone. Recall that under the BMA, structures damaged beyond repair are not
allowed to be rebuilt any larger than the pre-existing structure. This has represented to some beachfront propertyowners an inequity between those who had pre-existing structures, who were limited to this pre-existing square footage, and those building new homes who could build up to 5000 square feet. Eventually the Coastal Council decided that all beachfront propertyowners were entitled to additions to their homes, including those destroyed by Hugo, up to a total of 5,000 square feet. What this has allowed is a circumventing of the restriction on rebuilding larger structures. Particularly in Garden City and Pawleys Island, a number of propertyowners have simultaneously submitted requests to replace their original square footage, and to build additions, up to the 5,000 square feet total. The result of this policy has been that in some cases small cottages have been replaced with much larger structures, further increasing the amount of property at risk to future storm events. (This is further verified by the aerial photographic analysis and survey data presented in later chapters.)

Confusion Over the Regulatory Lines

The status of the regulatory lines was also the source of much confusion following the storm. Had the storm occurred even one year later, the setback and dead zone lines would have been relatively fixed and finalized. As it was the lines in place when the storm struck were officially considered "interim lines" and were not actually to become final until July of 1990. This created a substantial degree of uncertainty both for coastal council regulators and for propertyowners. Initially the lines were established by consulting engineering firms. Under the Act a beachfront monitoring program was established to collect data on current
rates of erosion (i.e. the establishment of beach monuments). By law the Coastal Council was required to adjust its initial baselines to reflect information collected from its monitoring program. Consequently, the Council has in some places modified the baselines several times, even before adoption of the final lines.

This further contributed to the impression of a regulatory moving target. While Council staff might tell a homeowner one day that she or he could not rebuild their home because it was in the dead zone, the line might be modified the next, excluding the previously affected home. For instance, the Council eliminated the setback zone entirely in Pawleys Island and these types of line modifications have occurred throughout the reconstruction period. The lines are also subject to appeal by landowners and local governments, and significant modifications to the lines have occurred in response to these appeals, both before and after Hugo. There was the perception on the part of some that such modifications are again the result of the Council's desire to be as flexible and lenient as possible.

Part of the problem with the regulatory lines has been the methodology used to draw them. A fairly complex methodology was involved, particularly with respect to the standard erosion zones. This methodology first entailed analyzing shoreline profiles along coastlines unaffected by seawalls, averaging these profiles, and constructing an "ideal profile." The latter was then superimposed on developed shorelines, and the baseline established at the ideal dune crestline. A number of individuals interviewed over the course of this study have expressed concerns about the accuracy of this methodology. Even supporters of the Act have admitted that, in the words of one observer, the lines were the result of "alchemy not science." The methodology requires prediction
about what sand and water will do over time and most agree involves considerable interpretation and educated guessing. This has tended to open up the methodology to sincere differences of opinion about where the lines should be drawn.

The system of establishing and amending the regulatory lines led to perceptions on the part of some that because the methodology was somewhat "loose" it allowed the Coastal Council to adjust the lines for political or other reasons. Some observers argued that in some cases the lines were even intentionally moved by the Council in order to minimize the impact on property owners. In a recent letter in the Charleston News & Courier, one citizen contends:

Since Hugo, the Coastal Council has scrambled to adjust baselines so that the actual amount of property stolen can be minimized. This has been done especially in wealthy areas like Pawleys Island, where well-connected owners have the financial resources to mount successful challenges to the act. Council's engineers have exercised liberal discretion (which the act does not allow) in condemning property to go as few oxen as possible and forestall the public outcry against the theft of hundreds of millions of dollars worth of private property.9

The system for establishing lines was also criticized by some for its failure to explicitly consider the impacts of hurricanes and major storms. The methodological basis for the lines is in theory long-term erosion patterns, and did not incorporate specific consideration of such storm impacts. This to some seemed irrational, and it has been suggested by at least one member of the environmental community that a triggering mechanism needed to be incorporated into the system so that the lines would be automatically redrawn where storm-induced erosion exceeded a certain pre-established amount or percentage.
Conflicts Between Local and State Regulations

Some of the frustration felt by property owners has been further exacerbated by local zoning regulations which also restrict reconstruction, and which varied greatly from place to place. Whether a beachfront property owner was able to rebuild outside of the no construction zone often depended on local land use restrictions, and it was interesting to see how different jurisdictions implemented their zoning ordinances in light of the need to move structures landward. Georgetown County, for instance, had a 25-foot frontyard setback requirement which served to restrict the extent to which beachfront property owners were able to move their structures landward and out of the no construction zones. Several property owners sought variances to this restriction but most were turned down by the county. For landowners who believed that this completely denied them use of their property it raised interesting questions about who ought to be sued. Was it the county's frontyard setback or the state's dead zone restrictions which prevented reasonable economic use? In the Horry County portions of Garden City, on the other hand, property owners received some relief from these local setback requirements. Under normal conditions Horry County required structures to have a 20-foot frontyard setback, but structures damaged by Hugo had only to meet 50% of this and other zoning setbacks. Also, if the owner had to construct a more vertical structure to achieve the same amount of square footage as existed before the storm he or she was allowed to do so, even if the resulting structure exceeded the 35 foot height limit.

Another example of a potential conflict between the requirements of the BMA and local zoning provisions, again contributing to propertyowner
confusion, arose in North Myrtle Beach concerning repair and replacement of pools. Under the Coastal Council administrative rules, if a pool was not damaged beyond 50%, and thus was repairable, the propertyowner could elect to replace the pool if he or she so desired (i.e. similar to the "replacement building" standard mentioned earlier). Apparently for pools it is often easier to replace a pool outright than to attempt to repair it. However, under North Myrtle Beach's zoning ordinance if the owner destroyed the pool, the use became nonconforming and the owner was then prevented from rebuilding it. The city deliberated at length about this issue and decided that to prevent a propertyowner from rebuilding a pool (i.e. replacing the pool with a new one), for which a permit from Coastal Council has been received, would be to risk lawsuits. The city was willing to allow the practice even though it was contrary to its ordinance.

