

Chapter 8

Notes From Hurricane Andrew

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8.1 Chapter Summary

Damage to the urban forest in Dade County, Florida by Hurricane Andrew was unparalleled to any natural occurring event in the United States' past history. In many areas, almost all of the trees were destroyed. Much of the hurricane related-damaged was a result of poorly located trees, poor species selection and improper maintenance. Efforts have been made and will continue to provide communities and volunteer groups with the most up-to-date technical information, so that replanting efforts can avoid past mistakes.

8.2 Chapter Outline

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8.3 Background

At 5:05 A.M. EDT on August 24, 1992, Hurricane Andrew, with sustained winds of 145 mph, made landfall on South Florida's coast near Homestead Air Force Base. (See *photograph 7.*) In about four hours, the hurricane had traversed the southern tip of the Florida peninsula and entered the Gulf of Mexico. Less than two days later, Hurricane Andrew struck the Louisiana coast with sustained winds of 120 mph. Hurricane Andrew was the third strongest storm to make landfall in the United States this century. Also, Andrew was, at that time, the most costly natural disaster in United States' history in terms of property loss (approximately \$25 billion) (U.S. Doc, 1993).

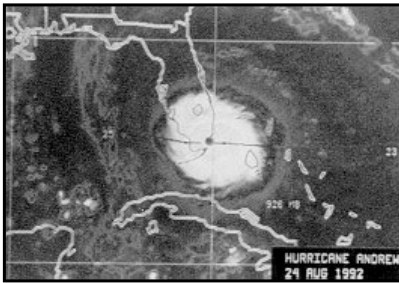


Photo 7. Satellite view of Hurricane over Florida.
(National Oceanic and Atmospheric Administration)



Photo 8. Hurricane Andrew Damage.
(National Oceanic and Atmospheric Administration)

The devastation caused by Hurricane Andrew over South Florida was immense. (See *Photograph 8.*) A total of 126,000 houses were destroyed or damaged, and 9,000 mobile homes were demolished. At least 160,000 people were left homeless in Dade County, and many were left without jobs either temporarily or permanently. (See *Photograph 9.*) Amazingly, the loss of human life, directly or indirectly resulting from Hurricane Andrew, was very low. In Florida there were 44 fatalities with only 17 in Louisiana.

Hurricane Andrew was an unusually compact storm when it hit the Florida coast. Hurricane-force winds were confined to a region approximately 70 miles in diameter. The most severe damage occurred along the swath of the eye and in the surrounding eyewall. In Florida the most severe damage was limited to a 30 mile wide area in South Dade County. Unlike other hurricanes affecting the United States, most of the damage caused by Hurricane Andrew was a result of the severe winds rather than the storm surge. (See *Photographs 9 & 10.*) Experts feel that Hurricane Andrew will likely prove the norm for future storms in that winds will pose a very significant threat to life and safety and will cause most of the property damage (US DOC, 1993).



*Photo 9. Impact of Hurricane-intensity winds--plywood driven through a tree.
(National Oceanic and Atmospheric Administration)*



*Photo 10. Near total loss of canopy as a result of Hurricane Andrew.
(National Oceanic and Atmospheric Administration)*

The extensive tree damage on public and private property which occurred as a result of Hurricane Andrew left the area virtually treeless. (See Photograph 10.) Trees that remained posed possible safety risks. Initial surveys by the University of Florida conducted in the hardest hit areas indicate that as much as 100 percent of the tree canopy was destroyed. (See Photograph 11.)



*Photo 11. Trees literally shattered as a result of Hurricane Andrew.
(National Oceanic and Atmospheric Administration)*

Less severe tree damage extended as far north as Palm Beach County. **In addition, it became apparent that improper and inappropriate pre-hurricane species composition, planting and maintenance practices in urban and suburban areas resulted in extensive and unnecessary tree losses and associated property damage.** For example, aerial and ground examination of trees, damage revealed that poorly-formed and poorly-maintained native trees, numerous exotic trees and some palm species were shattered or were uprooted by the storm. This resulted in additional damage to structures, utilities, obstructed roadways and canals, and increased the threat to human lives. Hence, mitigation practices as outlined in Chapter 3, are highly recommended to reduce or eliminate these impacts.

