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Redefining the Edge: Life Without Levees

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In March of 2008, while home for spring break, I received an email telling me that as an architecture student at UCLA I had been accepted to a thirty-week graduate studio course at UCLA with the architect Thom Mayne. Our task would be to design and build a floating house for the residents of New Orleans' Lower Ninth Ward.¹ We would also participate in development of an urban plan for the New Orleans region proposed by Mayne's office, Morphosis.

Our first weeks were a baptism by fire. We began our research on a flight to the "Big Easy." Then, after reading hundreds of pages on the history of the city and its recent troubles, we stood on vacant ground where flooded neighborhoods had been cleared of debris by FEMA.

It is one thing to consider the issues facing the people of this region abstractly by watching stories on TV or by reading the reports of government agencies. It is another to meet survivors face-to-face. These families desperately wished to return home. We returned to California eager to find solutions.

Preventable Disasters

The New Orleans flood was the kind of disaster we can predict and even prevent. One day, before studio began, Mayne discussed the disaster: "We know a storm will hit the coastal regions of Louisiana just like we know in Southern California there will be fires, mudslides, and earthquakes. The disaster isn't the flood....It is what happened to the people afterwards."²

Storms will continue, and their risk is known. But Mayne argued we can use architecture and infrastructure to minimize the damage. Our studio proposals, both macro and micro, were rooted in this view. In particular, we challenged the conventional use of levees to control the Mississippi River. We sought an alternative in dense urban development on high ground and a new infrastructure of floating houses.

Above: The Lower Ninth Ward in March 2008. **Left:** The signs promise new homes by Make It Right. **Right:** The steps used to lead to a front porch: three years after the storm, a poignant symbol of this devastated neighborhood. Photos by author.

The geographer Peirce Lewis wrote lucidly about this region in 1976. He explained that the location of New Orleans is one of “situation,” based on adjacencies, rather than “site,” based on characteristics of the physical ground. New Orleans originally occupied a slightly elevated piece of land at the mouth of the Mississippi, a highly trafficked commerce corridor. But it expanded onto sinking delta land between the river and Lake Pontchartrain, two bodies of water that continually threaten to flood it.

In New Orleans the high ground runs along the banks of the river, the shore of the lake, and a former river path that is the I-10 corridor through the city. According to Lewis, it is a classic case of “if a city’s situation is good enough, its site will be altered to make do.”³ In the 1920s, as technology allowed, the city began expanding slowly toward the lakefront as levees were installed to protect newly developed areas. A postwar building boom then saw swamp lands drained, and the footprint of what was once a compact European-style city doubled.

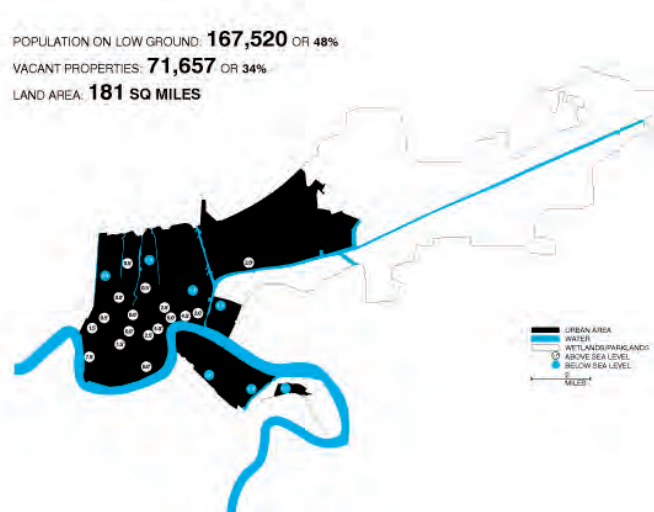
A City on the River

Numerous cities have dealt with risks similar to those of New Orleans. Rome is comparably situated, on the bend of a powerful river, and through history it has experienced repeated flooding. Romans were able to build lasting buildings, but they did not protect themselves from the Tiber. Why?

