

Impacts of Global Warming on NC's Coastal Economy

This study was conducted by:

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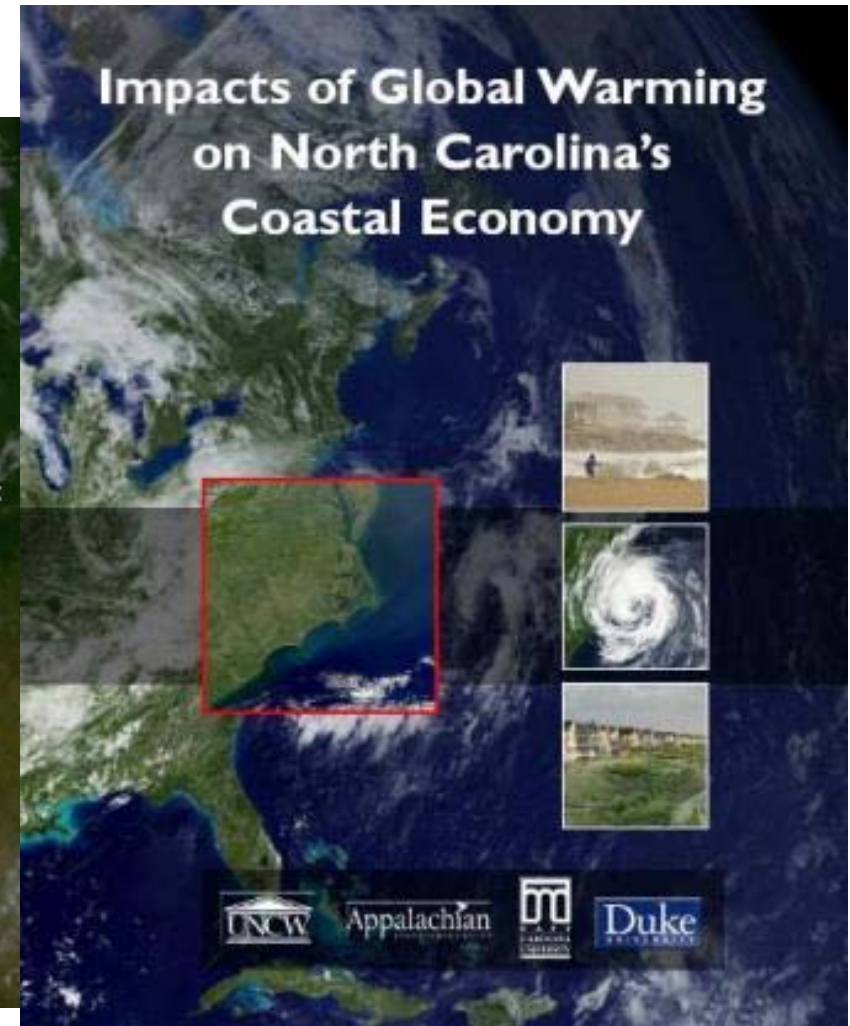
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Problem

- Climate change is projected to have severe impacts on North Carolina coastal resources
 - Extensive development in the coastal zone in recent decades has put more people and property at risk
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Climate change in coastal North Carolina