Many coastal localities have faced their own unique questions concerning rebuilding following Hugo. Myrtle Beach, for instance, debated what to do about reconstruction of parking lots, grassy yards, gazebos, and other improvements by hotels which had for years been located on the publicly-owned beach. The city owns significant amounts of the dry sand beach as a result of a donation of land in 1939 by Myrtle Beach Farms. While the city has had a policy on the books for several years to gradually retrieve these lands, stiff opposition from hotel interests made this difficult in the aftermath of Hugo. (For more discussion of local reconstruction issues see Chapter 5.)
Questions About Damage Assessment

The process by which damage assessment was undertaken has been questioned by some, particularly in light of the relatively low number of beachfront structures classified as "damaged beyond repair." While admittedly the established 66 2/3% damage threshold was higher than the 50% threshold used by FEMA and other localities and states, it did appear that again the Coastal Council sought to be flexible, erring on the side of the property owner where possible. For instance, while the law did not require it, Coastal Council would at the property owners request have a second damage assessment prepared for a structure. An interview with the chief permitting officer for the Myrtle Beach Coastal Council Office indicated that of these second assessments a fairly high percentage resulted in a change in the permit decision (that is, a decision that a structure was not damaged beyond repair after all). For damaged pools and seawalls in North Myrtle Beach, for instance, it was estimated that reassessments lead to a reversal of the original permit decision in 30 to 40% of the cases. (The procedure for reassessment was somewhat different for seawalls and pools, with the property owner given the right to hire his or her own consulting engineer to conduct their own independent assessment; if the property owner's engineer found that the damage was less than 50%, the Council's consultant and the property owner's consultant together selected a third engineer whose assessment became binding on both parties).

These high rates of reversal suggest either that Coastal Council appraisers were giving into the pressures of property owners, or that the methodology was so subjective that it was open to considerable interpretation. There was a perception held by many observers that the
assessment process was quite loose. The Mayor of Folly Beach in an interview with the author, for instance, indicated that he could not believe some of the structures the Council appraisers considered not to be "damaged beyond repair." He and others indicated that in many cases there really wasn't much left of some of these structures. Even structures which had been completely detached from their foundations and had been transported some distance away, were allowed to be returned to their original sites and repaired as long as they did not exceed the 66 2/3 threshold.

Other technical issues concerning damage assessment also arose. The approach taken to evaluating damaged seawalls was particularly contentious. Property owners contended that Council appraisers should consider the entire seawall structure when making their assessments, even that portion which is underground and out of sight. A South Carolina circuit court, apparently impressed with the arguments of hotel-motel operators about the need to complete repairs before the tourist season, issued an opinion in January of 1990 allowing ten plaintiffs to rebuild their walls as long as each posted a $10,000 bond, to be forfeited in the event that they eventually lost their arguments. The Coastal Council appealed this opinion to the State Supreme Court, arguing that such a decision would substantially undermine their ability to implement the Act. In February 1990, the Supreme Court found in favor of the Coastal Council, reversing the lower court's opinion. However, by that time one of the property owners had already rebuilt his seawalls at two hotels. The Coastal Council promptly ordered the walls to be removed, and when they were not, began imposing a $2000 per day fine on the hotel owner. However, the original circuit court judge eventually decided that the propertyowner
could keep the walls until the case was decided later that spring. These legal battles illustrated again the unsettled nature of many of the Coastal Council procedures and policies. The 1990 revisions to the BMA sought to specifically correct this problem, by stating that:

The portion of the structure or device above grade parallel to the shoreline must be evaluated. The length of the structure or device parallel to the shoreline still intact must be compared to the length of the structure or device parallel to the shoreline which has been destroyed. The length of the structure or device parallel to the shoreline determined to be destroyed divided by the total length of the original structure or device ... yields the percent destroyed.¹⁰

This assessment is to occur on a lot-by-lot basis.

The Regulatory "Takings" Issue: Where to Draw the Line Between Public and Private Rights in the Coastal Zone

Perhaps the most significant deficiency of the Beachfront Management Act was its failure to adequately deal in advance with the potential "takings" question. Specifically, what would the state do in situations where as a result of the dead zone restrictions landowners were denied all, or virtually all, reasonable economic use of their beachfront land. And, if compensation by the state was deemed by the courts to be necessary, where would these funds come from? The failure to adequately discuss and deal with these questions was consistently cited by a number of those interviewed as the single most important failing of the Act.

Even before the hurricane hit, the Act was generating takings challenges. One in particular was a suit filed by David H. Lucas, who owned two small lots in the Wild Dunes development in Isle of Palms. Represented by a Charleston law firm, Lucas claimed that inverse
condemnation had occurred because the Act prohibited the construction of anything on the two parcels (they were both located seaward of the baseline in an inlet erosion zone). The lower courts in this case found in favor of Lucas and awarded $1.2 million in compensation. While the award to many seemed high, it did at the time illustrate the potential amount of financial liability created for the state by the dead zone provisions. Awards of the Lucas magnitude do not seem inconceivable, moreover, along a coastline where 10,000 square foot oceanfront lots typically go for between $150,000 and $500,000 apiece. Not long after the initial Lucas decision, a similar decision awarding $670,000 for a single beachfront lot was issued.

The Lucas decision was immediately appealed by the Coastal Council to the State Supreme Court, which interestingly reversed the lower decision, finding that no taking had occurred. This decision was later appealed by Lucas to the U.S. Supreme Court, with a decision rendered in June of 1992. The Supreme Court, in a 7-2 decision, reversed and remanded the S.C. Supreme Court decision. The Court held that where government regulations do not allow for a reasonable economic use a takings must be found, unless the use of the land would amount to a common law nuisance (or would be precluded by some other pre-existing common law doctrine). It is unclear how the S.C. Supreme Court will decide the case on remand, but most believe that upholding the BMA restrictions based on a common law nuisance will be difficult.

