

Living With Water

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Irises surround a house built on stilts in low-lying Pilottown, Plaquemines Parish, on the Louisiana coast. (Photo by Jackson Hill)

The rhythms and resources of water define Louisiana and New Orleans. Even our sense of direction comes from the Mississippi River and Lake Pontchartrain. Who knows where north and south, east and west are? It's the lake or river side of streets by which we pinpoint our way.

But water is also often hidden in New Orleans, pumped out as fast as possible after a storm. It's visible only at the lakefront or on the riverbank and in the ribbon of Bayou St. John.

The threat of a flood of water often scares New Orleanians. But to survive and prosper we need to embrace the promise of water while recognizing and managing the perils it presents.

“The entire coast, including everything that New Orleans sits on, was built by the Mississippi River,” said Mark Davis, senior research fellow at Tulane Law School and director of the Tulane Institute on Water Resources Law & Policy. “And the land was largely built during times of high water when the river would leave its channel, spread out over the shallow waters and the lowlands. And it would start dropping out sediment, sand and silt.”

For a hundred years now, we’ve walled the river away behind levees—and we’ve enshrined this protection in law and policy, said Davis.

But now maybe it’s time to rebalance our use of water.

DUTCH DIALOGUES

After Hurricane Katrina, John Klingman, Favrot Professor of Architecture, became part of a group that connected with consultants from the Netherlands who offered their expertise on how to live with water. The Dutch, after all, have been living harmoniously with lots of water for thousands of years.

Ironically, in the early 1900s Dutch engineers had come to New Orleans to learn about the Wood Screw Pump designed by A. Baldwin Wood, who graduated from Tulane with a Bachelor of Science in Engineering in 1899. The Dutch took this technology back to the Netherlands, and New Orleans continues to use Wood’s invention to pump rainwater out of city streets.

In 2006, a series of workshops called the Dutch Dialogues began, spearheaded by New Orleans architect David Waggoner. Dutch consultants—hydrologists, civil engineers, landscape architects and urban designers—brought new ideas to New Orleans, including proposing the installation of “wet” canals throughout the city. Wet canals are continuously flowing urban amenities, like Amsterdam’s, as opposed to New Orleans’ system of “dry” canals that hold water only after rainstorms and are considered eyesores and dangerous by the public.

Klingman has presented the concepts initiated in the Dutch Dialogue charrettes as a challenge to his architecture students. Since 2009, in an ongoing series of upper-level architecture Water Studios, Tulane students have designed projects that

expand upon these ideas, treating water flowing through the city as a positive rather than a negative.

The long-term goal of the architecture Water Studios is to “change people’s perception of what’s possible,” said Klingman. This involves making water visible on sites, storing rainwater and utilizing water in dramatic and environmentally sustainable ways in and on buildings.

He tells his students that while these water infrastructure concerns seem specific to New Orleans, “they’re actually issues that you may well address wherever you end up.”

Cities around the country—Miami, New York, Boston and others—and throughout the world are dealing with sinking land, increasingly intense rain events and sea-level rise.

RAIN GARDENS

Among his outreach activities, Klingman contributed to the 2013 Greater New Orleans Urban Water Plan. Public officials have embraced the plan, and it includes projects to demonstrate how to handle torrential downpours.

For example, five rain gardens have been built in the city on public land in the past few years. They catch rainwater and allow it to stay around for a day or two after a storm and then slowly, naturally drain. The gardens relieve the city’s pumping system and collect water that might flood streets. The aim is to slow land subsidence through recharging groundwater.

“What happens in New Orleans is that our soil under the city is mostly clay and organic matter, which when it dries out, compresses. Then oxygen gets into the organic matter, and microorganisms literally eat it,” said Klingman.

Parts of the city have subsided by as much as 5 feet in the last century since the drainage system was put in place.

The Dutch advised that New Orleans should do what they do—keep the water table as high as possible. And that’s where rain gardens come in.

MOSQUITO CONTROL

Of course, standing water on an open lot provokes another fear for New Orleanians—that this is a place for mosquitoes to breed.

While the last outbreak of yellow fever in the United States occurred in 1905 in New Orleans, the species of mosquito that transmits yellow fever (as well as dengue, chikungunya and Zika fever viruses)—*Aedes aegypti*—is still around. *Aedes aegypti* has even been making a comeback in population in New Orleans because of hotter, drier weather, which can be associated with climate change.

But, “the danger associated with mosquitoes is not high if you don’t have a pathogen that they’re transmitting in your environment,” said Dawn Wesson, associate professor of tropical medicine in the Tulane School of Public Health and Tropical Medicine. She’s on the board of the Louisiana Mosquito Control Association, which closely monitors mosquitoes infected with the yellow fever family of viruses as well as West Nile virus, which is usually transmitted by another species of mosquito—the southern house mosquito.

In her research, Wesson is investigating ways to suppress mosquitoes through control traps to capture female mosquitoes near the end of their life cycle after they’ve ingested a few “blood meals” and when they are most likely to transmit disease, if they are infected themselves. (The *Aedes aegypti* mosquito needs meals of human blood to thrive. Hence, they bite us.)

As a practical matter, though, the primary action that an individual person can take to protect against mosquitoes breeding is to empty out standing water in containers, like coolers and saucers for potted plants, in yards. And wear mosquito repellent.

“Mosquitoes don’t exist in running water or in water that’s choppy,” said Wesson. Adding a bubbler or a few mosquito fish to fountains and frequently cleaning birdbaths also prevents mosquitoes from surviving.