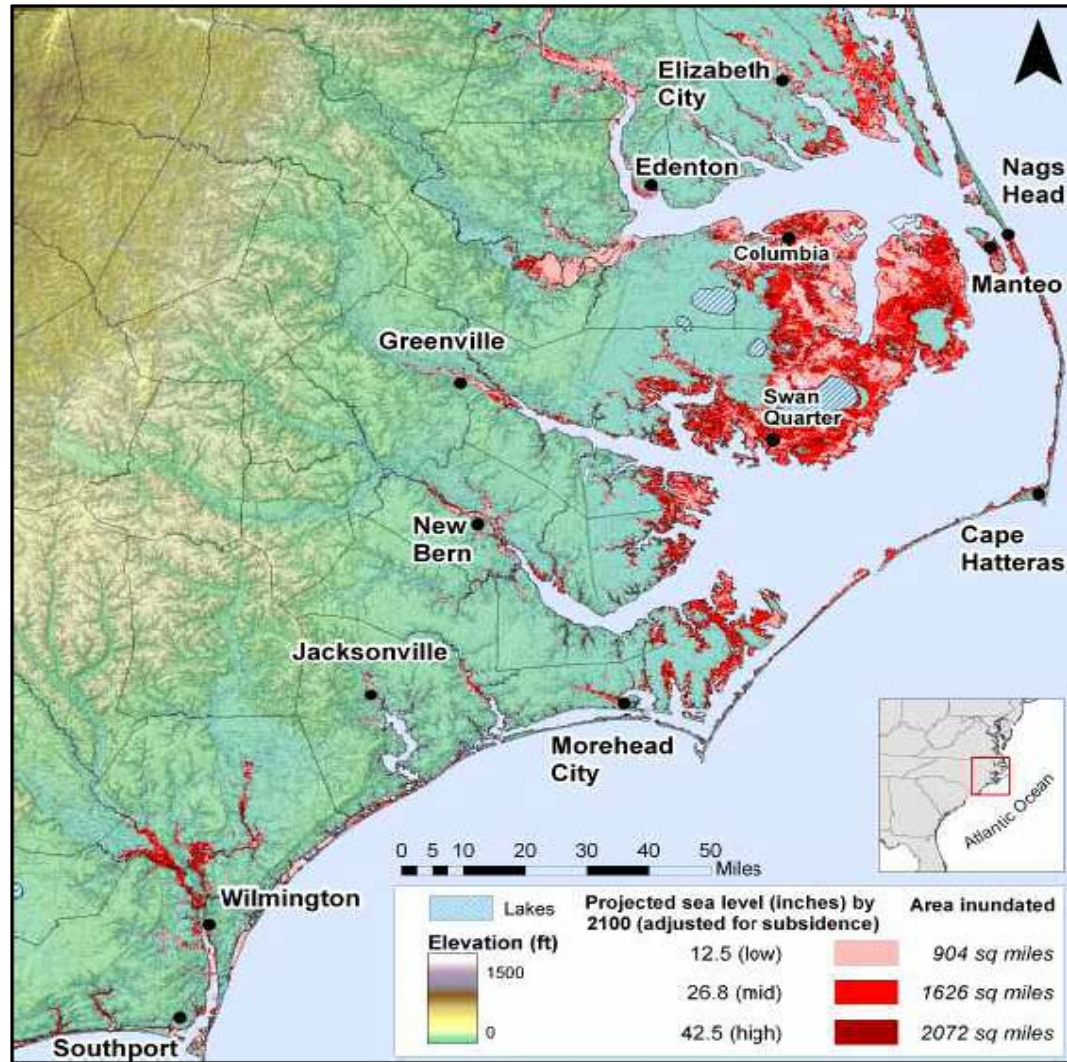
- Sea-level rise
 - Complete loss of many beaches
 - Lost property values
 - Lost recreation and tourism values
 - Increased hurricane activity and intensity
 - Business interruption
 - Agricultural losses
 - Greater damage to forests
 - Commercial fishing losses
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Sea-level Rise and Coastal Inundation



- A one-foot rise in sea level can cause the inland movement of the shoreline by 2000 to 10,000 feet when the land is as flat as the North Carolina coast.