The Lucas case was important in illustrating the potential cost of buying out propertyowners who are prevented from rebuilding in the dead zone. While a large number of the buildings damaged beyond repair and located in the dead zone would have been able to build back in some
form (e.g. many lots were deep enough to allow rebuilding behind the dead zone line, and perhaps requiring a smaller home) if as many as one-third were not be able to, the potential cost could be as much as $50 million. By January 1990 there had been some 45 petitions filed with the circuit court claiming a government taking without compensation as a result of rebuilding restrictions. As noted earlier, a number of landowners had also appealed the lines, and many of them were also poised to file similar circuit court petitions in the event that they were unable to get the lines redrawn in their favor. And, it was not always clear (as the discussion later will show) that the public would get much for its money should compensation eventually be paid.

This issue raises fairly fundamental philosophical questions concerning where the line is drawn between public and private rights in the coastal zone. Coastal Council attorneys questioned why the government should be forced to pay someone for not doing something they should not be permitted to do in the first place. Coastal Council attorneys have used several lines of argument in defending the dead zone restrictions as legitimate police power regulations not requiring compensation. One argument, though infrequently used by the Council, was that rebuilding should be prevented in these oceanfront areas because it infringes on the public's beach -- these public rights established through the common law doctrine of "customary use." This doctrine holds that as a result of centuries of use of the dry sand beaches by the public they have essentially acquired ownership rights. Interestingly, this doctrine was the basis for similar rebuilding restrictions imposed on Galveston Island, Texas, following Hurricane Alicia in 1983. Here, the doctrine has been used to establish the public beach as all land seaward of the first line of
vegetation (these rights were codified under the Texas Open Beaches Act). Because the hurricane moved this line of vegetation substantially landward many property owners found that their damaged structures were now seaward of the line and thus on the public beach. The Texas Attorney General's office moved quickly to prevent reconstruction of heavily damaged structures (damaged to greater than 50%) without provision of compensation. The Texas Supreme Court later upheld these actions. Because of differences in the common law histories of Texas and South Carolina, this customary use doctrine appears not to be as applicable to South Carolina.

The primary argument put forth by the Coastal Council in defense of the dead zone prohibitions was based on the fundamental public interest served by these restrictions. Specifically, Council attorneys argued that the courts in decisions like the Lucas case have inappropriately mixed public police powers and eminent domain requirements, and that when public police power regulations are intended to protect public health and welfare, the extent of property value diminution is not determinative. Council attorneys argued that regulating oceanfront development is essential to protecting the public's welfare. The actions of the Coastal Council under the Beachfront Management Act do not take property for a public purpose, but rather prevent private use of land which is harmful to the public interest. As argued by the Council before the S.C. Supreme Court on appeal of the Lucas decision:

There is no 'taking' for public use here, but instead a classic land regulation aimed at preventing use of Respondent's [Lucas] property in a way that is harmful to the general public. There can be no question that the 1988 Beachfront Management Act is a valid exercise of police power protecting
significant public interests from ... ill-planned development ... Based on the foregoing, it is evident that the Court did not properly distinguish between a valid exercise of police power and an exercise of eminent domain, and assumed damages were appropriate merely because a diminution in the value of the property was shown. Such a conclusion fails to weigh the State's interest, and is counter to all precedent.12

The public's health, safety and welfare is protected by these types of oceanfront restrictions for several reasons. They prevent the location of people and property in highly dangerous areas, prevent actions which would create considerable public expense (e.g. in the form of emergency public relief, public subsidies for rebuilding and recovery from hurricanes, public beach renourishment where development accelerates or exacerbates erosion) and public harms (e.g. beachfront homes acting as battering rams, destroying or damaging the beach and dune system). Just as we might prevent people from building homes on high slope terrain or on a seismic fault line we might also prevent them from locating in particularly vulnerable oceanfront locations. Protecting the beach and dune resource, furthermore, is important to preserving the state's tourism industry, to preventing the need for future costly renourishment projects, to preserving the recreational public beach, and to preserving habitat for plant and animal life. "Clearly, the public purposes of preservation and retreat are so important that preventing Plaintiffs [Lucas] from building on their lot should not amount to a taking."13

Several state cases were cited in defense of the Council's opinion, notably the opinion of the South Carolina Supreme Court in Carter v. S.C. Coastal Council. This opinion upheld the Council's actions preventing a private land owner from filling and raising the elevation of approximately 5.3 acres of marsh on Edisto Island (in Colleton County). The landowner
had claimed that failure to issue a permit to allow the filling constituted a taking. The court, however, concluded that the council was merely preventing the "detrimental affect that the uncontrolled use of coastal wetlands would have on the public welfare."14

Council staff also challenged the contention of propertyowners like Lucas that the "highest and best use" of their land is indeed residential development, and that council setback regulations deny all reasonable economic use of the land. Taking the second point first, Council staff have argued that preventing construction of a permanent residential structure does not preclude all economic use of the land. The property owner can still erect a temporary structure, and can use the property for recreation, camping and other similar activities. Also, Council has presented evidence that even when development is precluded there is a market value for the land, in that adjacent landowners could wish to acquire the land for views or beach access. On the first point, council attorneys have argued that the sites in question are highly dynamic beach and dune environments and as such permanent residential development is not the highest and best use. Moreover, the propertyowners should have had, based on these natural characteristics, no expectation that they would be able to build here.

"...There can be no justified expectation to build on property unsuited in its natural state for construction of a home. Beachwood East subdivision is located on shifting sands and subject to ongoing serious threats of erosion. Given the fact that the property is unsuitable for building and that existing neighboring construction does not legitimize the Respondent's [Lucas] to build on the subject lots, he totally failed to show that he has been thwarted in this substantial, justified expectations concerning the property ... The factual situation here is exactly as in Carter, where the court essentially recognized no justified expectation to fill marsh
Plaintiff. The highest and best use of marsh/wetlands was to leave it in its natural state and here the highest and best use of the Respondent's property is to leave it in its nature state as well... In this case, there is a current unjustified expectation to build upon property unsuited for building, regardless of what the Respondent paid for the property."15

The opponents of these BMA rebuilding restrictions have often talked of lost tax base and impacts on the commercial economy of beach communities. Is this not, after all, the reason why people are attracted to such beachfront communities in the first place, to be right on the ocean? Does this not amount to killing the golden goose? Does tourism demand that hotels and development be right on the water? Will people stop coming to the South Carolina coast if they are required to walk an extra forty or fifty feet? Proponents, on the other hand, seem to hold a more fluid theory of coastal economic value. They have argued that preventing reconstruction in the dead zone does not diminish the overall economic "value" manifest in coastal areas but rather shifts it landward somewhat. Empirical evidence would seem to support this -- in highly erosive barrier island situations, where an oceanfront row of houses disappears over time, and the second row becomes the oceanfront row, the value of these properties increases accordingly. This redistribution of property values may, of course, suggest the need to find certain mechanisms for requiring those landowners benefitting from these natural changes to help cover the losses incurred by those harmed by them (e.g. perhaps some sort of special oceanfront tax?).