Sarah Michaels, who graduated from the School of Public Health and Tropical Medicine in 1999 with a master’s degree, is an entomologist for the New Orleans Mosquito Control Board. She’s also a doctoral student working under Wesson’s mentorship.

It’s Michaels’ job to spread the word to New Orleanians about the importance of emptying and removing containers of standing water. She also supervises a surveillance program that detects changes in mosquito populations and tests pools of mosquitoes for viruses.

Mosquito larvae can hatch in as little as a teaspoon of water, if left undisturbed for about a week. Items such as old tires discarded and left outside are fertile grounds for mosquito breeding, said Michaels.

Michaels has long been interested in the historical aspects of yellow fever in New Orleans and how it's shaped the city's history. "It's a fantastic place to study that," she said. "You'll still find *Aedes aegypti* mosquitoes breeding in urns in front of yellow fever victims' graves in Lafayette Cemetery No. 1."

Through an Environmental Protection Agency Urban Waters Grant, Michaels and her staff have been inspecting the city's new rain gardens to find out if there has been an increase in mosquito abundance associated with their construction. For two and a half years, they've collected data. "We haven't seen an increase in mosquitoes relative to the rain gardens," said Michaels. "They're pretty similar to the neighborhood around them."

THE PLEASURE OF WATER

One of the new rain gardens is at the Hollygrove Greenline, a small community gathering spot at the site of a former railroad corridor at the corner of Forshey and Monroe streets, designed by architecture professor Judith Kinnard, who holds the Harvey-Wadsworth Chair of Landscape Urbanism, and professor of practice Irene Keil. The Greenline is a project of the Small Center, formerly Tulane City Center. Nick Jenisch, Small Center project manager, has worked with a variety of collaborators and donors on the project for over five years.

"One of the things you discover about low-income neighborhoods in this city is that they have little tree canopy," said Kinnard. "This is because the lots are smaller and the houses closer together, but also because the city hasn't invested in the public amenity of tree-lined streets. Providing a shaded neighborhood path was a primary goal."

With a grant from the Sewerage and Water Board, Keil and Kinnard proposed a water-collecting shade structure on the site that also would provide educational content on water issues. "We wanted to give the neighborhood a center, a place to sit and enjoy the garden," said Keil.

Inspired by baroque European gardens, the architects imagined the pavilion as a machine that allows and facilitates engagement with water. They wanted the water to be playful, useful and educational and designed a series of concrete elements to

catch and display rainwater: A long bench coupled with a trough distributes water cascading from a low table receptacle and disperses it through scuppers to the water garden behind. An L-shaped concrete wall acts as a gate but also catches water and channels it to a storage tank behind. Cuts in the slab allow water to drain and be channeled to two rain gardens at the low-lying areas of the site.

Fabric sails overhead provide shade and add color and movement to the structure. “This little pavilion is not only useful for the community but also adds value and beauty to the neighborhood,” said Keil.

CHANGING LOUISIANA

Life is certainly going on in Louisiana—but maybe not the way it’s been before. Land loss in Louisiana is accelerating. The state of Louisiana is in the process of rewriting its Master Plan for Coastal Protection and Hurricane Protection for 2017.

The last plan was in 2012. With this new plan, Louisiana is adopting the view “of most climate scientists that global warming is moving at a much faster pace than officials assumed when writing the 2012 plan,” wrote Mark Schleifstein in the Times-Piayune/Nola.com on Oct. 23, 2016. “As a result, state officials now predict a higher rate of ‘relative sea-level rise’—the combination of rising Gulf water and subsiding coastal lands—over the next 50 years.”

The leaders of the Louisiana Coastal Protection and Restoration Authority have proposed projects to reduce predicted land loss, including wetlands and land restoration projects, building and raising levees, surge walls and floodgates, and raising—in some cases 18 feet or higher—or relocating homes and businesses threatened by surges and sea-level rise.

The fact is, said Davis of the Institute on Water, “Louisiana is not sustainable exactly as we know it today. There are parts that are not going to be with us in the future, just as there were parts where nobody lived a hundred years ago.”

Whatever your doubts about climate change, Davis said, “if your insurance company thinks it’s an issue, you should think it’s an issue.”

Financial and property insurance companies are calculating risks. And before writing policies, they are going to start asking if insured people are managing for climate change.

“You do that by doing things that are otherwise smart to do,” said Davis. “You build higher. You build out of places that you know have historically taken water. You use building materials that are resilient such as Sheetrock that is mold-resistant.”

The city of New Orleans proper is now protected from hurricane storm surge and river flooding by an impressive array of levees and pumps. These fortifications include new floodgates and pumping stations built at the cost of \$14.5 billion by the U.S. Army Corps of Engineers since Katrina.

RAIN EVERYWHERE

But there is still a good chance of rain. The Great Louisiana Flood of 2016 was a reminder that a more everyday threat than a hurricane or the river overflowing is a summer thunderstorm. The rainstorm that began Aug. 12 inundated a swath of the southern third of Louisiana with as much as 2 feet of rain within 48 hours, impacting more than 100,000 homes.

“Rain produces more floods and broader floods than anything else,” said Davis. And such severe, intense rain can happen anywhere—from Las Vegas to Long Island, the Carolinas to California.

Everyone should have federal flood insurance, said Davis. A single rain event cannot be tied to global warming. But many models of climate change predict that extreme weather events—storms, rain events and droughts—will become more severe, said Davis. “And you should probably prepare for that.”

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