Land at risk due to sea level rise by 2100



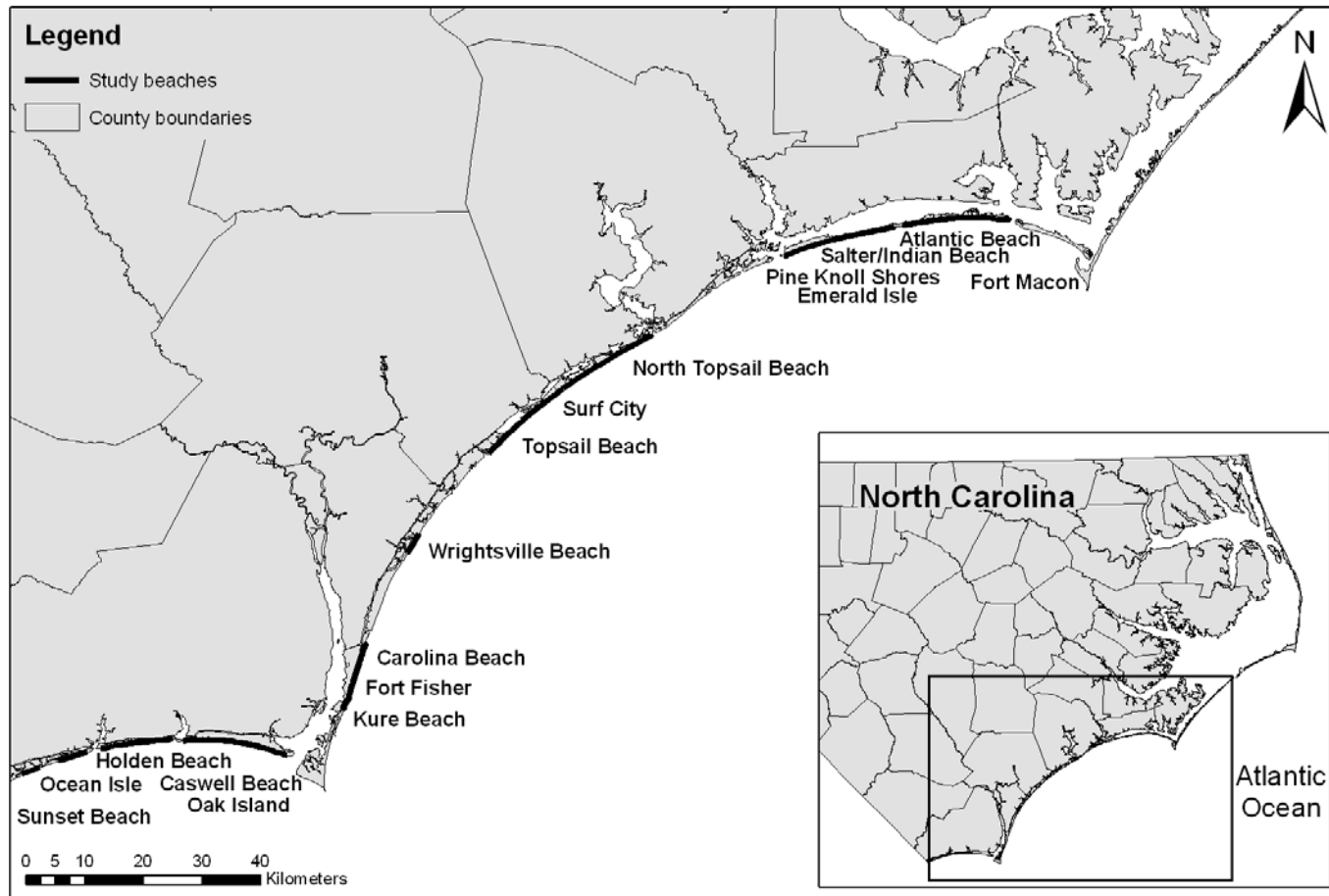
In this context, this study ...

- Considers the impacts of climate change on
 - coastal real estate
 - coastal recreation and tourism
 - business activity
 - We utilize a range of modest assumptions for sea-level rise and hurricane intensity increases, not best- or worst-scenarios.
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Coastal Recreation and Tourism



