

# Tropical Storm Allison



June 13, 2003, 2:41PM

## Two years after Allison, Houston has reached a watershed moment

By KEVIN SHANLEY

Houston is exploding with growth. But city building can be a messy business, and the infrastructure to support the growth often can't keep pace with the demand.

The Houston region is especially challenged to safeguard its citizens from the damaging effects of heavy rainfall on a very flat coastal landscape. Much of the early city was built within natural floodplains, and many other older parts have been put at risk from increased runoff coming from newer upstream development.

Tropical Storm Allison should have been a clarion call to us that it's time to work together to create regional solutions to our flood damage risks. More than \$5 billion in damages and more than 70,000 homes damaged in one event shows the magnitude of our challenge. The dozens of local municipalities in the region, the county governments, the various drainage districts, and the state and federal governments are all players in the problems we face. They all must be players in the solutions we need to create.

Urbanization, or city building, has a huge effect on natural drainage systems and the watersheds that drain into them. As more and more people join the city, whether in the new communities around the periphery with fresh rooftops, driveways and streets, or in the inner-city neighborhoods sprouting new homes at ever-increasing density, the overall effect is to speed up the rate at which storm water runs off the land and into the streams.

We have traditionally defined flood control as "better drainage" -- let's just get rid of the rain water as fast as we can. But when you add up the thousands of storm drain systems draining all the neighborhoods of the Houston region, and you toss in a typical Gulf Coast tropical storm, there is simply not enough carrying capacity in our bayous to hold all that runoff at the same time. Lo and behold, we get flooding!

As new neighborhoods are built with good modern drainage systems and as older neighborhoods successfully lobby to get upgrades to their ageing and inadequate drainage systems, the flooding problem can be just moved from one neighborhood to others downstream.

In a small town, better drainage may be all you need to minimize flood hazards, just as two streets and a blinking red light may be all the transportation system a small town needs. But the Houston metropolitan region has grown beyond the point where we can solve our problems with just more, or better drainage. It's time to begin to think in terms

of watershed management to address our flooding and stormwater challenges, just as long ago we graduated from country roads and blinking red lights to traffic management -- freeways, thoroughfares, buses, trains, toll roads and electronic traffic management systems to try to keep up with our transportation needs.

The better drainage model is failing our community today (we are high on the list of the worst repetitive flood damage communities in the nation) and it is time to move on.

So what is watershed management? Watershed management will require the city of Houston (and more than 30 other municipalities), working closely with the Harris County Flood Control District, to reduce the amount of water that rushes into our bayous during a storm event. To use the traffic analogy, the flood control district is like the highway department, only responsible for our stormwater highways. The municipalities are responsible for the regulation, design and maintenance of all the street and neighborhood drainage systems that feed stormwater into the major channels and bayous.

Effective watershed management has three key components: risk management; public policy; and engineering solutions. It can provide residents with a level of safety, security and assurance of protection from known flood hazards that they do not enjoy today. This should be one of the highest priorities of any municipality or regional government.

Risk management means knowing what the flood damage risks really are and aggressively communicating those risk levels to the community. Despite the inclination to deny the risks or to forget (during dry weather) the damages caused by flooding, flood risks are real and everpresent in our coastal community and need to be clearly identified.

I recommend that we:

- Map all flood hazards in the city's watersheds, not just those that are currently shown in the Federal Emergency Management Agency's flood insurance rate maps. In a city where a tropical storm can damage more homes outside of the FEMA floodplains than inside them, it seems reasonable to ask that risk maps include all flood risks.
- Map the floodplain as it will be when the watershed is fully developed. In order to accurately map a fully developed watershed, the community has to come to terms with what kind of rules and policies will govern present and future construction in the watershed. That in itself would be a big step forward in the management of our watersheds.
- Identify the floor elevation of each structure in a special flood hazard zone. Considering the difference between being at risk of having 6 inches of water in your house versus having 6 feet of water in your house, floor elevations provide a much clearer measure of risk.
- Include flood hazard zone, floor elevation and base flood elevation on all tax bills (include this information on utility bills for renters).

- Try to achieve 100 percent participation in the national flood insurance program for properties within special flood hazard zones. Encourage all other property owners in the city to purchase flood insurance, since everyone in our coastal plain is subject to some level of flooding risk.

The public policy aspect of watershed management means creating rules that guide building and construction activities in the watershed to prevent any increase in risk to existing properties and to lessen current levels of flooding risk. Rules should be clear, consistent and transparent.

