

## South Carolina Sea Grant Consortium

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**AMERICA'S HURRICANE THREAT**

VOLUME 1, NUMBER 1

FALL 1998

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**America's Hurricane Threat** is a publication of the National Oceanic Atmospheric Administration and the S.C. Sea Grant Consortium. This report describes community efforts to reduce future hurricane damage, to mitigate storm threats, and to address roadblocks to change.

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## Racing to Catch Up:

South Florida's Battle Over Building Codes

By **John H. Tibbetts**

The 1990s have been lost years, a decade of missed chances for coastal areas from Texas to Maine. After Hurricane Hugo battered South Carolina in 1989 and Andrew hit Florida and Louisiana in 1992, hundreds of local governments had a window of opportunity. Pointing to these huge storms, officials could have argued that homes and businesses must be built stronger to withstand ferocious winds. Instead, while population and development boomed along shorelines, many communities essentially ignored the hurricane threat. Very few localities, in fact, tightened building codes and boosted enforcement. Dozens of metropolitan areas failed to establish adequate evacuation routes and safe public shelters. Even today, after two additional large hurricanes—Opal in 1995 and Fran in 1996—U.S. coastlines are in greater danger than ever from tropical cyclones.

Governments can take a number of measures to reduce future hurricane damage. They can fund retrofitting programs, improving the strength of existing buildings, including shelters; relocate highly vulnerable structures; establish floodplain zoning and other measures to reduce construction in hazardous areas; toughen building codes and enforcement so that new structures have better chances of surviving high winds and floods; improve transportation routes for evacuations; and create public-education campaigns to explain these efforts to constituents and encourage initiatives by homeowners and industry.

To its credit, South Florida has taken a number of steps to reduce local impacts from hurricanes. But in this decade, the region's greatest mitigation achievement, by far, has been to strengthen its building codes. South Florida is the only major urban area to toughen the high-wind provisions in its codes and enforcement since Andrew. In addition, South Florida counties have instituted strict testing and approval for all building products so that materials are more likely to withstand hurricane-force winds and other pressures.

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But now this achievement is being undercut. Relentless population, development, and political pressures are undermining the region's efforts to reduce storm damage next time, experts say. As a result, South Florida is probably more vulnerable to a giant storm today than before Andrew struck.

The South Florida megalopolis stretches across 300 miles, broken only by salt marsh and waterways, from the Keys of Monroe County, north through Miami-Dade County (called Dade County until its name was changed in 1997), past Ft. Lauderdale and the sprawling suburbs of Broward County, to luxurious Palm Beach. The region is geographically isolated, a finger of land between the River of Grass and the sea, most of its urbanized areas bordered on the west by the Everglades and on the east by the Atlantic Ocean.

This region is highly susceptible to intense storms. In 1926, a huge storm killed 370 in the Miami area,

and two years later a hurricane killed 2,000 near Lake Okeechobee. In September 1935, a gigantic tropical cyclone hit the Keys, killing 408. Over just seven years from 1944 to 1950, the Florida peninsula was battered by seven major hurricanes, six of them crashing through the southern portion of the state. In fact, according to the National Hurricane Center, Monroe County is the U.S. locality most vulnerable to Atlantic tropical cyclones, and Miami is one of the most vulnerable urban centers.

In the first half of the century, the Sunshine State was hit so often and so hard that Atlantic tropical cyclones became popularly known as "Florida hurricanes"—perhaps the way some Americans still assume that earthquakes are a plague exclusive to California.

But South Florida's memories of big storms faded during its boom years when the region was transformed from a sleepy backwater into an international commercial and tourism center. From 1951 through 1991, major storms missed South Florida's urban areas; only Betsy in 1965 came close, sweeping south of Miami. By the time Andrew arrived, Miami-Dade and Broward counties had a larger population—almost four million—than that of all 109 coastal counties from Texas to Virginia in 1930. Palm Beach County grew rapidly too, with a population of one million that would double or triple during tourist season. Many long-time residents forgot about the storm hazard; and the great majority of newcomers had never experienced one. "In years before Andrew, there was a great amount of complacency," said engineer Herbert Saffir, a leader in hurricane-mitigation efforts in the region over the past four decades.