Study Beaches



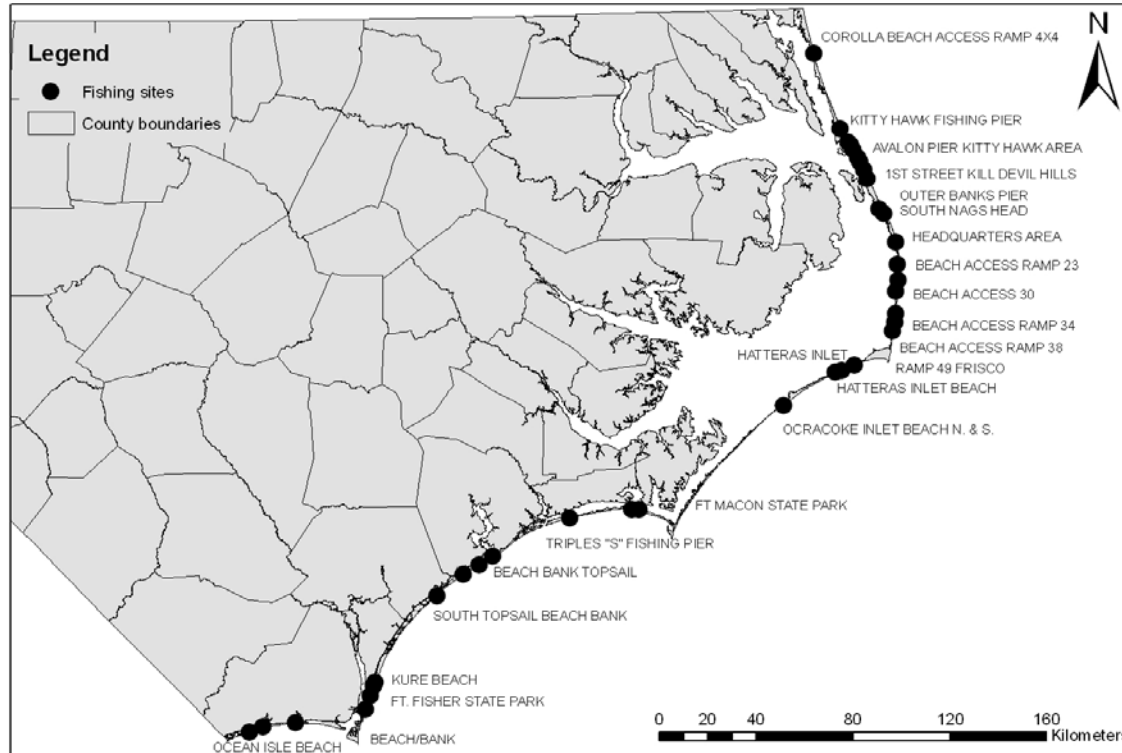
Beach Width

<u>County</u>	<u>Beach</u>	<u>2003</u>	<u>2030</u>	<u>2080</u>
Carteret	Fort Macon	90	40	0
Carteret	Atlantic Beach	135	85	0
Carteret	Pine Knoll Shores	110	60	0
Carteret	Indian Beach / Salter Path	90	40	0
Carteret	Emerald Isle	130	80	0
Onslow-Pender	North Topsail Beach	82	32	0
Onslow-Pender	Surf City	90	40	0
Onslow-Pender	Topsail Beach	110	60	0
New Hanover	Wrightsville Beach	160	110	3
New Hanover	Carolina Beach	185	135	28
New Hanover	Kure Beach	130	80	0
New Hanover	Fort Fisher	400	350	243
Brunswick	Caswell Beach	80	30	0
Brunswick	Oak Island	120	70	0
Brunswick	Holden Beach	90	40	0
Brunswick	Ocean Isle Beach	85	35	0
Brunswick	Sunset Beach	115	65	0

Impacts on Beach Recreation and Tourism

- The lost recreation value to local beach goers is projected to be \$93 million a year by 2030 and \$223 million a year by 2080 for the southern NC beaches.
 - Spending by non-local NC residents on beach trips would fall significantly with sea-level rise
 - 16% per year by 2030
 - 48% per year by 2080
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Fishing Sites