When considered by the U.S. Supreme Court, many of these supportive arguments come under critical fire by the court. As noted, the Supreme Court found in favor of Lucas, reversing the S.C. Supreme Court
decision, and remanding for further deliberation. Specifically, in the 7-2
decision, the majority found that the S.C. Court erred in applying the
"harmful or noxious uses" principle, instead concluding that the fact that
the regulations deprived the property owner of all "economically-viable
use of his land" was determinative. In the words of the majority opinion,
these instances of depriving all economically viable uses "constitute one of
the discrete categories of regulatory deprivations that require
compensation without the usual case-specific inquiry into the public
interest advanced in support of the restraint." To allow elimination of all
economically valuable use of land is "inconsistent with the historical
compact recorded in the takings clause that has become part of our
Constitutional culture." The Court strongly denounces the validity of using
a "prevention of harmful use" standard, and the impossibility of
distinguishing these cases from those intended to "confer benefits." Rather,
such distinctions (i.e. between preventing a harm and securing a public
benefit) are largely "in the eye of the beholder" and the prevention of
harms standard was merely an early expression of the defense of the
police power.

The Court did not definitely conclude that a taking had occurred in
this case, however, remanding back to the S.C. Court to decide. Specifically,
the majority allowed that the regulations might not represent a taking, if
all they did was to make explicit restrictions already inherent in the
bundle of rights -- namely, the state's background principles of the law of
property and nuisance. While the Court thinks it highly unlikely that such
background principles would support deprivation of all reasonable
economic uses they were willing to send it back to the S.C. Court to
deliberate this question. In the majority's words:
We emphasize that to win its case South Carolina must do more than proffer the legislature's declaration that the uses Lucas desires are inconsistent with the public interest, or the conclusory assertion that they violate a common-law maxim ... [such as prevention of a public harm]. Instead, as it would be required to do if it sought to restrain Lucas in a common-law action for public nuisance, South Carolina must identify background principles of nuisance and property law that prohibit the uses he now intends in the circumstances in which the property is presently found. Only on the showing can the state fairly claim that in proscribing all such beneficial uses, the Beachfront Management Act is taking nothing.17

The majority, while remanding, does appear skeptical that such background nuisance principles can be invoked. Among other considerations working against such a finding is the fact that similarly situated landowners have not been prohibited and are permitted to continue their uses (although the court does admit that circumstances and knowledge can change).

An important question in these disputes is whether in fact there are no reasonable economic uses for the land remaining. Coastal Council attorneys have (as already noted) argued that economic uses of the property did remain (e.g. for assemblage value, erection of temporary structures). A similar case in Maine -- involving restrictions to beachfront development under Maine's Sand Dune Rules -- was decided in part on the fact that the property owner was able to park a recreational vehicle on the land, thus leaving a certain reasonable use for the land (and thus upholding the State's restrictions).18

Another issue involves the question of what portion of the property is to be evaluated when a takings claim is made. If the landowner buys a
parcel of beachfront land, subdivides the parcel into two lots, and is able to build on one lot, but not the other, has a takings occurred. The majority opinion in Lucas even acknowledges these ambiguities:

Regrettably, the rhetorical force of one 'deprivation of all economically feasible use' rule is greater than its precision, since the rule does not make clear the 'property interest' against which the loss of value is to be measured. When, for example, a regulation requires a developer to leave 90% of a rural tract in its natural state, it is unclear whether we would analyze the situation as one in which the owner has been deprived of all economically beneficial use of the burdened portion of the tract, or as one in which the owner has suffered a mere diminution in value of the tract as a whole.19

Such questions will continue to be important in determining the legality and constitutionality of attempts to substantially manage development along the coastlines including restrictions placed on rebuilding following a hurricane or major storm event.

The constitutionality of the dead zone restrictions aside, many South Carolinians were troubled by the unfairness of preventing a propertyowner from rebuilding without some provision for compensation. This line of argument has taken several directions. Affected propertyowners have often claimed that their life savings were tied up in their beachfront lots and while they had foreseen the possibility of a hurricane, they had not imagined that the state would prevent them from rebuilding. Many have expressed the "expectation" that once allowed to build and live on the beach they would always be allowed to do so, provided sufficient dry beach existed. Many have argued that the passage of the Beachfront Management Act amounted to an unfair changing of the rules of the game. It was one thing, they say, to impose these coastal
regulations on new construction, but another thing entirely to apply them retroactively to existing coastal development. In the words of the mayor of Folly Beach, this is like "telling someone with a brick house that now their house must be made of wood."

**The Role of Federal Programs**

Several federal programs also influenced reconstruction. One such program was the National Flood Insurance program (NFIP), administered by FEMA. In terms of large short term improvements in the safety of coastal populations in South Carolina as a result of rebuilding restrictions following Hugo, some of the most significant impacts may result from FEMA elevation requirements. A large number of structures was affected by FEMA's "substantial improvement" provisions, requiring elevation to the base flood elevation (BFE) when a structure is damaged 50% or greater (thus a lower threshold than the Beachfront Management Act). In Folly Beach alone it has been estimated that between 75 and 100 structures would have to elevate to the BFE. The Georgetown County building inspector estimated, as a further example, that between 60 and 70 homes in the Georgetown County portion of Garden City have been damaged more than 50% and thus must elevate.

