

HOW HURRICANES IMPACT FLORIDA'S TOURISM INDUSTRY

Almost every year, hurricanes bear down upon the state of Florida. The storms appear to be growing in occurrence and severity. While the media cover the damage and death toll, the impacts on the state's critical tourism sector remain largely anecdotal. The full story lies buried in data. Dr. Arthur Huang from UCF's Rosen College of Hospitality Management has investigated different data sets to understand the impact of hurricanes on the tourism industry. What has been uncovered has significance not only for Florida but for tourism sectors elsewhere affected by these giant storms.

Florida is a beacon to millions of tourists every year, but it is also attracting the unwelcome attention of an increasing number of powerful hurricanes. Research published in the *Proceedings of the National Academy of Sciences* in 2020 suggests that whereas it's almost 25% more probable than 40 years ago that tropical storms worldwide will reach a major intensity, in the vast swath of warm water nicknamed 'Hurricane Alley', in the North Atlantic, that figure is more than double. At the western edge of that alley, in the path of the hurricanes that will emerge, sits the Sunshine State. What could that mean for Florida's tourism sector? Dr. Arthur Huang of the UCF Rosen College of Hospitality Management and Ph.D. student Marcos Madeiros have combined three high-frequency data sets to answer that question. What they've discovered has significant implications for tourism resilience management, not only for Florida but also worldwide.

Every time a hurricane rips through communities, the media covers the immediate physical destruction and its impact on human lives. Cameras show wrecked seafronts, destroyed homes, and flooded cities, but little is known about the effects on tourism, especially in the longer term. The tourism sector is especially susceptible to such extreme

weather events; not only does it rely on the physical infrastructure and visual appeal of destinations but also on perceptions of safety. Most tourists hope for pleasant weather when vacationing and continue with their plans if the weather is poor, but it's a different story if that comes with significant risks.

Florida is apt for studying tourism. In 2019, the year before the COVID-19 pandemic, the Florida tourism sector accounted for nearly 6% of real state GDP and 14% of total employment. Furthermore, 15% of state sales tax collection came from tourism. To get an idea of the potential long-term effects of hurricanes on the state's tourism leading up to that year, Huang turned to high-frequency data sets. The first was the monthly tax revenue of 94 types of businesses in the state's tourism sector for the period 2002 to 2018. Of particular interest was the annual percentage changes in sales tax revenues over that period in four subsectors within Florida tourism: admissions, hotel and lodging, restaurants and bars, and transportation. The researchers examined those figures against a second data set covering the state's historical hurricane records; they were particularly interested in storm intensity, when the hurricanes struck, and where. They compared this against a third data set that classified all Florida's counties as urban or rural and coastal or inland. The hypothesis

was that geographic location mattered in how tourism recovered after a hurricane effect.

TRACKING THE HURRICANE TRAIL

The researchers believed that by comparing the data for July to October—the so-called 'hurricane season'—and the traditional U.S. busy August-to-September holiday season they could track the financial impacts of hurricanes on different tourism subsectors at different parts of the state over a period of 16 years. They employed Mann-Whitney-Wilcoxon tests to examine pairwise statistical differences across the variables.