- 22 Piers
- 28 Beach

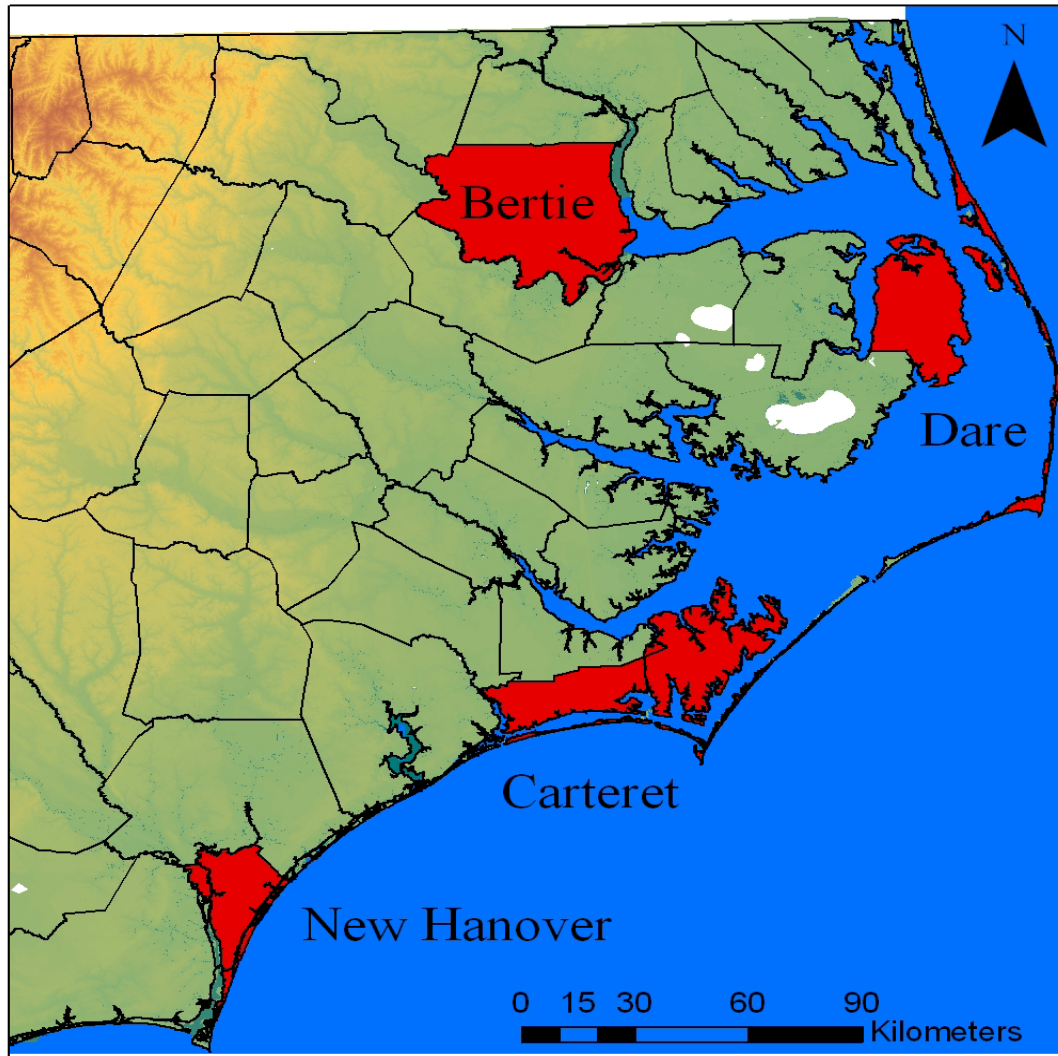
Impacts on Marine Recreational Fishing

- The lost recreation value to local shore anglers is projected to be \$15 million a year by 2030 and \$17 million a year by 2080.
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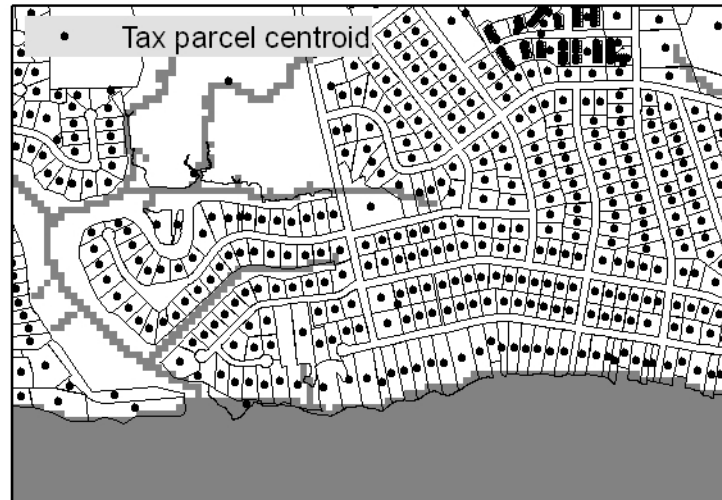
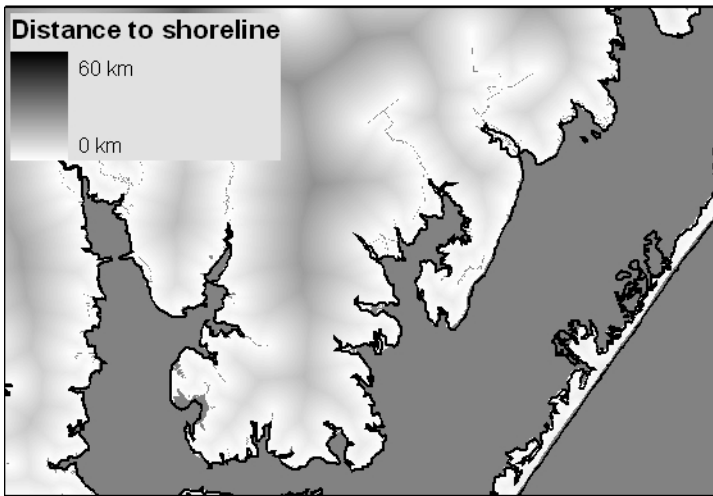
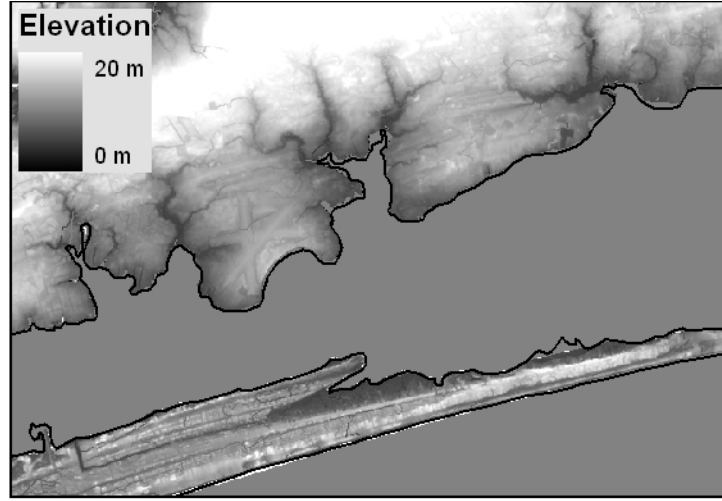
Coastal Real Estate