I recommend that we:

- Adopt the "no adverse impact" standards being recommended by the Association of State Floodplain Managers. Adoption of these standards would help our region significantly lessen our risk of flood damages.
- Establish a zero tolerance policy for increased runoff from any public or private project; there is not a bayou, stream or stormwater culvert in the city that can carry additional stormwater flows.
- Establish an immediate zero-tolerance policy for any loss of floodplain storage capacity, regardless of the size of the project. Whether a project is large or small, there can be no excuse for diminishing the capacity of the floodplain at the direct expense of increasing the flood damage risk to surrounding properties.
- Create floodplain and storage mitigation banks to compensate for the thousands of small projects that the city of Houston (and other municipalities) grant permits for that are not otherwise required to provide on-site mitigation for increased runoff or floodplain fill.
- Require that mitigation projects be fully implemented before the project and its impacts are constructed.
- Establish a permanent city-funded buy-out program to acquire the most frequently damaged structures and undeveloped properties that are deepest in the floodplains, abutting stream and bayou corridors. These buy-out dollars would complement flood control dollars and the federal disaster mitigation money that we only receive after a major flood.
- Establish a compliance-based buy-out program to allow elevating or rebuilding frequently damaged structures within neighborhoods that are distant from stream corridors and in the shallow fringe areas of our floodplains. This will help maintain the integrity of neighborhoods and counteract the checker boarding that can occur in neighborhoods.
- Create a long-term plan to substantially reduce the flows from city drainage facilities into our bayous. Our problem is not that we have too much rainfall; it is just that we get it all at once. We have to build into our city storm drainage systems the ability to temporarily detain the water and stretch out the length of time the stormwater takes to get to the bayous.

Finally, engineering solutions are the real answers to the question of how to build a great city without ever increasing the flood damage risks for the community. Improved engineering and design standards provide the detailed "how-to" for the transition from a better-drainage model to a watershed-management model and for responding more appropriately to our rainfall, our topography and our ecology. Improved design solutions need to steer us away from thinking that a bayou is just a bottomless sewer to carry away our drainage; to recognizing that our bayous have limited carrying capacity and that rainfall needs to be held and detained close to where it falls in the watershed. As the region's population increases and the urban density increases, we need to recognize the role our bayous will have to play in providing seriously needed recreational open space and urban habitat. Only with watershed management can we keep our streams and bayous from becoming single-purpose, hydraulic superhighways while minimizing flood damages.

I recommend that we:

- Change from the better-drainage model of stormwater planning and engineering (which just increases flows into bayous and worsens flooding) to a watershed-management model of stormwater planning and engineering, which controls and reduces the amount of water leaving a watershed. This means designing into the entire drainage system the capacity to store water, not to just move water. Storage should be built into street design, storm drain piping design, channel design, neighborhood design and regional planning. Storage should not be an afterthought.
- Develop and adopt design standards for all drainage facilities that maximize multiple benefits: stormwater storage, water quality, recreation and ecosystem benefits. Land is a scarce resource in an urban area, and money is even scarcer, so every part of a drainage system should be evaluated and designed to serve more than just one purpose. Streamline and standardize procedures to allow and encourage multiple agencies to participate in funding the construction and maintenance of the drainage system.
- Develop and adopt building regulations that require or encourage measurable decreases in the rate of runoff on both new and existing projects. Adopt standards that encourage rainwater storage on flat roofs, the use of cisterns for pitched roofs, storage media under parking lots. Identify methods to enhance shallow aquifer groundwater recharge to reduce runoff and to provide water for our urban tree canopy; and encourage the use of systems that provide natural filtration, treatment and cleansing of urban runoff.

Properly executed, watershed management is a wise investment of community resources to reduce the risk of flood-induced damages while creating other sorely needed benefits: recreation opportunities, water quality improvements and urban habitat.

Watershed management approach will require a greater level of capital investment than we are currently spending on drainage, but do we really have a choice? If we would spend just the amount that we have lost in direct flood damages over the last several

major storms that have passed across our region, we could accomplish all the above recommendations and more.

Two years ago, Allison provided us with an expensive warning. Had the storm deposited its watery cargo just a little farther to the west, the damages and loss of life could have been an order of magnitude worse. Let's get to work now to be sure that as this city grows in size and population, it also grows in safety and quality of life. Let's be sure that it can, without irony, live up to its nickname: "The Bayou City."

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*Shanley is president of the Bayou Preservation Association. He can be e-mailed at [shanley@swagroup.com](mailto:shanley@swagroup.com).*

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