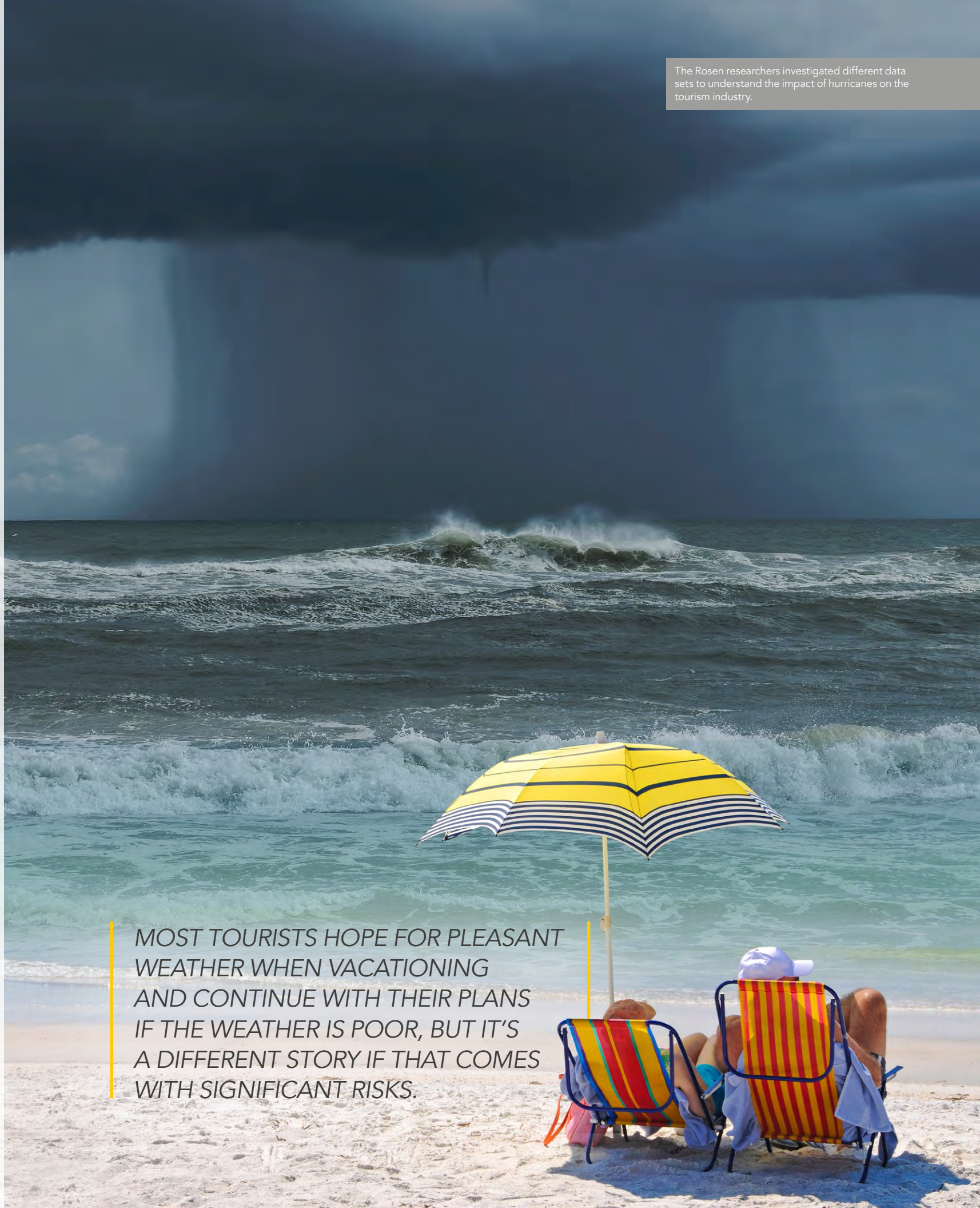
The data showed that, overall, tourism businesses in counties affected directly by hurricanes ('with hurricanes') are associated with lower tax growth rates than those in counties largely unaffected by hurricanes ('without hurricanes'). However, the negative effect was not equal across the state; rural counties seem to bear the brunt of it. Whether or not a county was along the state's coastline mattered too. Coastal counties with hurricanes had lower tourism sales tax rates than coastal counties without hurricanes.

The data became particularly interesting when the Rosen researchers compared the various subsectors. While all tax growth rates in subsectors affected by hurricanes showed yearly dips and jumps associated with differing hurricane seasonal intensity over the period 2002 to 2018, in the hotel and lodging and restaurants and bars subsectors, there was little overall statistical difference compared to the more stable rates of those without hurricanes. The same was not true for the admissions subsector, which showed a distinct decline in sales taxes in those businesses impacted by hurricanes over the 16-year study period. Over the same time, those businesses within the admissions subsector in areas not affected by hurricanes enjoyed positive growth.

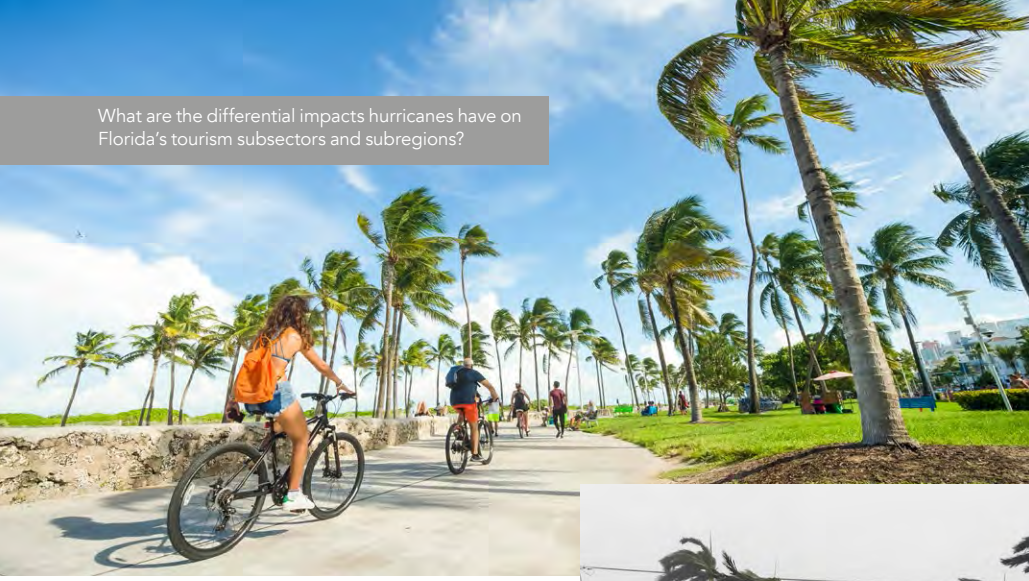
Fascinated by this anomaly, the researchers did a deep dive into the data sets to focus on one particularly powerful storm. Hurricane Irma, which struck Florida in 2017, caused considerable damage, becoming the most expensive storm in the state's history. The data showed that the storm's impact on businesses in the admissions subsector was felt for several months after the event; those in the rural counties in the north-west of the state recovered the slowest.