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## PROTECTING LIVES

Two of South Florida's greatest challenges today are evacuating and sheltering residents during a giant storm.

The region's escape routes are limited. Evacuees have only two directions to drive out: north and west, along highways where massive traffic jams occur during typical rush hours. If hundreds of thousands attempt to evacuate at the last minute, many could be trapped in traffic snarls as a hurricane barrels over them.

Now emergency officials strongly advise most residents to stay home or move to a safe place nearby. "If you have to evacuate, travel the shortest distance possible—within the county if possible," said Tony Carper, director of Broward County Emergency Management Division. But most evacuees don't heed this advice. "Everybody wants to see Mickey," he said. That is, tens of thousands flock north toward Orlando and Disney World, potentially into the path of a storm that unexpectedly swerves north.

Officials also encourage evacuees to leave very early, 72 hours before a storm strikes, said Bill O'Brien, head of emergency management for Palm Beach County. Few people, though, are willing to leave three days before a storm arrives. "At 72 hours before landfall, we don't even know where the storm is going," admitted O'Brien.

The evacuation problem is most dangerous in the Florida Keys. With about 85,000 permanent residents and 50,000 visitors during storm season, the county needs 36 to 42 hours to evacuate along narrow roads to Miami-Dade County, said Billy Wagner, director of Monroe County Emergency Management. Monroe County does not have public shelters due to low elevation throughout the islands; any shelter there could be swamped by a storm surge. Nevertheless, 30,000 residents of the lower Keys, including Key West, refused to leave before Andrew. "If Andrew had hit the Keys instead of Dade County, we would've lost thousands of people," said Wagner.

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To make matters worse, some South Florida counties have cramped shelter space. Most evacuation shelters throughout Florida and the Southeast are public schools and community colleges. These buildings are supposed to be designed with a safety margin to withstand hurricanes. But "in many cases, our school facilities are not designed to withstand hurricane force winds, and therefore may not be suitable as shelters," noted a 1998 report by the Florida Division of Emergency Management.

In 1993, the Florida legislature instructed state officials to evaluate how many facilities could withstand an intense tropical cyclone. Florida has surveyed 11 counties and found that only a tiny fraction—2%—of shelters have adequate structural safety for a hurricane-prone area. State law now requires that certain areas—or "pods"—within new schools must meet tougher guidelines to resist storm pressures. But it would take many years before enough new facilities could be built to meet rising demand for shelter space, especially since dozens of school districts are resisting the 1993 requirement as a costly "unfunded mandate."

Local officials throughout Florida have failed to tell the public that most evacuation shelters do not meet current safety standards, said Erle S. Peterson, emergency recovery coordinator for Miami-Dade County Office of Emergency Management. The state evaluation of shelters "has received flak (from

counties) because it's giving a dose of reality," said Peterson. "Now counties know that their shelters won't withstand wind storms, and this issue won't stay hidden very much longer."

Miami-Dade County has retrofitted some shelters to make them safer, adding shutters to windows and other measures. Despite the upgrades, though, the county has the second largest deficit of shelter space in the state. Meanwhile, Miami-Dade is not complying with the 1993 state law requiring counties to upgrade new school facilities.

So it seems wise to encourage residents, with important exceptions, to stay home as a tropical cyclone approaches. Still, this strategy has a major flaw. For more than 20 years—from the 1970s through the early 1990s—there was a steady decline in South Florida's construction quality and building code enforcement.

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### BEFORE ANDREW

As a code compliance officer for Miami-Dade County, Kenny Everett is the watchdog and teacher for roofing inspectors in 30 municipal building departments. In a conference room at a county office, Everett leaned as far as possible across the table without leaving his chair, jabbing the formica with his forefinger. He was describing sloppy construction practices in the years before Andrew. "Workmanship was down the tubes," he said. "And building inspectors were in the dark, blind to the problems." Roofers routinely ignored important details and fundamentals, Everett said. They even neglected to read installation instructions for construction materials. To illustrate this problem, Everett hurried off to a storeroom and brought back an asphalt shingle. "Instructions on shingle packages always said that roofers should attach each shingle with six nails in high wind areas," he said, jabbing to show their placement. "But roofers used only four nails; it was just the way things were done." Inspectors also didn't read installation instructions, and the local building code did not spell out requirements. "We were in the dark, too," Everett said, shaking his head.

