

Although critical, carbon choices alone do not determine the fate of coastal cities

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A recent article in PNAS contained shocking assertions that carbon emissions “already have exceeded the critical level” for New Orleans (1). In this letter, we challenge how the analysis was applied to New Orleans and point out that this latest in a series of “New Orleans is doomed” reports actually undermines very important, on-the-ground efforts to enhance the city’s resilience to climate change and sea level rise.

As an implicit assumption, the study’s approach applies a uniform and spatially homogeneous rate of inundation for a given level of sea level rise. This “bathtub” model of inundation due to sea level rise ignores hydrological barriers, such as the levees and flood walls, and actually predicts that most of our city is presently part of the ocean. Simply put, the current existence of our city on dry land demonstrates that the model is poorly calibrated.

However, levees and flood walls are only part of our city’s resilience strategy. Restoring our natural coastal lines of defense—marsh, barrier islands, and natural ridges—is an important part of our strategy to combat sea level rise. Along with levees, these natural landscape features are all elements in our state’s coastal master plan.

We agree that now is the time to act on carbon emissions. In fact, our adaptations to sea level rise, which span many decades now, explain why land loss in Louisiana has reversed in recent years (2) and why we have been able to rebuild thousands of acres of coastal marsh, which happen to be efficient carbon

sinks, to protect our levees and our communities (3). However, there is no guarantee of success. The authors are correct to point out that urgent action is required (1). This urgency is why we continuously advocate for a federal commitment to our master plan and coastal restoration efforts.

Failing to disclose adequately the assumptions of the bathtub model creates the risk that Americans will erroneously conclude that New Orleans’ fate is sealed. It hinders support crucial to the success of our master plan. Why should taxpayers invest in a city where the “critical level” has already locked in its fate? The false narrative presented by this study, based on a poorly calibrated model, discourages efforts to implement the very policies that could make our region sustainable.

The bathtub model of coastal inundation (4) is simple and easy to use. However, its simplicity masks many important local factors, such as levees and coastal restoration. If the analysis is not going to account for these factors, then the results should exclude areas where these factors are dominant. This practice is common in storm surge modeling (5), which is effectively a more rapid and higher type of sea level rise.

With climate change science facing so many questions regarding its credibility, we advise that future sea level studies also account for important local factors that violate the assumption of the bathtub model, or at least explicitly state this assumption along with its limitations in cities such as New Orleans.

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- 2 Couvillion B, et al. (2011) Land Area Change in Coastal Louisiana from 1932 to 2010. U.S. Geological Survey Scientific Investigations Map 3164 (Lafayette, LA).
- 3 Mack S, et al. (2014) Carbon Market Opportunities for Louisiana’s Coastal Wetlands: Technical Report (Tierra Resources and The Climate Trust, New Orleans).
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- 5 Zachry B, Booth W, Rhome J, Sharon T (2015) A national view of storm surge risk and inundation. *Weather Clim Soc* 7(2):109–117.

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