While most coastal jurisdictions in South Carolina were participating in the NFIP, it was surprising how many homeowners had not purchased flood insurance. Generally in South Carolina, homeowner policies will pay for wind damages, but will not pay for damages associated with flooding. As might be expected there was considerable wrangling over what constituted wind damage versus flood damage, particularly where a property owner had one type of coverage but not the other.
The FEMA Section 1362 Flooded Property Purchase Program was one possible answer to the compensation problem, and was actively pursued in several localities, including Garden City, Folly Beach and Pawleys Island. But 1362 and the general notion of converting damaged stretches of the shoreline into beach access areas was not uniformly favored by local communities. Pawleys Island is a case-in-point. Here the town council went through a heated debate over the issue, with the mayor spearheading opposition to the project. His position eventually prevailed and the town officially chose not to participate in 1362. The general sentiment of many on the island appeared to be concern over attracting more visitors and beachgoers, and the noise, traffic, crime, etc. that might accompany it. Outside observers accused Pawleys Island of being exclusionary. The mayor characterizes the local sentiment as being one of not wanting to see any change. Some accused the mayor of personally sabotaging the proposal because he owns a second row home behind and adjacent to the proposed 1362 site (i.e. and did not want to personally put up with noise, traffic, etc.).

Furthermore, FEMA decided that it would not provide 1362 funds to buy-out coastal propertyowners who would be unable to build back anyway under the BMA restrictions. One site in Garden City (Georgetown County) would have included five adjacent propertyowners in a 1362 project, converting a stretch of shoreline into a public beach access point. But FEMA rejected the project because there was insufficient land for the propertyowner to build back. 20 FEMA's position was that should the propertyowners later be able to secure necessary state and local permits to rebuild their homes (a setback variance from the county might provide
sufficient room), then FEMA might reconsider the proposal. This apparently never happened, however.

Despite numerous possibilities to set land aside under 1362, and despite the development of these full proposals, no 1362 acquisitions have been completed. Reconstruction of private structures has at this point already occurred on these sites. The potential of 1362 to take advantage of post-Hugo opportunities, i.e. to promote retreat, to prevent recurrent damages, and to promote beach access, was clearly not realized. Relocation assistance under the Upton-Jones provisions was virtually not utilized as well following Hugo, raising similar questions about program efficacy. (Five claims for demolition of condominium were approved.)

Retreating from retreat

As already noted, there was substantial political pressure following Hugo to significantly modify the BMA. The dead zone restrictions particularly came under fire as unfair, confiscatory and perhaps opening the state up to major financial liability through takings claims. These pressures culminated in a major redrafting of the BMA in the summer of 1990. The new BMA loosens considerably the coastal setback provisions, eliminating entirely the 20-foot no construction zone. The new act went even further by creating a special permit procedure for property owners wishing to build seaward of even the baseline (crest of the ideal dune). Under the BMA, Coastal Council can issue such permits for structures if they are not located "on a primary oceanfront sand dune or on the active beach and, if the beach erodes to the extent the permitted structure becomes situated on the active beach, the permittee agrees to remove the structure from the active beach if the Council ordered the removal."21 The
Council must also conclude that the action will not be "detrimental to the public health, safety, or welfare."²²

So far, while the Coastal Council has not been besieged with special variance permit requests, it has confronted a number of them and appears to exhibit a tendency to approve them. Of 19 permit requests for habitable structures (as of June 1992) the Council has approved 12 (5 were denied and 2 were withdrawn). Several of these permits were approved against the advice of Council staff and were for beachfront locations experiencing erosion.

These changes in the Act represent to some observers a major "gutting" of the BMA, eliminating its major "teeth." Indeed, it would seem that in response to political, legal and economic concerns, state legislators have chosen to retreat from the retreat policy.

The Act as currently implemented is not, however, without positive features. It maintains the forty-year erosion line and the prohibition on structures larger than 5,000 square feet. In addition the Act actually tightens restrictions on seawalls. Representatives of environmental groups did not vehemently oppose the changes in the law in part because they saw the strengthening of seawall restrictions as a _quid pro quo_ to counterbalance the elimination of the dead zone. Specifically, under the revised BMA, once seawalls are damaged beyond a certain level they will not be permitted to be rebuilt at all (not even a sloping revetment as permitted under the original BMA). The new BMA incorporates an interesting time phased approach to determine what damage threshold to use in deciding whether a seawall is damaged beyond repair. Up until June 30, 1995, the seawall must be damaged 80% or more before the rebuilding prohibition takes effect. After this date but before the June 30,
2005 threshold falls to 66 2/3%. After June 30, 2005 the threshold drops to 50% and stays there.

Summary

The chapter has outlined the basic features of the BMA as originally enacted, and as amended in response to Hurricane Hugo. It has described the Coastal Council's efforts to implement the reconstruction provisions of the Act and the practical and political difficulties faced by this agency and its staff. The performance of the council was mixed. On the one hand, the Council and its staff had established certain reconstruction standards and procedures in advance of the storm, for example preparing a basic damage assessment methodology. On the other hand, it does appear that efforts were made following Hugo to be as lenient and flexible as possible in implementing the BMA.

The South Carolina experience is instructive in identifying the range and variety of specific enforcement questions that are likely to arise in implementing such reconstruction restrictions. An understanding of these issues should help other coastal states and localities in anticipating similar dilemmas following other hurricanes or major coastal storms. Among the specific issues that had to be confronted by the Council included whether structures not damaged beyond repair in the dead zone could be replaced, a number of specific questions about damage assessment (e.g. could propertyowners return a structure that had been washed away to its original building site?), and whether propertyowners are entitled to build additions to their homes up to the 5000 square feet level.

Probably the most significant issue arising during reconstruction was the so-called "takings" question. Did the restrictions of the dead zone
amount to public confiscation of private property, unconstitutional without fair compensation? Propertyowners were adamant in arguing it was, while Coastal Council attorneys argued that the BMA was merely preventing the creation of public harms. This issue has not yet been resolved and will likely continue to be the subject of considerable debate. Any state wishing to implement a similar program can expect to confront this takings debate.