In recent decades, some South Florida contractors—and inspectors paid by taxpayers to regulate them—went far beyond "blindness" to a calculated negligence. Charles Danger, Everett's boss, became director of the Dade County Building Code Compliance Office just months before Andrew struck. Danger is the county's top construction regulator, enforcing proper building practices, materials, and inspections. "Contractors and inspectors were just going through the motions before Andrew," Danger said. "If the code said that you need 45 nails in a section of roof, a contractor could put in 10 nails, and inspectors didn't care, even though a roof could fly away in a hurricane and somebody could get killed." All told, Andrew caused \$25-30 billion in damage, killing 28 in Dade County and in Louisiana. "We were extremely lucky that we lost only 28 people," Danger said.

Andrew totally destroyed 63,000 homes and partly damaged another 110,000, making 250,000 people homeless. With roofs damaged or blown off, rain following the hurricane poured inside structures, soaking and collapsing Sheetrock and destroying billions of dollars worth of furniture, carpeting, televisions, and other items. The insurance industry estimates that 25–40% of insured losses were due to slipshod construction practices.

Most homeowners do not give a second thought to their roofs—until they leak or disappear. Yet roofs are the Achilles heel of homes in hurricane-prone areas from Maine to Texas.

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As strong winds strike a building, their flow is diverted, swirling over and around the structure. Think of a mountain stream roaring against a giant boulder, which deflects the current. The stream flow accelerates around the obstacle, resulting in rapids. In the same way, hurricane winds speed up around corners and edges, creating suction that pulls on building materials like a super-powerful vacuum hose. Fierce gusts and suction pressure make a dangerous combination, especially for roofs. They yank off tiles and shingles, first at the roof edge and then along its slope as you'd peel an orange. During Andrew, huge numbers of tiles were stripped from roofs this way, and carried off by high winds, they crashed through windows by tens of thousands.

If you lose a window or door during a hurricane, you're in big trouble. Extreme winds push through an opening in a building, increasing air pressure inside like blowing up a balloon beyond its capacity. If you force enough air pressure inside a house, it can break at its weakest point, usually the roof.

As roofs are being pushed off from within, they are being pried loose from the outside. Peel away tiles

or shingles and you'll find a covering of roofing paper, under which is plywood attached to rafters. But a roof won't stand much of a chance in hurricane-force winds if builders haphazardly tie down plywood to rafters—if they use too few nails or miss the rafters altogether with their nail "guns." After Andrew, engineers reported that many contractors had routinely missed their marks. "With the use of automatic nail guns, the workman lost his feel for the nailing process," said Saffir. "The result was that many nails went through the sheathing into thin air, not into the truss or rafter below. This was a common occurrence."

If your plywood sheathing flies away in the wind, you've lost more than just a roof covering. You've also lost a portion of the house's structural integrity. That is, plywood sheets are often the sole lateral bracing for the rafters, actually holding the roof together. So with the plywood gone, the rafters are loosely tethered in the wind.

To compound the problem, many contractors fail to tightly fasten wood gable ends—the flat ends of a pitched roof—to walls. So when a powerful gust hits an unbraced gable, the gable end can be pulled loose at the wall, allowing wind to enter the building. If the roof sheathing is pulled off at the gable end, the rafters can fall over.

During Hurricane Andrew, tens of thousands of homes were damaged due to such failures in roofs.

Alex Major was the owner of a frame house in Country Walk, a development of more than 1,100 homes in unincorporated Dade County. Country Walk gained notoriety because virtually every building there was destroyed or damaged during Andrew due to inferior construction, and later property owners won a class-action suit against the developer. "Devastation was amazing—some houses were totally flattened," said Major, who won a separate lawsuit against the developer. "There were 52 code violations in my house, most of them in the roof." Major's roof gables had not been tightly attached to the frame walls, which had not been tied down to the slab. So when the roof gable was blown off, some of the walls collapsed. Fortunately, Major and his family were not at home during Andrew.

