Weathering the storm:

water systems versus hurricanes

Hurricane Andrew ravaged southern Florida and left emergency planners with plenty of food for thought.

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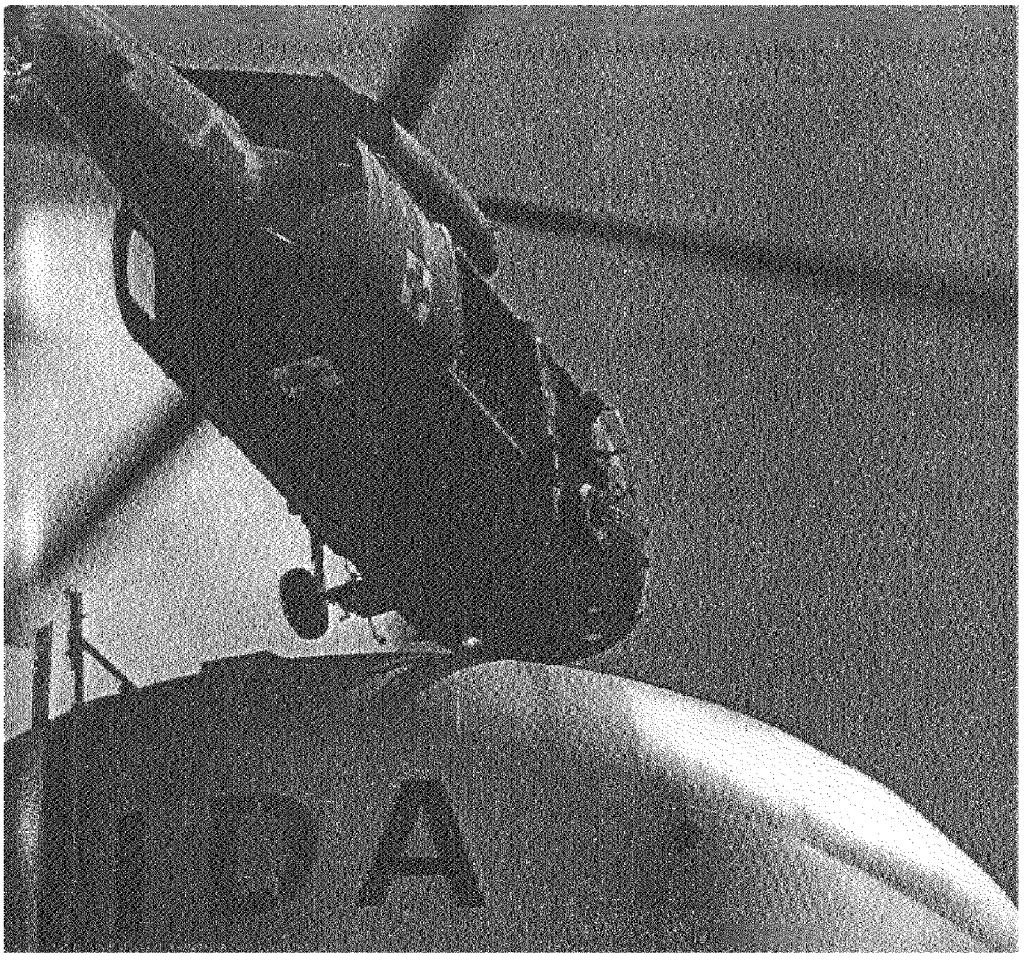
The enormously destructive Hurricane Andrew flattened southern Florida last year and left a quarter of a million people homeless. Its cost is estimated to be $20 billion—an estimated $100 million of that damage to drinking water systems. In this wide-ranging report, the author describes the frustrating range of problems water professionals faced as they began the lengthy process of recovery. The problems were legion, ranging from "uprooted" water mains and debris-laden flood control canals to useless radio communication systems disabled because antennas above the roof line had been knocked out. Bookkeeping became impossible because addresses no longer existed. Some employees were injured; many lost their homes. AWWA's Florida Section offered financial help, and water professionals from unaffected utilities lent their expertise. This inventory of problems faced and solutions discovered will provide helpful ideas to emergency planners for water utilities.

Virtually every drinking water utility in [illegible]e territory has an emergency plan for trop[illegible]rms. As early as Aug. 21, 1992—before Hur[illegible]ricane Andrew had huffed up to even category 1 status on the Saffir–Simpson scale—water professionals in southern Florida were taking the usual steps to protect their utilities from the approaching storm.

Personnel at the Miami–Dade (Fla.) Water and Sewer Authority (WASA)* were among those preparing for the hurricane. The utility, which is the largest in the area, serves more than 2 million customers and wholesales water to 12 smaller systems; clearly, the storm's effect on the WASA system could have serious repercussions in the community.

* *Now called Water and Sewer Department*



An Army helicopter hovers above a water storage tank, attempting to close a damaged hatch.

Miami–Dade has facilities dating back to 1924 and had learned lessons from previous storms, reports Tom Segars, water production superintendent. For example, ever since a 1936 storm that resulted in tremendous flooding, the utility has had elevated electrical equipment.

Many wellhouses were built to withstand man-made, not natural, destruction, according to Luis Aguiar, WASA superintendent of water distribution and sewer collection. "We design wellhouses to create a minifortress. Although we did it to guard against vandalism, the concrete structures proved very good at protecting our equipment and control panels during Hurricane Andrew."

Andrew was different

Hurricane preparedness plans are geared to tropical storms of forces up to and perhaps including category 3 on the Saffir–Simpson scale. But Andrew was not typical. Reasonable forecasts did not apply, and the usual preparations were to prove inadequate.

In addition, it is not possible to calculate precisely where landfall will occur. That, Segars explains, is why "every one of our plants follows the same procedures and makes the same preparations." WASA's plan provided for protection of the water system's infrastructure and source of supply. Forty-eight hours before predicted landfall, staff cleared loose debris from plants and checked on supplies of treatment chemicals, gas and diesel fuels, emergency generators, and food. Twenty-four hours before landfall, hurricane shutters were installed, and managers ensured that shifts were adequately staffed with supervisory personnel and that other vital employees were put on notice Eight hours prior to landfall, said Segars, "we basically battened down hatches to ride out the storm the best we could."

In Homestead, 30 minutes south of Miami, Director of Utilities Rob Brush was also preparing for the storm. Water supplies were overchlorinated to protect against bacterial contamination in the event of leakage into the system. Emergency generator-driven pumps were prepared for use; in some cases they were operating even before the storm hit. In and around Dade and Broward counties, smaller water systems were taking similar precautions.

Perhaps Andrew's most notorious characteristic was the speed with which it moved and amassed power. As late as dusk Sunday, August 23, the storm's strength was still predicted to be category 3 or 4. But by the time Andrew hit land at 3 a.m. August 24, it was a full-blown category 5 hurricane, driving gusts up to 175 mph.

Category 5 hurricanes occur rarely—only a few times per century. The US mainland had experienced one in 1969—Hurricane Camille—but it's debatable whether experience could have prepared the residents of southern Florida for Hurricane Andrew. Acting more like a regionwide tornado, Andrew leveled entire communities and left a quarter of a million people homeless. It disrupted power to more than 3 million homes and businesses. Monetary damages have been placed at $20 billion, making Andrew the most costly storm in US history and the nation's greatest natural disaster.

"If they had a category 10 for hurricanes," says Segars, "then Andrew was a 10. For our utility, Hurricane Andrew showed up the deficits in the system,