Before Hurricane Andrew, the urban forest in South Florida contributed to the public well-being by providing many economical and social benefits. Many areas used trees and palms to create a tropical atmosphere in support of the local tourism industry. In this warm subtropical climate trees, provided shade which resulted in lower cooling bills for both commercial and residential buildings. Trees provided social continuity that defined and held together local communities. Glare reduction, area beautification, soil stabilization, "backyard" tropical fruit production, and stress reduction were all benefits provided by South Florida's urban and community forest.

Without a proactive urban forestry education campaign, many communities and individuals in South Florida may have been reluctant to replant missing and destroyed trees or may unknowingly have recreated an urban forest of the same pre-hurricane species composition and quality -- with the same inherent weaknesses. A well planned and coordinated planting program was needed to help to prevent this situation and promote the creation of a safer and healthier urban forest. It was essential that a strategy be implemented to educate public leaders and private individuals so that planning, restructuring and replanting of the urban forest could take place in an orderly and timely manner.

At the time Hurricane Andrew struck South Florida, the Florida Department of Agriculture and Consumer Services' Division of Forestry (Division) had nine urban foresters assigned to this region who were able to offer assistance to communities and individuals. The Division was also able to respond by sending foresters and rangers from other parts of the state to assist. The Everglades District of the Division went from 40 full-time employees to as many as 200 immediately following the storm. As a result of being involved with recovery and replanting efforts, many things have come to light that might assist others involved in such a disaster.

8.4 Immediate Actions - Information Distribution

The immediate response of all involved agencies was the safety and well being of all individuals in the areas hardest hit by Hurricane Andrew. Initial actions included clearing roadways, establishing temporary housing, restoring lines of communication, supplying food, ice and drinking water, and meeting medical needs.

The Division realized that during the period immediately after the hurricane, agencies, communities, and individuals were involved in many activities that involved trees. Most communities had plans to deal with all the aspects of disaster recovery -- except for the urban forest. The Division established an urban forestry liaison with the Federal Emergency Management Agency (FEMA) to aid FEMA and affected communities in tree-related issues. Refer to Chapter 6 of this document for more detailed information.

The Division worked with the Florida Urban Forestry Council (Council) to develop an information packet containing publications, references and contact telephone numbers for groups and communities involved with correcting tree damage. It was felt that accurate information about tree clean up, maintenance needs and post disaster management was critical immediately after the disaster. Information included:

- chainsaw safety
- safety hazards when clearing debris
- debris disposal
- basic tree pruning techniques

- arborist selection criteria
- equitable vendor prices

Previously printed material from national groups such as the National Arbor Day Foundation, American Forests, International Society of Arboriculture, and the National Arborist Association was used to speed up the production and distribution of the packet. A cover letter from the Chair of the Council provided information on finding replanting assistance.

Note: During the period immediately following Hurricane Andrew, all of the local television and radio stations were broadcasting recovery information 24 hours a day. There was abundant opportunity for tree experts to distribute advice through the mass media. I would recommend that local, state and federal agencies produce public service announcements (PSA's) covering the above information for use during such a period after a future disaster.

8.5 Clean Up Efforts

It is quite possible that more trees were damaged as a result of debris clean-up than were damaged directly by Hurricane Andrew. In the urgency of clearing roads, trees were "topped" that could have been pushed to the side and later uprighted. Trees that were left standing by the storm were "topped" to remove damaged branches or in fear they might blow over in future storms. Trunks of trees along roadways were damaged when the trees were used as brace posts to load debris. Natural and endangered areas were bulldozed to make room for tent cities to house the large number of storm-related homeless people. Most of these problems could have been avoided with proper planning. Some of the areas that need to be considered in planning for disaster recovery are listed below:

- **Areas need to be designated as temporary dumping sites for debris disposal.** The amount of debris produced by Hurricane Andrew was tremendous. Dumping and burning sites were set up throughout the area in suitable open tracts, but some locations proved troublesome due to traveling distances and close proximity to residential area.
- **When clearing roads, especially side roads, care should be given to indicate trees worth saving.** These trees then could be carefully removed from the roadway and uprighted later. Also, plans should be developed for trees of special significance to a community and champion or historic trees, so that special care could be given immediately after a disaster to save the tree if possible.
- **Trees that will be uprighted in the future should received immediate care.** The root systems of blown-over trees should be shielded from the sun as soon as possible and protected from drying out. Materials used for this purpose should allow the roots to gain oxygen. After Hurricane Andrew, many communities were interested in salvaging trees that had been blown over during the storm. Unfortunately, most communities were so involved in other recovery efforts that it was three to six weeks after the storm before these operations started. Many of the root systems of these trees had been exposed to sunlight and possibly disease; therefore, the trees probably won't survive.
- **Blown-over trees should be treated as transplanted trees.** Community tree crews and others involved need to be instructed on techniques of salvaging trees. Care needs to be taken when pruning the crowns and roots of blown-over trees so that the trees are not further damaged. It was common practice after the hurricane to "top" blown-over trees to reduce the weight when uprighting. Furthermore, almost no concern was given to root systems. Pruning of crowns should be minimal, and damaged roots should be pruned to remove rough tears and so that the remaining roots will "fit back in the hole." Once a tree has been properly uprighted it will need watering daily, just as if it were a transplanted tree.
- **People need to be instructed of proper care of storm-damaged trees.** Most communities in South Florida battle with unscrupulous tree trimmers on a daily basis. Unfortunately, after major disasters, many more "fly by night" tree services appear to work their magic on trees. Instead of applying proper techniques to do remedial pruning on damaged trees, many trees were "topped" so that the tree service could move on to the next house. Homeowners and even community leaders need to be continually instructed on proper tree pruning both before and after a disaster to prevent this from happening.
- **Tree debris should be separated (when appropriate) and utilized for mulch, firewood, and other landscape materials rather than disposed of with other storm damaged materials.** Volunteers could assist local crews in the separating out of woody materials.

8.6 Recovery Efforts

It was nine months after Hurricane Andrew had struck South Florida before any major replanting efforts were started. During these nine months following the storm, most people involved were just trying to pick up the pieces of their lives and regain some normalcy. Fortunately, an effective replanting program was seen as a need; and, the Division, along with local and national experts, began the planning process.

Planning

The Division approached FEMA with the need of supplementing the urban forestry staff in the Dade area. Two temporary urban forester positions were approved, which resulted in an Urban Reforestation Information and Education Coordinator and an Urban Reforestation Technical Assistance Coordinator being placed in the south Dade County area. The job duties of these two positions included:

- developing press releases and Public Survey Announcements (PSAs)
- conducting mailings to residents and community leaders
- distributing reforestation information
- coordinating school and volunteer tree plantings
- conducting educational programs and workshops
- soliciting trees and funds for the reforestation efforts
- training community personnel in tree planting and care techniques
- providing planning assistance to communities
- developing specie recommendations for replanting projects

A Hurricane Reforestation Task Force was also formed that included foresters, arborists, utility foresters, Cooperative Extension Service personnel, and other appropriate persons. Local, state and national experts were involved in developing a plan for funding, implementing, and involving citizens and volunteer groups in the reforestation effort. The group developed the following goals for the replanting of South Florida (Hurricane Reforestation Task Force Goals, 1993):

1. **Environmental** - Replace and expand the tree canopy with a diverse, ecologically functional forest of high quality, energy-saving and properly maintained trees.
2. **Cooperation** - Gain cooperation between Federal, State, County, and Municipal agencies and departments with civic and environmental organizations to establish and maintain the urban forest.
3. **Education** - Conduct a public and private sector awareness and education campaign on environmental and economic benefits of replanting and restoring the

tree canopy.

4. **Masterplan** - Design a "do-able" masterplan for re-establishment of the urban forest. The plan should develop standards for tree selection, planting and care, provide a "future storm" perspective, and be updated continually to incorporate latest technical advances.
5. **Funding** - Identify and obtain dedicated funding source(s) for planning, replacement and maintenance of existing and replanted trees plus all related costs (i.e. labor, equipment, and materials).
6. **Procurement of Plant Materials** - Identify sources and make available needed materials on programs, assistance and contract growing options.