To be sure, jerry-built structures are not unique to South Florida, experts said. "In many coastal areas, the housing industry is almost unregulated, either because counties don't have codes or they lack enforcement," said Tim Reinhold, Clemson University civil engineer. Damage surveys by engineers after Hugo, for example, showed that many roofing materials were poorly attached, causing widespread insured losses. After hurricanes Fran and Bertha hit North Carolina in 1996, engineers found widespread cases of shoddy workmanship in construction.

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#### HOLES IN CODE

Considering the scale of Andrew's destruction, you'd think that the South Florida Building Code was a weak one. Actually, since it was first adopted in 1957, Dade County has had one of the toughest codes for hurricane winds in the country and the strictest in the state.

The code specifies that certain construction materials and techniques must be used on every one-story, concrete-masonry building, the most common type of home built in South Florida. Contractors must install steel reinforcements within concrete footing around the perimeter of each home, and the steel bars must be tied to the slab foundation. Steel rods must be installed around the top of the walls as well, with reinforcements tied from the top beam to the slab. These prescriptive details were the strength of the code, engineers said.

Driving South Florida streets, you see block after block of single-story concrete-masonry homes, which look like tough bunkers. Indeed, aside from roof weaknesses, many concrete houses held up well during Andrew—that is, walls did not collapse. "The South Florida code actually saved a lot of lives," said Peter Sparks, Clemson University civil engineer who surveyed damaged structures after Andrew.

But there were long-standing problems in the code as well, experts noted. Some roofing specifications were vague. Builders did not have to install bracing for gable ends of roofs, or to attach gables adequately to walls. County officials routinely approved shoddy building products. And the code lacked specific details for construction of wood-frame homes, which became increasingly popular in South Florida during the 1980s. Although Herbert Saffir often tried to propose improvements to the code after the 1950s, he said, "There was no impetus to adopt a tougher one."

The homebuilding industry, moreover, changed dramatically throughout the Southeast during the 1980s. Decades ago, most builders would construct one house at a time, working on-site with help from a few subcontractors. But to meet rising consumer demand, builders started assembling 6–8 homes simultaneously, hiring 25–30 subcontractors. "Now the work of home construction gets divided up into 25–30 pieces," said George Zimmerman, an architect and litigation analyst. "The contractor becomes more of a scheduler than an on-site builder. Each subcontractor wants to show up, do his work, and leave, so he learns how to avoid interfering with everybody's else work. No one wants any confusion in the sequences in construction. So the subcontractors have a tendency to leave gaps in a structure where there should be overlaps and seals."

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As a result, newer houses became more rickety, while consumers also demanded greater sophistication in design and materials. Homeowners, for example, increasingly sought intricate structural details, especially in roof design. But complicated roofs, with numerous angles and pieces, are trickier to build and tie together than simple ones—a dangerous weakness in high-wind areas. A large number of builders moved from colder climates to South Florida during the boom years, but they lacked the sophistication necessary to construct homes with complex designs and new materials in hurricane country, experts said. "People were building in climatic conditions that they didn't understand," said Bob Ghianda, interim building division coordinator for Palm Beach County.

Meanwhile, government inspectors were not catching these endemic weaknesses. Four times in the past nine years, grand juries have sharply criticized Miami-Dade's building department for negligence, corruption, or incompetence. In 1989, a grand jury noted that some county regulators did not work full days, claimed inspections they had not done, and performed inferior inspections. The grand jury also

criticized regulators for their cozy relationships with builders. "[T]here is a tendency to see the [building] department's role as assisting the construction industry," the grand jury noted in its report.

"Inspectors are supposed to look after the people who are going to occupy a structure, not the people who are building it," said Danger.

Three years later, a grand jury noted that the county's "building inspection process has been questionable for decades. The process has remained vulnerable to innuendoes of corruption . . . and apathy." Another grand jury in 1993 noted that huge numbers of buildings were damaged during Andrew due to "design failures; an inadequate building code; workmanship deficiencies; inappropriate approval of materials; and an inept inspection process."