The historian Gregory Aldrete has identified five factors contributing to ancient Rome’s lack of protective measures like levees.⁴ The two most relevant to the case of New Orleans were its topography and the use of materials. In the first case, Rome is topographically varied, so high ground was always nearby. New Orleans also has areas of high ground. But a reliance on seeming protection provided by levees there gave residents a false sense of security. In the second case, much of sprawling postwar New Orleans was built of wood. While the Romans chose to put many important buildings on lower ground, they built them of lasting materials such as stone and marble, which are significantly less vulnerable to flooding.

In Rome, respect for the power of the river forced residents to deal with the results of flooding rather than try to control it. They understood the risks of the site and chose to live with them.

Morphosis’s planning proposal for New Orleans conveyed a similar outlook. Its aim was to reconcile site with situation to create a dense urban core and a surrounding protective zone of wetlands.



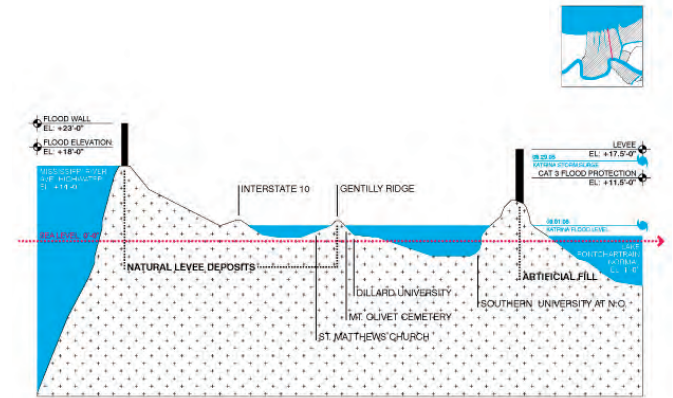
Shrinking City

Morphosis’s project manager, Brandon Welling, explained how the urban, or macro, proposal came to life. Morphosis had been invited to participate in an exhibition of building proposals by high-profile design firms.⁵ Its organizer, Reed Kroloff, then dean of the School of Architecture at Tulane University, intended it as a way to promote redevelopment of the city. But after studying the issues, Mayne and the office decided to take another path. Welling explained:

When we provided our response, we decided not to do a building, but to do a larger urban planning proposal. That is when we started working with Allen Eskew [of Eskew+Dumez+Ripple in New Orleans] and the Rand Corporation and a couple of other entities.... We came to the conclusion... that you shouldn’t be rebuilding this area at all, but should instead be looking at ways to rebuild the city in a more dense manner and turn the rest of the areas over to wetlands.⁶

The macro-plan proposes that the city contract in order to better deal with future storms. Rarely does a city plan to reduce its footprint and give up land—in this case, to return it to wetlands. But New Orleans’ population had already begun to contract more than forty years before Katrina struck, in August 2005. It hit its peak population in 1962.⁷ Mayne saw this as key. “A contracting city is a very different problem from that of the optimistic modernist’s urban proposal for a city that will expand,” he said.⁸ In essence, the storm had revealed the problem of a shrinking city: How does a city plan for a reduction in population and physical size?

POPULATION ON LOW GROUND / IN EDGE COMMUNITIES **44,928** OR **13%**
 VACANT PROPERTIES: **0**
 LAND AREA: **149 SQ MILES**



The phased Morphosis proposal suggests that low-lying areas be returned to marsh, and that levees that once protected them be abandoned. The additional wetlands will help protect the city from future storms by absorbing the power of storm surges and reducing the effects of flooding.⁹ Meanwhile, remaining and returning populations can take advantage of the many abandoned properties on higher ground to create dense, sustainable housing along the river's edge.¹⁰ Many of these areas were originally settled in the late 1800s, but lost much of their population density when new lands were opened with the draining of nearby swamps.

Mayne's proposal is one of many that have been developed, none of which have been wholly adopted by the city. A hybrid, voter-approved master plan for the city is still in development and could include some ideas central to our proposal.¹¹

Floating Houses

Not long after the exhibition had closed, in late 2006, Morphosis was asked to participate in another project to stimulate growth and rebuilding. Brad Pitt and his Make it Right Foundation were requesting proposals for affordable, sustainable housing for residents of the Lower Ninth Ward. I asked Welling about Morphosis's response to this request, which came shortly after it had argued against rebuilding this area of the city.