As a result of the task force meetings a request for \$1.66 million was submitted to Congress to supplement base funding from FEMA. After Federal approval, the Hurricane Andrew Urban Reforestation Grant Program was developed and provided much needed funds (100% Federal dollars, no local match required) to communities and civic and volunteer groups. Money was provided for:

- **Tree inventories** for assessment of tree planting needs and the evaluation of hazard trees.
- **Tree planting** on public school grounds and public parks and right-of-ways.
- **Educational program** development on the topics of tree care and maintenance.
- **Structural repair** and trimming of damaged trees in public parks and right-of-ways.

It soon became apparent that while there was funding for trees available to the public sector and nonprofit groups, there was no funding available for the private sector. **Homeowners had few, if any, options available to them for assistance in re-establishing their landscapes.** In an effort to assist the private sector, the Division worked with the National Tree Trust and local corporations to establish temporary nurseries that will "grow out" donated seedlings. The seedlings will then be donated to the public in a few years when they reach sufficient size.

Public Education

The Division, through funding provided by FEMA, has been able to develop several booklets, brochures and displays to aid in educating community leaders and the public on tree selection, tree planting, tree care and maintenance, and the proper reforestation of Dade County. Numerous workshops and symposiums have been held throughout the area to provide forums for discussion of reforestation efforts. Displays and information booths have been set up at county fairs, festivals and other public events to distribute information. Thousands of people have been reached through these events and efforts, and requests for these services continue to come in.

Tree Planting

The greening of the area devastated by Hurricane Andrew is a project which no single entity can accomplish. Cooperating efforts among citizens, public and private groups, are essential to greening success. While the funding provided by FEMA and the Hurricane Andrew Reforestation Grant Program has provided for tree planting, this will not replant the area back to what it was before the storm. Many groups have already been involved in the replanting of the urban forest in South Florida:

- The United Way's 1993 Annual Community Service Event was the rebuilding of a community park in Florida City. Hundreds of trees and shrubs were planted along with the new playground equipment and pavilions. Community leaders and the media were a part of the event which gave area attention to the greening needs of South Dade.
- A project started a few months before Hurricane Andrew called "Leaves over Miami", funded by Texaco and American Forests' Global Releaf provided hundreds of trees after the storm to be planted on public school grounds. Division and School Board personnel worked together with Parent and Teacher Organizations (PTOs) and other volunteers to plant the trees to reduce costs.
- The Florida Federation of Garden Clubs collected nearly \$20 thousand dollars, which was matched with a Urban and Community Forestry Grant to plant trees in the South Dade area. The Division worked with the Garden Clubs to develop a program patterned after the "Leaves over Miami" project to plant trees on school campus' that were in separate need of vegetation.
- Trees are now being planted at intersections along a U.S. 1, a main artery of South Dade, by a volunteer group called South Dade Beautification. The group has received a Small Business Administration Tree Planting Grant for the plantings.
- Cool Communities, a energy conservation program through tree planting, has provided privately funded grants to many groups for tree planting.
- The Florida State Parks Division has started replanting a 400 acre park totally destroyed by Hurricane Andrew. Over \$4 million (federal dollars), in the form of state-administered grants, have been allotted to this re-establishing of a natural area and coastal park. Thousands of trees will be replanted during this project.

Note: Through the State-administered grant programs the Division has been able to provide some control over the quality of planting stock and the species selection. This is critical to the area due to the potential use of exotic and invasive tree species.

8.7 For More Information

Florida Department of Agriculture and Consumer Services, 1993. *Replanting the Urban Forest After Hurricane Andrew*, Editor, James B. Harroll, 27 pages.

U.S. Department of Commerce, *Hurricane Andrew: South Florida and Louisiana August 23-26, 1992, Natural Disaster Survey Report*. National Oceanic and Atmospheric Administration and National Weather Service, Silver Spring, Maryland. November 1993.

Hurricane Reforestation Task Force, 1993. *Hurricane Reforestation Task Force Goals*.

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