In April 1998, a grand jury indicted two of Miami-Dade County's top building officials and a former chief inspector. One official allegedly allowed defective work to be completed on a commercial building; another official was accused of failing to report income beyond his salary and routinely short-cutting the review process for building plans; and a former chief inspector continued to operate a private contracting business while he worked as an inspector, even serving as inspector on some buildings where he was contractor.

Compounding these problems was a virtual collapse of regulatory oversight for months after the storm. Florida Governor Lawton Chiles suspended contractor licensing requirements for 120 days following Andrew to allow swifter reconstruction of damaged buildings. Homeowners by the thousands hired unlicensed contractors, many of whom turned out to be criminals or incompetents. Of 1,600 citizens' complaints that county investigators received in November 1992 alone, 1,300 of them were about unlicensed contractors. Katherine Fernandez Rundle, state attorney for Miami-Dade County, aggressively prosecuted contractors who cheated homeowners. "We had charlatans all over the place," she said. "They flew in like locusts." With their roofs blown off, "people get desperate," agreed Ed Griffith, Rundle's assistant. "They'll hire anybody who comes along."

A significant percentage of damaged homes in Miami-Dade were rebuilt or repaired by unlicensed contractors with little oversight by government inspectors. So it seems likely that these homes will not fare well during a future hurricane, experts said.

The next time a giant storm strikes South Florida, Rundle said, she would strongly advise the governor not to suspend licensing requirements for contractors.

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### MITIGATION EFFORTS

In recent years, South Florida has needed strict building codes and hazard-mitigation measures to discourage insurance companies from fleeing the region and to control skyrocketing homeowner rates and deductibles. Since Andrew, insurance rates have more than doubled in the region, and now residents of Key West, Miami, Miami Beach, and Ft. Lauderdale pay some of the highest homeowner premiums in the nation.

Property insurers, backed by reinsurance policies, funded most of the rebuilding after Andrew. Eleven Florida insurers collapsed, and numerous other companies were squeezed by rising reinsurance premiums. As insurers sought to reduce their financial exposure in coastal areas, the state had to create a last-resort insurance fund for residents who could not buy policies on the private market. Now the fund is Florida's second-largest insurer.

If another Andrew or a series of major hurricanes struck South Florida, there could be a collapse of insurance availability in the area. Businesses could be unable to purchase affordable property insurance, and could leave in droves. "If a period of intense storm activity like that of the 1940s returned, the impact could be catastrophic," said Tony Carper, director of Broward County Emergency Management Division.

Meanwhile, the economic vulnerability of South Florida continues to grow. For example, huge luxury condominium projects are being built in several beach communities in the region. Kate Hale, former director of Dade County Office of Emergency Management and now a consultant, summed up the region's dilemma: "There is little recognition that we are expanding the demographic and economic vulnerabilities at a rate that exceeds our capabilities to respond to and recover from hurricanes."

Driven by these nagging problems, South Florida has taken some important strides to reduce future storm damage. Broward County is a showcase for numerous federal, state, and local hazard-mitigation programs. In 1997, the city of Deerfield Beach became a pilot community for Project Impact, a program established by the Federal Emergency Management Agency. Through this initiative, communities build partnerships with local businesses and leaders to assess their vulnerabilities to and prepare for natural disasters. The city will receive about \$1 million for retrofit projects, including \$150,000 to install window shutters and hurricane straps on the auditorium and cafeteria of the local high school, which is also the city's emergency shelter. In addition, Broward County, to its credit, is the only county in Florida to build schools, which can double as shelters, to meet new state standards for storm resistance.

The state of Florida has started a \$9 million program to help communities identify hazard-prone areas. Each city and county will receive funds to develop a Local Mitigation Strategy. The state encourages counties and municipalities to work together to assess local vulnerabilities such as areas prone to flood or storm surge. After a natural disaster, communities would have a list of mitigation initiatives, which would allow for rapid application of rebuilding funds.

