

## A NEW FLASH FLOOD ACTION PARADIGM

Jon W. Zeitler  
NOAA/NWS Weather Forecast Office, Austin/San Antonio, Texas

### 1. INTRODUCTION

Tropical Storm (T.S.) Allison struck Southeast Texas from June 5-10, 2002. Twenty-two people lost their lives, nearly 50,000 homes were flooded, and over \$5 billion in damage occurred in the Houston Metropolitan area. Despite accurate forecasts, extensive pre-event awareness outreach, and continuous media coverage, many were still surprised by the intensity of rainfall and consequent flooding. This event demonstrates that decades of awareness efforts have not been fully effective in preventing loss of life and mitigating the financial and emotional impact of flash flooding. Increasing urbanization and population in coastal and southwestern states indicates that a new type of flood—the urban area flood—is becoming the major life and property threat for many metropolitan areas.

This study aims to address the gap between current flash flood awareness campaigns and the emotional and financial impacts flood victims experience. Section 2 describes some of the lessons learned from T.S. Allison and proposes a new paradigm for flash flood awareness. Section 3 lists five key steps to eliminate or mitigate the emotional, financial, and loss of life risks from flash floods. Section 4 describes outreach efforts and conclusions.

### 2. LESSONS FROM T.S. ALLISON AND A NEW FLASH FLOOD ACTION PARADIGM

Some of the lessons from T.S. Allison (e.g. driving through floodwaters) were those not learned from earlier events. Others were new, generally resulting from the increasingly urban, unprepared population expecting to receive instant, detailed information. From all of the lessons, two primary themes emerged. First, there was a general lack of planning by individuals and businesses. Second, a communication gap existed between official warnings and announcements and what the public actually expected.

Therefore, a new flash flood action paradigm is indicated. The paradigm is based on two tenets: i) flash floods have occurred before and will occur again; ii) protection of lives and property is most effective before the event takes place. The first may seem obvious, but many businesses and individuals do not fully accept their risk from flash floods, or they have moved to a coastal or fast-runoff area and are unaware of the threat. The second tenet is based on the fact that even a flash flood warning with a lead-time of one hour still leaves precious little time for those affected to take action.

### 3. SPECIFIC ACTIONS TO REDUCE FLOOD RISK

What can individuals do to protect themselves, property, and communities? Five simple steps can nearly eliminate the risks of death, injury, and financial loss from inland flooding.

#### 3.1 *Protect Your Past – The 15-Minute Rule*

Most people have accumulated a large number of possessions. Many possessions are replaceable, but a few special items are not. Flood victims often state they wish they had saved pictures, important documents (e.g. a marriage license), collectibles, and jewelry from floodwaters. In many cases they didn't have the *means* nor the *time* to transport the valuables to safety.

A very simple solution to save these valuable memories and protect your past is to buy plastic containers with locking tops. These containers allow one to organize and protect valuables, then be put out of floodwaters' reach (in the attic or evacuated). Home improvement, hardware, and discount stores carry the containers, with prices ranging from \$5 to \$50 each. Regular storage of valuables in the containers greatly reduces the amount of time it takes to move them, or the need to move them at all if stored in a high place such as an attic. National Weather Service (NWS) flash flood warning lead times are around one hour. Assuming an individual may not receive the warning immediately and still must have time to evacuate safely, all valuables should be secured and moved within fifteen minutes—The 15-Minute Rule. This implies that most of the items should be in the plastic containers to begin with.

#### 3.2 *Protect Your Present – Buy Flood Insurance*

Once irreplaceable valuables are safeguarded, one should consider protecting possessions that can be replaced, but are expensive to do so. The largest financial asset for most people is their home. Many have an emotional tie to their home and neighborhood; so, protecting the ability to repair or replace one's home is important. The irony is that **most homeowners' policies do not cover flood damage**. Yet, supplemental, low-cost flood insurance is one of the best deals around. Too often, homeowners find this out *after* they have been flooded.

Flood insurance is available from the National Flood Insurance Program (NFIP). This program is administered by the Federal Government, available through your regular insurance agent (or from the NFIP), very reasonably priced, and *covers flood damage*. How reasonably priced? Table 2 shows the cost for various amounts of coverage for most homeowners—those who live outside the 100-year flood plain. The 100-year flood plain is has a one percent chance per year, or 30 percent chance over a standard 30-year mortgage, of being flooded. For example, coverage for a \$150,000 home and \$38,000 of contents is only \$251 per year (Federal Emergency Management Agency (FEMA), 2001). More than 25 percent of NFIP claims have come from structures outside identified flood plains—meaning those claimants received a substantial benefit for a small cost.

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\* *Corresponding author address:* Jon W. Zeitler, National Weather Service, Austin/San Antonio Forecast Office, 2090 Airport Road, New Braunfels, TX 78130; e-mail: jon.zeitler@noaa.gov.

**Table 2.** 2001 Preferred risk coverage and premiums for structures without basements (e.g. outside the 100-year floodplain).