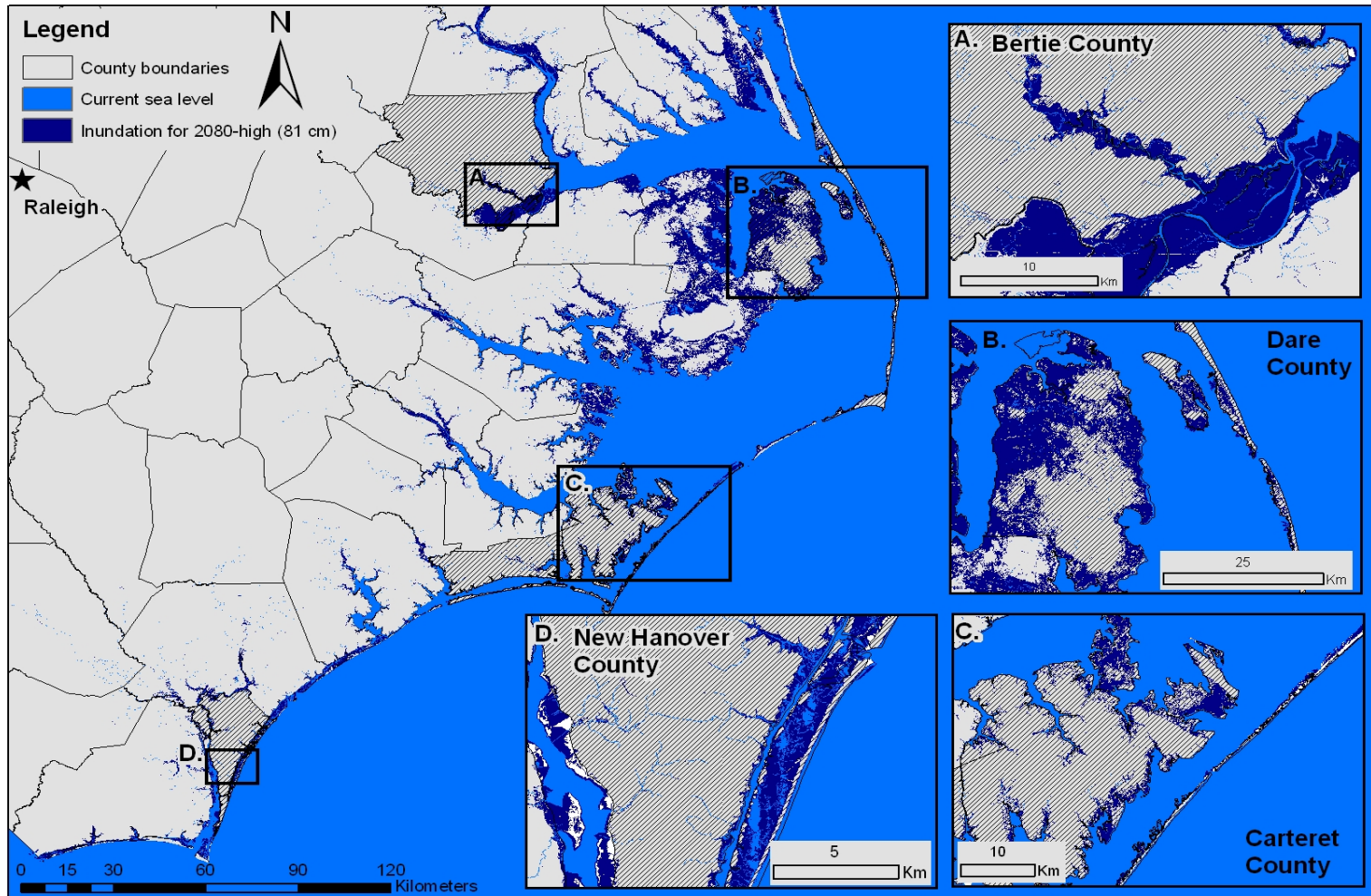
Study Area



GIS Real Estate Data



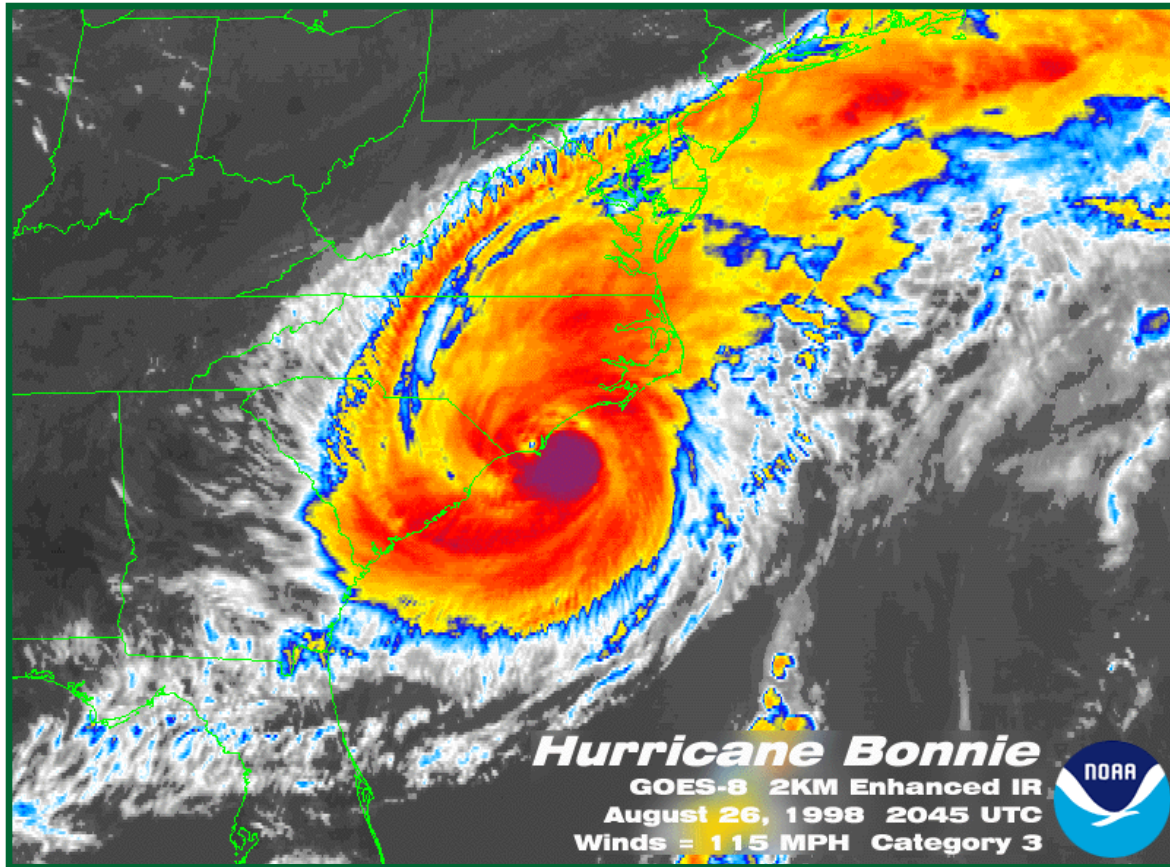
Inundation for 2080-High



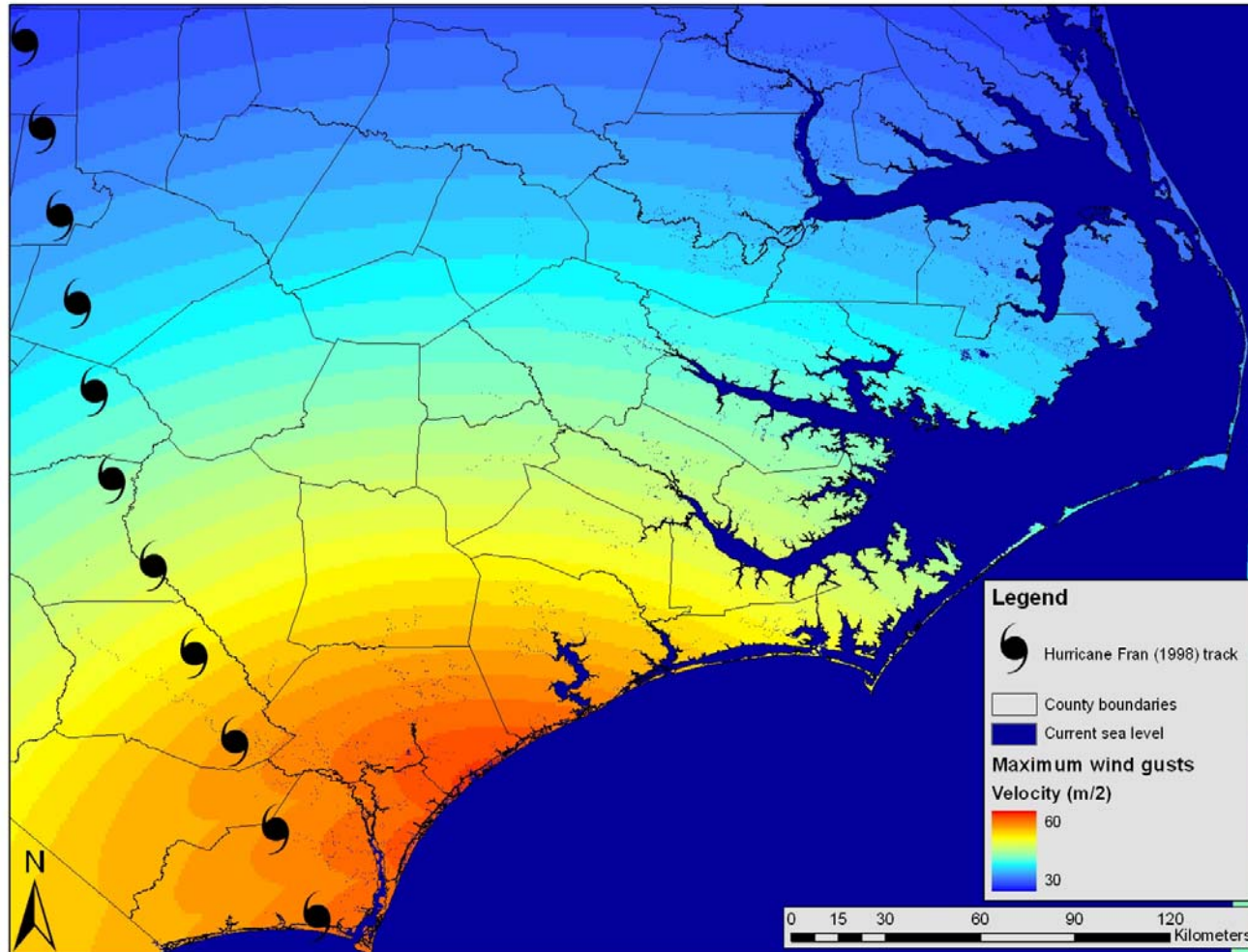
Impacts on Coastal Property Value

- The value of property at risk to sea-level rise in just four counties over the next 75 years is \$6.9 billion.
 - Projected losses in residential property values vary by county, with the northern counties more vulnerable than the southern.
 - The residential property at risk in Dare County ranges from 2% to 12% of the total property value.
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Hurricane Activity and Intensity



Hurricane Wind Speeds (Fran 1996)



Impacts on Business and Industries

- Business interruption losses in just four NC counties due to increases in category 3 hurricane severity are projected to rise by \$34 million per storm in 2030, and by \$157 million per storm in 2080.
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Impacts on Agriculture

- Increasing storm intensity is expected to have serious impacts on agriculture.