Since Andrew, South Florida's most effective mitigation effort has been an overhaul of its construction standards. In 1994, the South Florida Building Code, which applies to Miami- Dade and Broward counties, was extensively revised, although each jurisdiction administers the code independently. In both counties, contractors must follow stricter construction guidelines and install certain products on homes and businesses.



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[In Miami-Dade County, current rules include the following:](#)

- Roofing sheets must be thicker—5/8-inch—instead of a half-inch required before Andrew, and they must be plywood. Particle board, which is banned, has a tendency to soak up moisture and collapse.
- Plywood sheets must be nailed down. Roofers cannot use staple guns.
- Roofers must use 45 nails instead of 33 to attach each 4-by 8-foot sheet of plywood to rafters.
- Wood gable ends must be properly cross-braced with 2-by-4s.
- Contractors must install high-quality shutters or super strong "impact" glass—like that found in car windshields—in each new single-family home to prevent wind-blown debris from breaking windows.
- Construction products are examined by independent laboratories under the guidance of the county compliance office.

Yet many builders and manufacturers aggressively opposed South Florida's code revisions. "Our industry spent tons of money and effort to fight the implementation of these standards," said Jeff Robinson, owner of Jeff Robinson Shutter Company, who has supported the 1994 code changes.

When Palm Beach County tried to pass a measure to require shutters or "impact-resistant" glass on new homes, builders again fought back hard. "There was tremendous industry opposition," said Bob Ghianda. So the county offered another option: property owners could buy pre-cut and pre-drilled plywood to be stored. Plywood and structural attachments probably cost less than \$500 for a small house. There is no way of knowing, however, whether homeowners will actually use this plywood to cover windows in case of a storm, said Kurt Eismann, county building director. Plywood is difficult to install on windows, especially when winds kick up as a storm approaches. So for protection during hurricanes, Palm Beach County's provisions for window protection are probably inferior, though they cost homeowners much less in the short-run, local officials said.

The regulatory cost to consumers, of course, is at the heart of the controversy over the South Florida code. "People are being shut out of the residential market," said William T. Stroop, chapter manager of the Associated General Contractors, South Florida Chapter. He argued that the code is full of "mandatory details" that allow little discretion to architects, engineers, and contractors. "Local code policies are typical of governmental over-reaching. This conflict represents a battle in all segments of society of how much government is the right amount."

Hurricane shutters and superwindows, for example, are expensive, driving up home price tags by thousands of dollars. To limit damages of major storms, contractors must use storm-resistant materials and technologies that can add 25–40% to the cost of a new home, builders said. Engineers, however, dispute those figures. Saffir, for example, estimates that the South Florida code has added 5–8% to the price of new homes.

Homebuilders and architects criticize local programs that oversee testing of building products, arguing that regulators are arbitrary and rigid. Miami-Dade's approval process is probably the toughest in the country for wind protection. (Broward County's rules are generally considered more flexible.) Architects and builders said they must often wait several months—sometimes up to a year-and-a-half—to receive approval for a product from the Miami-Dade compliance office, causing expensive delays in construction. "It can cost a manufacturer \$60,000 to get approval for a product for use in one county, so it's impractical to have this kind of process on a county level," said Mark Wynnemer, an architect based in South Miami. "Manufacturers do not want to redesign their products to get approval in a single jurisdiction."



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Christopher Cooke-Yarborough, an architect also based in South Miami, said that county rules are encouraging scofflaws to build illegally. He compared Miami-Dade's "overly strict" policies to the establishment of a 35 mile-per-hour speed limit on an interstate highway. "Eventually," he said, "people will stop paying attention to that kind of law." Regulators acknowledged that there is an epidemic of illegal building in the county.

But shutter manufacturer Jeff Robinson argued that tougher standards have vastly improved the quality of construction materials used in South Florida. For example, before the code revisions came into effect in 1994, manufacturers did not have to test shutters. Adding shutters did not require a building permit, so their installation was rarely inspected. In a highly competitive market, manufacturers made inferior window-protection devices out of increasingly cheap materials, and local regulators turned a blind eye. "We could have made a shutter out of a rigid piece of cardboard and it could have gotten approval from building departments," Robinson said.