This chapter has also briefly discussed the role of local regulations and the impact of certain federal programs, including the NFIP and the Section 1362 Flooded Properties Purchase Program. The NFIP did influence reconstruction in a significant way by promoting elevation, but surprisingly no use of the 1362 program was made, despite some promising opportunities to do so.

Hurricane Hugo clearly heightened opposition to the BMA and major changes to the law were made in the summer of 1990. For outside observers it is discouraging to see these changes, including elimination of the no-construction zone, and appears to represent a retreat from the retreat policy.
Chapter 2 - Footnotes


3 For a more detailed discussion of this methodology, see Timothy W. Kana, "Methodology for Establishing Baselines and Setback Lines Under the South Carolina Beach Management Act," in Federal and State Regulation of Beaches and Wetlands in South Carolina, Legal Education Seminar, Columbia, South Carolina, August 25, 1989.

4 Beachfront Management Act, Section 48-39-290(B)(7).

5 The most seaward point of the replacement structure must not extend further seaward than the original vertical wall.


9 Philip F. Borden, "The Beachfront", letter to the Editor, Charleston Evening Post, 1/13/90.


13 Ibid., p. 37.

14 As cited in Harness, Ibid., p. 11.


17 Ibid.


22 Ibid.
Chapter 3: Comparing Pre-Hugo and Post-Hugo Oceanfront Development Problems: Results of Aerial Photographic Analysis

The Methodology

Several research techniques were utilized to assess the extent to which the Beachfront Management Act has been successful at promoting retreat following Hugo. One primary technique used was a comparison of the location and size of heavily damaged beachfront structure before Hugo and following their reconstruction. Two sets of post-Hugo aerial photographs were taken: the first in September 1990 and the second in October 1991. Thus, photographic interpretation and analysis of rebuilding was available for two annual snapshots following the Hurricane. Low-altitude aerial photographs were shot at approximately 2600 feet, following a similar flight path extending from Folly Beach north to Myrtle Beach.

Pre- and post-storm building patterns were analyzed for three heavily-damaged communities: Folly Beach, Pawleys Island and Garden City (an unincorporated community encompassing parts of Horry and Georgetown Counties).

To conduct the analysis, a data base was first developed of heavily-damaged structures. Specifically, structures were analyzed which were either categorized as "damaged beyond repair" (damaged 66 2/3%) by the S.C. Coastal Council, or damaged 50% or greater as determined by local government building and zoning codes, or the Federal Emergency Management Agency (under the National Flood Insurance Program). Once addresses were identified, these structures were then located on aerial photographs through the use of local tax maps for these three
communities. Overall, 263 structures were classified as heavily damaged and analyzed through aerial photography. By October of 1991, the second of the two photographic sets, 151 structures had been repaired or or rebuilt.

Two types of information were collected from the before and after photographic analysis. The first factor analyzed was the location of the rebuilt/replaced beachfront structure relative to the shoreline, and the extent to which the new or rebuilt structure is now further landward, further seaward, or approximately in the same location. This was accomplished through a process of overlaying newly constructed buildings onto the original buildings, using roads and other landscape features as constants. Measurements were then taken of the movement of the structure perpendicular to the shoreline, to determine the extent, if any, of landward or seaward relocation. A number of factors cause these measurements to be rough, including the effects of shading and photographic angles. For this reason measured locational changes of ten feet or less are assumed to indicate that the reconstructed building is in roughly the same place.

A second measurement was taken of the changes in the square footage of building roofs. This was an effort to determine the extent to which the "footprint" of the reconstructed building was substantially larger or smaller than the structure located there before the hurricane. This represents another possible indication of how the amount of property and people at risk along the oceanfront changed following Hugo.
Analysis of the results

An initial observation of the rebuilding patterns indicates that many property owners have not yet rebuilt at all, and that the pace of reconstruction has not been rapid. The 1990 aerial photographs indicate that approximately one year following the storm, only about 94 structures had been reconstructed, or only about 36% of those heavily damaged. An additional 57 structures were reconstructed in the following year, or about 22%, as indicated by the second set of aerial photographs. Thus, by the fall of 1991, more than two years following the hurricane, only 151 beachfront structures had been rebuilt, or about 57%. Some 43%, then, had not yet been reconstructed even at that late date. There are a number of possible reasons which help to explain these delays in rebuilding, and responses to a propertyowners questionnaire offer some insights into these reconstruction decisions (see chapter 4).

Because a major goal of the original Beachfront Management Act was to promote longterm retreat from the shoreline, the locational measures offer a particularly good indication of the Act's effectiveness or success. As Table 3-1 indicates, the majority of the structures (99 or about 66%), were rebuilt in the same location they existed prior to the storm. While a small number, about 7%, were found to have relocated seaward (or about 10 buildings), a much larger number, about 28% were relocated landward. Of the 42 structures reconstructed landward of their original location, the extent of movement ranged from a low of a few feet to a high of 50 feet. An average landward movement of approximately 25 feet was recorded.

A second aspect of reconstruction measured through the aerial photographs was the size or footprint of the new or reconstructed building. Because the actual configuration and square footage of rebuilt structures
did in fact change, vertical aerial photographs can provide only an indicator of size changes. A larger or smaller roof size was generally assumed to provide a rough indication of changes in the size and extent of coastal property at risk to future storms. Table 3-1 summarizes the number of structures with larger or smaller roofs, and the average change in square footage. A considerable amount of change in roof size was detected, with 109 of 151 structures showing some degree of change. Specifically, 56 structures, or 37%, were found to have a larger footprint, while 53, or 35%, were found to have a smaller building footprint. For some 42 buildings, or about 28%, no appreciable change in building footprint was detected.

Definitive conclusions about changes in building size are difficult based on aerial photographic measurements. Less systematic, anecdotal evidence does suggest that both increases and decreases in building size have occurred. In some cases, because of BMA restrictions and limited lot sizes, damaged structures had to be reduced in square footage in order to "fit" the remaining buildable lot. In other cases, especially in more recent months, damaged and destroyed structures have been replaced with much larger homes, as a result of propertyowners simultaneously seeking to rebuild and to construct additions (as allowed by Coastal Council up to the 5000 square feet limitation; for a more extensive discussion of this issue see Chapter 2). These changes in building size and configuration are further verified through the propertyowners survey (presented in the following chapter).

