

The impacts of hurricanes upon long-term research: a note from Louisiana

Paul Keddy

Southeastern Louisiana University
Louisiana, USA

E-mail: pkeddy@selu.edu

An offer of employment from Louisiana is a rare event in anyone's life. The offer of an endowed chair and a full time assistant is even rarer. The potential adventure seemed too good to decline. On the professional side, as a professor of biology experienced in the northern temperate zone, I expected the biota of the Gulf coast would challenge some of my preconceptions about how plant communities and wetlands really work. On the personal side, coming from a rather strict British up-bringing, I anticipated that the Louisianans might be able to teach me how to have a good time. "Laissez les bon temps rouler" is, after all, the local motto.

It has been a remarkable adventure - even before the hurricanes. We encountered a rich jambalaya (that is, stew, for British readers) containing alligators, snakes, egrets, oppressive heat, torrential rain, unlimited guns, free-flowing alcohol, enormous pick-up trucks, superb cooking, refined culture, beautiful art - all spiced with a fragrant mixture of extreme kindness, extravagant gossip, and in-your-face aggression. Then came the hurricanes, which can be thought of as a social amplifier.

My mother lived through the Nazi blitz of London, so I understand something of the stiff upper lip approach to catastrophe. But the images and tales coming out of New

Orleans seem decidedly un-British. We might wonder how New Orleans would appear today if Major General Sir Edward Pakenham had triumphed over Major General Andrew Jackson at the Battle of New Orleans in January 1815, but he did not, and that is that.

The personal side

We live on the edge of the vast Manchac Swamp (here vast usually means something greater than 100,000 hectares), four miles (that's about ten kilometers, in real distance units) from Lake Pontchartrain, which is a fresh water bay in the Gulf of Mexico on the north side of New Orleans. We were prepared for the occasional flood. Our house is elevated on pilings, a large propane tank provides for emergencies, and our artesian well flows without electricity. So when hurricane Katrina appeared off-shore, we had already resolved to ride it out. The Saturday before Katrina, the day was bright and sunny with a slight breeze - the calm before the storm really exists. We put all our valuables in the highest cupboards, reviewed our stock of canned food, and tied our outside belongings (e.g., wheelbarrow, trash can) to trees to ensure they would not float away, nor become projectiles hurled through the windows. As the day passed, a steady breeze stiffened, and an ominous band of dark clouds obscured the southern sky.

Sunday morning the wind had strengthened. I turned to the weather channel on television, learning that overnight Katrina had surged to a category five hurricane, that the eye was projected to pass directly over our house, that winds were expected to exceed 150 miles per hour, and that the storm surge was predicted to be some 20 feet deep. Then the satellite system went blank, leaving a test pattern (a dolphin frolicking in the ocean) which seemed not a good omen. Change of plans.



Figure 1. Turtle Cove Experimental Marsh is reached by a 20 minute boat trip and then a half mile of boardwalk. The top view shows that the treatments spread over an area the size of about six football fields. The side view shows the entry sign before the arrival of hurricanes Katrina and Rita.



Figure 2. After hurricanes Katrina and Rita, the entry boardwalk has an abrupt dead end. Only a half mile to go. Photo: Tiffany McFalls.



Figure 3. The entry sign, and some boardwalk, neither in a useful position. Photo: Tiffany McFalls.

Soapbox

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The nearest town is Ponchatoula, an old railway town that grew up where the railway from New Orleans first hit high ground. Hundred year old buildings that had survived many other storms seemed like a good place to take shelter. In any case, the main roads north were already blocked with cavalades of evacuees from New Orleans. Fortunately our Irish friends in town owned an old house that had survived countless hurricanes. We arrived with our Prius stacked to the roof with essentials (canned food, clothes, liquor, soon-to-thaw frozen meat, passports), not knowing how long it might be until we could return. Even minor tropical storms cover the road to our home with waist deep water churning with tree frogs, amphiumas, cottonmouths, bowfins, and alligators (in increasing order of size).

To leap ahead, we survived, and, three months later, we are back in our house (well, sleeping on the floor in the end that the fallen trees didn't crush), and are still enjoying the simple pleasures of running water and electricity. Part of this article was written on a lap top connected to a marine battery and solar panel, in sweat-sodden clothes, and a diet of MREs. The article was refined in my home office with a working ceiling fan, a gin and tonic (with fresh lime from the garden), and workmen hammering away at the repairs. We may be back to normal by Christmas. Meanwhile, hardly a tree over ten inches dbh remains standing around my house, our neighbors are well-armed against looters, the National Guard has taken over sections of campus, vast areas of New Orleans are still without light and power, and we are being warned of multiple budget cut-backs as the state and cities drift towards bankruptcy.

The scientific side

When I arrived, my scholarly priority was to set up two large long-term experiments that expanded themes of my earlier work. The first objective was to measure both main effects and factorial interactions among different types of stress and disturbance in coastal wetlands. The second objective was to study the effects of asymmetric competition on the zonation of a dozen different wetland plants.

Consider the first of these two. We set out to manipulate experimentally most of the key factors that control coastal marshes. The experiment is the area of many football fields, reached by a half kilometer of boardwalk, itself a half-hour boat trip from the nearest road. Americans don't do things on small scales. We have three herbivore exclosures (each 40 m by 60 m), paired with three control areas. Within these were nested sub-plots having different disturbance regimes

(fire, single herbicide, multiple herbicide) and different fertility regimes (fertilizer, sediment, fertilizer and sediment). Treatments manipulating water levels or alligator density remained beyond our experimental capacity. We planned at least a ten-year duration, since many of the biological interactions might be expected to take at least that long to resolve. Post-Katrina, our boardwalks have been smashed, upturned, draped over the fences meant to exclude nutria, or simply carried away (Figures 2 to 4). We cannot reach the plots without wading through an eight foot deep channel and picking our way through trees and other debris. The nutria gaily scamper through holes in the fences or use debris as walk-ways. A refrigerator even drifted into one of the plots (Figure 5).

To put this in context, New Orleans is still a fraction of its former self. Although our scholarly problems are minor compared with the problems of those who died or lost their homes, research has to continue. We are now trying to decide whether any of Turtle Cove Experimental Marsh can be resurrected, and what we can legitimately conclude from the half million dollars so far invested in that research. All of which may illustrate why short-term, single-species experiments in flower pots may have certain advantages – at least when you live in hurricane country.



Figure 4. An expanse of storm debris (logs, sticks, dead marsh plants and trash) spreads across the experiment. The remains of the boardwalk are in the lower left, while two herbivore exclusion cages can be seen in the background. Photo: Tiffany McFalls.



Figure 5. The powerful storm surge even carried a refrigerator into one of the experimental plots. Photo: Tiffany McFalls.