Consequently, thousands of shutters failed during Andrew. Small pieces of debris broke through shoddy materials, allowing wind to rush into buildings and wreak havoc. In other cases, high winds caused shutters to break or bend so far that windows were shattered. Many shutters were pulled off by suction pressures. "Shutters didn't work the way clients expected, and that was an embarrassment to

me," Robinson said.

Now shutters must pass tough impact and wind-stress tests. Just as important, each shutter installation in Miami-Dade and Broward counties is checked by inspectors. Despite all these requirements, shutters in South Florida are less expensive today than before Andrew, primarily due to manufacturing innovations driven by strict government standards, Robinson said. Nevertheless, the building industry's "antipathy against (the code compliance office) is strong, and there has been a tremendous amount of political pressure to undo the South Florida code. Yet I don't hear any consumers asking for pullbacks in the code."

Actually at least one homeowner objects to tighter construction standards. In the Country Walk development, Ron and Carmen Berman owned a single-family residence and condominium, both destroyed by Andrew. Ron Berman, a local merchant, acknowledged that his house and condo were shoddily built before the storm. "The whole (development) was a code violation." Although part of the successful class-action lawsuit against the developer, he was infuriated by delays in rebuilding his townhouse. "The county went overboard after Andrew, making it uneconomical to build a home. County officials were primarily responsible for delays."

But Berman's next-door neighbor, Michael Hench, was impressed by tougher inspections as his new home was being rebuilt in late 1993. Hench went to the construction site for at least a dozen inspections. "The inspectors kept saying, 'You failed' to the builder on little, minor stuff." But Hench believes that the county's efforts made his home more valuable. "Someday when my house goes on the market, I'll tell the realtor and any potential buyer that this house was built after Andrew, it was built to code, and all inspections were made."

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#### WEAKENING LOCAL CODE?

Although South Florida's code saved lives and property during Andrew, it soon will be swept aside. Under a 1998 law passed by the Florida legislature, there will be a new statewide building code in 2001, replacing 450 local codes. A state system of testing and approving building products will be created, replacing county control. The building industry pushed for the law because many contractors, engineers, architects, and manufacturers have wanted to work under similar standards in all Florida counties. To Saffir, however, a statewide standard inevitably would be weaker than South Florida's. "A state code," he said, "would lack the details of our code, and would lead to weakened construction here."

Under the new law, localities could issue special amendments to the state code—with important restrictions. Localities could issue amendments just twice a year, but first they must analyze each amendment's economic impact on the building industry and consumers. Any interested party—homeowners, builders, or manufacturers—can appeal local changes to the code, first to a county board and then to a state building commission. But most important, all amendments would be "sunset" after three years, so local officials would have to reapply to alter state regulations.

Establishing tougher local codes would be very difficult under these conditions. Jeff Robinson noted that the best time to establish stringent building rules is immediately following a disaster. "In the wake of a hurricane, there is a brief political opportunity to implement new standards, because public memory is very short. After a storm is the only time that John Q. Public says, 'I don't want this kind of destruction to happen again.'"

Yet under the new state law, South Florida counties would have to recreate a public consensus every three years for stricter building standards as memories of Andrew fade.

More than any other coastal area, South Florida has made a serious effort to reduce its hurricane vulnerability. Since 1957, Dade County has had one of the toughest building codes for high winds in the nation—a code that saved many lives during Andrew. Moreover, when the 1992 hurricane highlighted holes in the code, local officials improved building regulations and enforcement, and demanded that builders use higher-quality materials and better construction techniques. As a consequence, there have been considerable improvements in the quality of construction. Even so, it seems clear that regulators, in their determination to strengthen buildings, sometimes have been inflexible and unwilling to listen to industry's complaints.

While both sides have compelling arguments, the region must confront unusual dangers. During hurricane season, South Florida faces a high probability of disaster, and one of the best methods to reduce future storm damage is to establish and enforce tough building codes. But under the new Florida law, local regulators would be unable to tighten construction standards without repeatedly asking permission from the state. Under the circumstances, it seems unwise for state lawmakers to sweep away South Florida's local authority and its historical legacy of success.

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