There are also differences in rebuilding patterns which can be detected by analyzing the results for each locality individually (see Table 3-2). Reconstruction of heavily damaged beachfront structures has been
fastest on Pawleys Island. There about 44% of the structures had been rebuilt by the fall of 1990, and 71% by the fall of 1991. Reconstruction rates for Garden City have been similar, with about 39% rebuilt by the fall of 1990, and about 60% by the fall of 1991. Reconstruction has been considerably slower on Folly Beach, with only about 25% of the heavily damaged beachfront structures rebuilt by 1990, and only about 44% reconstructed by the fall of 1991. The slower pattern of reconstruction in Folly Beach is understandable, given the highly erosive conditions there and the small remaining lot sizes there. Because of this erosion, a number of lots were not able to secure septic tank permits (see Chapter 5). In addition, the uncertain status of beach renourishment proposals for the island also had the tendency to dampen reconstruction efforts.

In terms of landward-seaward changes of beachfront structures, greatest landward movements were detected in Garden City and Pawleys Island. Overall, the percentage of structure relocating landward were about the same in each of these communities -- or about 33%. For Folly Beach, the percentage of structures relocating landward during this period was substantially lower, or only about 11%. This is not surprising considering the high historic levels of erosion and the general impracticality of relocating structures very far landward given the remaining size of beachfront lots. Interestingly, the majority of structures relocating seaward were found on Folly Beach (7 structures).

In terms of changes in building footprints, a significant number of structures changed in each of the communities. About 46% of the rebuilt structures in Folly Beach were found to have larger footprints, while about 48% of reconstructed building had larger footprints in Pawleys Island. A somewhat smaller percentage, or about 25%, of the structures in Garden
City were found to have larger footprints. An equally significant number of structures had smaller footprints. For Garden City about 46% of the structures had a smaller roof footprint, while about 37% were smaller in Pawleys Island. This percentage was somewhat smaller for Folly Beach, with only about 13.5% of the rebuilt structures having smaller footprints.

Because the reconstruction requirements of the S.C. Beachfront Management Act applied most immediately and stringently to structures classified as damaged beyond repair, it is useful to separate-out analysis of reconstruction patterns for these structures. As Table 3-1 indicates, of the 168 structures damaged beyond repair, in our database, 86 had been rebuilt as of the fall of 1991. Of these, a small number were found to have been moved somewhat seaward (6 or about 7%). Most of these structures, however, have either been relocated landward (37, or 53%), or have remained in roughly the same location (43 or 50%). In terms of changes in the building footprint, the DBR structures are also fairly evenly split between those found to be larger (33 or 38%) and those found to be smaller (40 or 47%). A smaller number of structures (13 or about 15%) were found to be of approximately the same size. The BMA was to have been the most stringent in the case of DBR structures, and it does appear that a sizeable number have relocated landward, with an average landward movement of about 26 feet (somewhat greater than the 23 feet average landward movement for all 50%-damaged structures). However, it is perhaps disappointing that 43 of these most heavily-damaged structures have not changed location appreciably and that in a small number of cases structures have actually been moved seaward.

Another way to gauge the effectiveness of the BMA regulations is to analyze reconstruction patterns relative to beachfront regulatory lines.
Reconstructed structures were analyzed according to whether or not they were located within (seaward of) the twenty-foot no construction zones (as the lines were drawn on orthoquad maps at the time Hurricane Hugo struck). Recall that under the original BMA, structures which were damaged beyond repair were not permitted to be rebuilt in this zone, but were required to relocated landward of this so-called "dead-zone." Of the 86 DBR structures that had been rebuilt, aerial photographic analysis found that 41 were actually located within and seaward of the deadzone. Thus, a relatively high percentage of the DBR structures rebuilt (about 48%) would not have been permitted under the original stringent interpretation of the Act (at least as the original regulatory line were drawn). Most of the rebuilt DBR structures falling in the deadzone (28) were rebuilt in 1991, clearly after the deadzone restrictions had been eliminated from the BMA. Of these 41 DBR structures partially or fully within the deadzone, the largest number, 26 (or about 63%), were located in Garden City. Of the remaining structures 11 were rebuilt in Pawleys Island, and another 4 on Folly Beach.

Another important influencing factor is the extent to which heavily damaged structures could easily move landward given such factors as lot depth, and local frontyard setbacks. To gauge the extent to which reconstructed beachfront structures could have relocated further landward, an additional measurement was taken, namely distance from the new structure to the edge of the nearest landward road, or obstacle. Not surprisingly, for a large number of beachfront lots there is little additional room available for setting further back from the ocean. Table 3-3 presents the results of these measurements. The largest number of
structures fall within the 21 to 40 feet category (73 structures, or about 50% of the total). Together some 58% of the structures (88), have forty or fewer feet between the structure and the edge of the nearest road. Some 135 structures, or about 89% of the total have 80 feet or fewer. Conversely, relatively few structures were found to have a great deal of excess setback potential -- all told, only 15 structures had 80 feet or more additional distance to the edge of the nearest road.