We were striving to come up with a way to inhabit these areas without reconstructing the levee system. How could you address the immediate need for housing and still support our larger idea that these areas should eventually be

depopulated and turned back to wetlands? Answering this question became the basis of our proposal for an off-the-grid floating house.¹²

Our studio took the original ideas for the house to residents in December 2007 and developed them into a holistic design. We are now creating a prototype.

Mayne has compared the design for the house to the high-performance BMW series of automobiles. In developing it, we faced many challenges, including the hot and humid local climate, the need for buoyancy, and ambitious sustainability goals.¹³ But each challenge provided a new opportunity for research and design.

Like a BMW, the house has two parts: a chassis and a shell. The chassis is a buoyant, prefabricated foam and concrete base which contains the electrical and plumbing systems. The shell rests on the chassis. It is modeled after the traditional regional shotgun house, adapted to maximize sustainability and energy performance. For instance, the roof is designed to collect rainwater and provide maximum area for solar panels; sliding shutters protect openings in the event of a storm; and large overhangs provide shading to prevent solar heat gain.

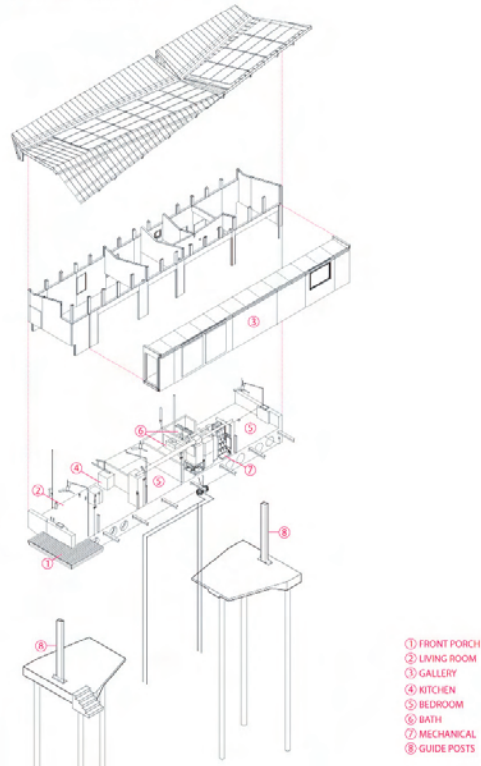
Above right: Cross-section showing how much of the city lies below sea level and where the flood waters settled.

Drawings by UCLA students. Images courtesy of Morphosis.

Above left and Opposite: New Orleans in 2008, and in 2050 as a result of Morphosis's proposal for a phased urban restructuring. Low-lying land would be returned to wetlands, and vacant properties on higher ground would be utilized to create a denser urban fabric.



ASSEMBLY DRAWING



The entire house is able to rise vertically on two steel masts in a flood. A combination of flexible and breakaway connections hooks it to conventional utilities but allows it to float, if necessary.

Mayne has suggested that the chassis be marketed as a product to be paired with any shell, even ones designed by others. He calls the one we have designed “a beautiful piece.” But the real significance of the chassis is as infrastructure. It can be deployed to protect a homeowner’s investment and provide utility service both on and off the grid. It also allows houses to be constructed in regions of the macro proposal that would no longer be protected by levees.

Above left (top and bottom): Rendering of the floating house by UCLA students.

Above right: Exploded axonometric, showing the foundation, chassis, shell, and roof. Drawing by UCLA students. Images courtesy of Morphosis.

Opposite left: Patrick Dunn-Baker of Morphosis and UCLA student Ryan Whitacre test fit a water tank into the foam of the chassis at the prefabrication site at UCLA. Photo by Linda Fu.

Opposite right: The author and Ryan Whitacre move a foam block into place. Photo by Saji Matuk.

Mayne believes abandoned factories could be converted to production facilities for these sophisticated chassis. “We could mold the whole thing, produce the plumbing as one piece and insert it, prefabricate the electrical system. There could be multiple models; we’d only have to make a hundred or so of each to pay for the mold.”¹⁴ This method of deployed infrastructure could be adapted to deal with other types of predictable disaster, such as the frequent wildfires in the canyons of Southern California. Mayne did not elaborate on how the project could be altered to deal with fires, but one might imagine the roofing and siding materials would be fire resistant, the opening could have protections, and collected rainwater could be stored on site for used to fight fires.