 - A category 1 hurricane now causes about \$50 million in agricultural damage, a category 2, about \$200 million, and a category 3, about \$800 million.
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Impacts on Forestry

- Increased forest damage associated with an increase in storm severity from category 2 to category 3 is about \$900 million more in damages.



Summary: Impacts of Global Warming on NC's Coastal Economy

- Over the next 75 years:
 - Lost recreational and tourism benefits total \$3.9 billion
 - The value of property at risk to sea-level rise in just four counties is \$6.9 million
 - Business interruption, agriculture and forestry losses due to increased storm severity are also substantial, on the order of \$1 billion in additional damage per category 3 storm event by 2080.
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Measuring the Impacts of Climate Change on North Carolina Coastal Resources

Okmyung Bin, East Carolina University, **Chris Dumas**, University of North Carolina at Wilmington; **Ben Poulter**, Duke University and Potsdam Institute for Climate Impact Research; and **John Whitehead**, Appalachian State University

Global warming is projected to have significant impacts on North Carolina coastal resources as sea level rises and hurricanes become more intense. Extensive development in the coastal zone in recent decades has put more people and property at risk for these impacts. In this context, a scientific study was undertaken by researchers at four North Carolina universities to consider three important aspects of the coastal economy and their vulnerability to a changing climate: the impacts of sea-level rise on the coastal real estate market, the impacts of sea-level rise on coastal recreation and tourism, and the impacts of stronger tropical storms and hurricanes on business activity.

The study used a range of moderate assumptions, not best- or worst-case scenarios. Its focus was only the specific economic impacts mentioned above, and as such, it does not attempt to provide a comprehensive analysis of all potential impacts, such as the possible loss of species or the natural ecosystems in which they live.



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