Structure Coverage	Contents Coverage	Annual Premium
\$20,000	\$5,000	\$106
\$30,000	\$8,000	\$131
\$50,000	\$12,000	\$171
\$75,000	\$18,000	\$196
\$100,000	\$25,000	\$221
\$125,000	\$30,000	\$236
\$150,000	\$38,000	\$251
\$200,000	\$50,000	\$281
\$250,000	\$60,000	\$301

### 3.3 *Protect Your Future – Make Your Home Flood Resistant*

Even if valuables are protected with plastic containers and homes with flood insurance, repairing flood damage in one's home takes time and effort. There are simple, low-cost ways to prevent damage and minimize the disruption of normal activities flooding causes. For example, if water starts to enter the home, shutting off the power at the main circuit breaker will prevent appliances from short-circuiting and eliminate the threat of electrocution to those in the home. Similarly, outside air conditioning units can be raised on platforms above ground level. Other steps, such as storing rarely used or expensive items in the attic or on high shelves, will reduce the chance floodwaters causing damage.

### 3.4 *Protect Your Peace of Mind – Save Your Life*

If one's possessions are protected, the focus then shifts to making good decisions to save your life during a flood. In many emergency situations, people either panic or withdraw—neither of which leads to effective action. Gathering information and developing a plan of action beforehand helps alleviate these reactions. One example is purchasing detailed road maps for your county. These maps allow you to plan an evacuation route and alternatives if floodwaters or traffic blocks your primary route. Most metropolitan areas have detailed maps available at special map stores; residents in rural counties should contact emergency management officials or the county sheriff for assistance.

Once flooding is imminent, an excellent source of information is a National Oceanic and Atmospheric Administration (NOAA) Weather Radio (NWR). NWRs receive continuous broadcasts of forecasts, statements, and warnings from the NWS twenty-four hours a day. Many models have an alarm feature that will sound a tone when a warning is issued for user-selected counties. NWRs are available at electronics stores and through Internet web sites, generally running from \$15 to \$75.

### 3.5 *Protect Others – Never Drive on Flooded Roads*

Consider these questions: i) How many people would drive directly into a tornado? ii) Yet, how many have driven directly into floodwaters? Both are a significant risk to one's life; the former is considered an act of insanity, the latter occurs with almost every flood event. Despite consistent warnings to avoid flooded roads over the past thirty years, the majority who lose their lives from floods are swept away in their vehicles or drown after evacuating a stalled vehicle. Nineteen of the twenty-two deaths and many of the emergency rescues during T.S. Allison were related to driving

or walking through floodwaters. In contrast, only three died (of electrocution) from the 48,000+ homes flooded. The true success rate of flood awareness efforts is unknown, but the mortality and rescue statistics indicate the message of avoiding flooded roads is still not effective.

Therefore, consider the impact driving on flooded roads has on others – the police, fire, and other rescuers whose lives are unnecessarily put at risk when trying to rescue motorists whose cars have stalled or are being swept away by flood waters. Moreover, rescuers assisting stranded motorists are not available for medical emergencies or to evacuate the elderly or those needing special assistance. It is probably safest to stay at one's current location unless specifically told to evacuate, rather than risk driving in floodwaters.

## 4. OUTREACH EFFORTS AND CONCLUSIONS

The five actions in Section 3 are only a first step toward making a difference in flood impact mitigation. Only cooperation among media, emergency managers, and disaster relief agencies (e.g. FEMA and the American Red Cross), and active outreach, will result in reduced emotional and financial impacts from floods.

Efforts at the NWS Houston/Galveston Weather Forecast Office (WFO) include the delivery of electronic presentations to local business and civic groups. More importantly, the 2002 Houston/Galveston Hurricane Workshop theme was the inland flood impacts of T.S. Allison and how to prepare for future events—featuring the five-step action plan described in this paper. In addition, a 15-minute video was produced to provide a visual introduction and demonstration of the five-step action plan (NOAA, 2002a).

A parallel effort was undertaken by the NWS Southern Region Headquarters (SRH) to produce brochures on inland flooding from tropical cyclones to accompany the annual NOAA P-3 Hurricane Research Aircraft Tour. Members of the team included meteorologists and hydrologists from WFO Houston/Galveston, TX, WFO Ft. Worth, TX, River Forecast Center (RFC) Peachtree City, GA, and SRH, Ft. Worth, TX. Two brochures were distributed with the P-3 tour (NOAA, 2002b,c), and additional copies were mailed to all NWS Southern Region WFOs.

In summary, major inland flooding associated with tropical cyclones, stalled fronts, mesoscale convective systems, and individual or clusters of thunderstorms has occurred and will occur again. Flood control projects and development planning can reduce some of the risk, but a substantial threat from flooding will remain for many in coastal areas and the southwestern U.S.. The five steps of: i) Protecting Your Past, ii) Protecting Your Present, iii) Protecting Your Future, iv) Protecting Your Peace of Mind, and v) Protecting Others, are simple, low-cost ways to significantly reduce the emotional, financial, and death risks from flooding. Nearly all deaths from flooding are preventable, irreplaceable possessions can be protected, and physical and financial losses to homes drastically reduced. The only question is if one chooses to act.

## 5. ACKNOWLEDGMENTS

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## 6. REFERENCES

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