Preventing Disaster

Such proposals suggest a new way for architecture to intervene in the wake of disaster. Their aim is to deal with risk, reducing the potential for future destruction. It is not unlike Aldrete’s analysis of Romans’ view of living with the Tiber. The solutions of ancient Rome were also mitigations of situational risk rather than alterations to the site.



Although the idea to rebuild New Orleans without repairing the levees seems radical, the combination of micro (shrinking city) and macro (housing) proposals provides a solution for a city that teeters on the edge of extinction. A river that is contained by levees cannot ecologically sustain itself. According to Lewis: “The Delta [of the Mississippi] is like a bank account where there are constant withdrawals, but nobody is making deposits anymore.”¹⁵ If this process continues, the delta will disappear and the levees that were designed to protect the city will be its ultimate demise. In order to halt this process, action must be taken to restore wetlands and allow the river to deposit sediment along its path. The city must take control of its fate by relinquishing some control over the river.

Preventing another disaster like that which followed Hurricane Katrina requires smart planning and innovative solutions. Our house is one of many innovative ways to deal with the complex set of issues facing this city. Architects cannot afford to wait until after the disaster to design.

Notes

1. The studio spanned the spring and fall of 2008 and included a summer internship; participants worked past the thirty weeks to build the prototype. The students were Linda Fu, Saji Matuk, Ian Ream, Monica Ream, Legier Stahl, Erin Smith, and Ryan Whitacre.
2. Interview by author, Nov. 3, 2008.
3. Peirce F. Lewis, *New Orleans: The Making of an Urban Landscape* (Harrisonburg, VA: University of Virginia Press, 2003; originally published, 1976), p. 19.
4. Aldrete argued that residential housing patterns, food storage, and water supply were the other factors contributing to the ancient Romans’ decision not to build protective infrastructure. Attempts were made to control flooding with drains,

and some efforts were made to raise ground. However, these were not of the scale one might expect from a culture capable of building massive aqueducts or the Colosseum. Gregory Aldrete, *Floods of the Tiber in Ancient Rome* (Baltimore: Johns Hopkins University Press, 2007).

5. “Newer Orleans—A Shared Space” brought together six Dutch and American firms to present new visions for symbolic and shared spaces in the city. Each firm was asked to create structures or landscapes to illustrate how design could facilitate community, create urban icons, and reconnect the city to the land. The firms were MVRDV, UN Studio, and West 8 from the Netherlands, and Huff + Gooden Architects, Morphosis, and Hargreaves Associates from the U.S.
6. Interview by author, Oct. 13, 2008. Available online at <http://hotbuildingscool-texts.wordpress.com/2008/10/14/brandon-welling-of-morphosis-on-katrina-recoveryprojects/>.
7. Population data comes from the Unified New Orleans Plan, “District 4, Introduction,” p. 13. <http://www.unifiedneworleansplan.com/home3/districts/4/plans/> (accessed Nov. 23, 2008).
8. Interview by author, Nov. 3, 2008.
9. *Coast 2050: Toward a Sustainable Coastal Louisiana*, p. 55 <http://www.lacoast.gov/Programs/2050/MainReport/report1.pdf> (accessed Nov. 26, 2008).
10. The social implications of the plan, although fascinating, are beyond the scope of this article.
11. The November 2008 vote established that the new master plan will have the force of law when it is completed, in late 2009. A team of consultants has been assembled by the city to develop it. The direction of the plan has not been made public, but there is a possibility that it will include a reduced city footprint. Bruce Eggler, “Master Plan Given Force of Law: Zoning Moves Must Conform to Blueprint,” *Times Picayune*, Nov. 5, 2008.
12. Interview by author, Oct. 13, 2008.
13. The Morphosis house is seeking a LEED certification for Homes Platinum rating.
14. Interview by author, Nov. 3, 2008.
15. Lewis, *New Orleans*, p. 167.