Further limiting oceanfront setback potential are local zoning regulations which typically mandate a certain building setback distance from the road. These frontyard setback requirements typically vary from locality to locality, and were also variously modified during the Post-Hugo reconstruction period. Following Hugo, frontyard setbacks for folly Beach were 10 feet, and 20 feet for Pawleys Island. The community of Garden City is split between two counties -- Georgetown and Horry -- each with their own policies concerning frontyard setbacks. Specifically, in the case of Georgetown County. Frontyard setbacks were 25 feet (from the road), and 20 eet for Horry County. (A fifty percent variance from these requirements was allowed, however, in Horry following Hugo).
<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>50%</th>
<th>DBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of original structures</td>
<td>263</td>
<td>95</td>
<td>168</td>
</tr>
<tr>
<td>Total number of structures rebuilt</td>
<td>151</td>
<td>65</td>
<td>86</td>
</tr>
<tr>
<td>percent rebuilt of original structures</td>
<td>57.4%</td>
<td>****</td>
<td>****</td>
</tr>
<tr>
<td>percent rebuilt of total rebuilt structures</td>
<td>****</td>
<td>43.0%</td>
<td>56.9%</td>
</tr>
<tr>
<td>Total number of rebuilt larger percent of total rebuilt structures</td>
<td>56</td>
<td>23</td>
<td>33</td>
</tr>
<tr>
<td>overall mean square feet</td>
<td>612.0sf</td>
<td>541.3sf</td>
<td>661.3sf</td>
</tr>
<tr>
<td>Total number rebuilt smaller percent of total rebuilt structures</td>
<td>53</td>
<td>13</td>
<td>40</td>
</tr>
<tr>
<td>overall mean square feet</td>
<td>451.0sf</td>
<td>408.9sf</td>
<td>464.7sf</td>
</tr>
<tr>
<td>Total number no change in size percent of total rebuilt structures</td>
<td>42</td>
<td>29</td>
<td>13</td>
</tr>
<tr>
<td>overall mean square feet</td>
<td>27.8%</td>
<td>19.2%</td>
<td>8.6%</td>
</tr>
<tr>
<td>Total number rebuilt landward percent of total rebuilt structures</td>
<td>42</td>
<td>5</td>
<td>37</td>
</tr>
<tr>
<td>overall mean feet</td>
<td>25.5ft</td>
<td>22.8ft</td>
<td>25.9ft</td>
</tr>
<tr>
<td>Total number rebuilt seaward percent of total rebuilt structures</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>overall mean feet</td>
<td>6.6%</td>
<td>2.6%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Total number no change in location percent of total rebuilt structures</td>
<td>99</td>
<td>56</td>
<td>43</td>
</tr>
<tr>
<td>overall mean feet</td>
<td>65.5%</td>
<td>37.0%</td>
<td>28.4%</td>
</tr>
</tbody>
</table>
Table 3-2

Reconstruction Following Hugo:  
**By Community**
(50% and Damaged Beyond Repair)

<table>
<thead>
<tr>
<th></th>
<th>Folly Beach</th>
<th>Garden City</th>
<th>Pawley’s Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Total number structures</td>
<td>85</td>
<td>113</td>
<td>65</td>
</tr>
<tr>
<td>b) Number structures rebuilt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>21</td>
<td>44</td>
<td>29</td>
</tr>
<tr>
<td>1991</td>
<td>16</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Total (1990 + 1991)</td>
<td>37</td>
<td>68</td>
<td>46</td>
</tr>
<tr>
<td>c) Number rebuilt larger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>8</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>1991</td>
<td>9</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>d) Number rebuilt smaller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>0</td>
<td>16</td>
<td>15</td>
</tr>
<tr>
<td>1991</td>
<td>5</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>31</td>
<td>17</td>
</tr>
<tr>
<td>e) Number no change in size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>13</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>1991</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>20</td>
<td>7</td>
</tr>
<tr>
<td>f) Number rebuilt seaward</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1991</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>g) Number rebuilt landward</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>2</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>1991</td>
<td>2</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>23</td>
<td>15</td>
</tr>
<tr>
<td>h) Number no change in location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>16</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>1991</td>
<td>10</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>44</td>
<td>29</td>
</tr>
</tbody>
</table>
Table 3-3

Distance from Structure to Seaward Edge of Nearest Road*

<table>
<thead>
<tr>
<th></th>
<th>Freq.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 feet or less</td>
<td>12</td>
<td>7.9%</td>
</tr>
<tr>
<td>21 to 40 feet</td>
<td>76</td>
<td>50.3</td>
</tr>
<tr>
<td>41 to 60 feet</td>
<td>32</td>
<td>21.2</td>
</tr>
<tr>
<td>61 to 80 feet</td>
<td>15</td>
<td>9.9</td>
</tr>
<tr>
<td>81 to 100 feet</td>
<td>7</td>
<td>4.6</td>
</tr>
<tr>
<td>101 to 120 feet</td>
<td>3</td>
<td>2.0</td>
</tr>
<tr>
<td>over 120 feet</td>
<td>6</td>
<td>4.0</td>
</tr>
<tr>
<td><strong>151</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*As measured from the landward edge of the building roof
Table 3-4
Distance from Structure to Seaward Edge of Nearest Road:
By Local Jurisdiction

<table>
<thead>
<tr>
<th>Distance</th>
<th>Folly Beach</th>
<th>Pawleys</th>
<th>Garden City</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 feet or less</td>
<td>2</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>21 to 40 feet</td>
<td>11</td>
<td>23</td>
<td>42</td>
</tr>
<tr>
<td>41 to 60 feet</td>
<td>11</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>61 to 80 feet</td>
<td>7</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>81 to 100 feet</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>101 to 120 feet</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>over 120 feet</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

Totals 36 46 67
Summary

Aerial photographic analysis presents a mixed picture of reconstruction patterns in the three beachfront communities analyzed. On the one hand, a number of heavily damaged structures have been relocated further landward (about one-third), and are presumably less vulnerable now to coastal hazards, including future hurricanes and storms, and long term shoreline erosion. On average, these structures relocated approximately 25 feet landward. On the other hand, the majority of the structures analyzed, were rebuilt in approximately the same location. Moreover, analysis suggests that a number of structures considered "damaged beyond repair" have been rebuilt wholly or partially in the so-called no-construction zone (no longer in existence), suggesting that such structures would not have been permitted to rebuild under the original stringent interpretation of the BMA (and given the original regulatory lines). In addition, while lot depth and local zoning laws limit the extent to which many of the structures could be relocated further landward the aerial photographic analysis does suggest that some additional landward movement would be possible in a number of cases.
Chapter 3 - Footnotes

1While several graduate students worked on developing and analyzing this reconstruction database, the majority of these aerial photographic measurements were taken by Tamara Green.