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What are the differential impacts hurricanes have on Florida's tourism subsectors and subregions?



IMPLICATIONS FOR TOURISM

The Rosen researchers set out to understand the differential impacts hurricanes have on Florida's tourism subsectors and subregions, and identify those subsectors seemingly most at risk. They also wanted to develop insights into how the tourism sector can best prepare and adapt to what seems likely to become an increasing challenge.

Firstly, because rural counties affected by hurricanes experience more significant impacts and recover the slowest, they should



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What is significant about this research is that its insights have international relevance. Hurricanes might be differently-named elsewhere—cyclones in the Indian Ocean and typhoons in the north-west Pacific—but their physical effects are similar. Also, because they primarily affect coastal regions of the tropics and sub-tropics, they are the one extreme weather event that has an inordinate impact on popular tourist destinations. Thousands of tropical and sub-tropical coastal resorts are

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be paid special attention to facilitate a timely recovery. Secondly, coastal subregions are more at risk than those inland to the impacts of hurricanes. These regions experience not only the effects of a hurricane's strong winds but also elevated sea levels, known as storm surges, extensive shoreline erosion and other geologic effects that contribute to the loss of property and life. This research suggests that state authorities and tourism businesses in Florida's coastal subregions should focus on active disaster planning, management, and recovery strategies.

Thirdly, the admissions subsector seems particularly vulnerable to the effects of hurricanes. This is important because the health

of the sector as a whole relies on the seamless integration between its constituent parts. Vulnerability in one subsector is a weakness tourism cannot afford, especially in a state so reliant on it. Therefore, tourism should investigate ways to develop specific resilience in the admissions subsector. One thing is clear: a one-size-fits-all approach in the sector as a whole will not work.



threatened by such storms. And unlike, say, earthquakes, hurricanes are seasonal, and their size and impact are likely to increase; they are, therefore, to a degree, predictable. This is important for a sector that relies heavily on people planning according to popular perceptions of attractiveness and risk. Tourism businesses in areas prone to hurricanes should, therefore, not only prepare for how to deal with their likely outcomes but also the challenges of assuaging public fears.

This research has theoretical and practical implications for tourism resilience management and should encourage further studies to develop upon it. According to the Rosen researchers, future work could include other economic indicators at a more microscopic level, such as tourism organizational structures, operational activities, and tourist spending, to provide additional insight. It would also be interesting to compare those outcomes with similar research from other countries. Shared wisdom on a global level will be necessary for a sector in the shadow of one of Mother Nature's most destructive beasts.

RESEARCHERS IN FOCUS

RESEARCH OBJECTIVES

Dr. Arthur Huang aims to understand how hurricanes impact different tourism subsectors and destination subregions.

REFERENCES

Huang, A., and Medeiros, M. (2021) How do hurricanes impact the tourism economy? *Anatolia*, 32(3), 513–516, doi:10.1080/13032917.2020.1861471

CO-AUTHORS

Marcos Medeiros, Ph.D. student, Rosen College of Hospitality Management, UCF. <https://www.linkedin.com/in/mamedeiros/>

PERSONAL RESPONSE

What is the most urgent priority for Florida's tourism sector to address the growing threat from hurricanes?

“The urgent priority is to develop public-private partnerships to enhance socioeconomic and environmental resilience among tourism communities. This might involve taking precautions to reduce the impact of hurricanes, allocating designated funds for disaster relief, and provide training to support workers' upskilling and reskilling in these communities.”



Arthur Huang



Dr. Arthur Huang is an assistant professor at the Rosen College of Hospitality Management. He has an interdisciplinary background, with a Ph.D. in civil engineering and M.S. in computer engineering. His research interests include travel technology, data-driven business decision-making, artificial intelligence, and sustainability. He has led multiple externally-funded projects by federal and state agencies and has been frequently invited as a keynote speaker at international conferences on smart city, big data, and tourism and hospitality technologies.

E: Arthur.huang@ucf.edu T: +1 407.903.8212
W: <https://hospitality.ucf.edu/person/arthur-huang/>