

Impacts of Climate Change on Tourism in the Coastal Towns of North Carolina

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I. Introduction

Climate change is one of the most important issues facing our world today. The effects of climate change are far reaching and, as a result, negative impacts are felt at every level of the ecosystem. National and state parks are a focus for many scientists trying to determine the current and future impact of climate change.¹ According to a new study, spring is coming early in three-fourths of the national parks.² These parks across the country not only serve as a vital part of the natural environment but are also a vital part of our tourism industry. In North Carolina specifically, a large part of that tourism industry stems from the coast.³ The state has 321 miles of coastline, which is the most of any state on the East Coast besides Florida.⁴ Climate change-driven sea level rise and its impacts—like beach erosion—are the most pressing issues facing North Carolina’s coast.⁵

In 2015, the North Carolina Coastal Resources Commission’s Science Panel updated the 2010 Sea Level Rise Assessment Report and included predictions for sea levels over the next thirty years.⁶ The report uses tide gauge rates and levels based off potential highest and lowest greenhouse emission scenarios to make its sea level predictions.⁷ The sea level predictions range from as low as 1.9 to as high as 10.5 inches.⁸ This broad range results from the uncertainty in

¹ 7 *Iconic Views at Risk from Climate Change*, U.S. DEPT. OF INT. NEWS (Oct. 6, 2016, 6:01 PM), <https://www.doi.gov/blog/7-iconic-views-risk-climate-change>.

² *Id.*

³ David L. Edgell & Carolyn E. McCormick, *Understanding Climate Change and Impacts on Tourism in the Outer Banks of North Carolina*, SCHOLARWORKS@UMASS AMHERST 6 (2011), <http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1701&context=ttra>.

⁴ SO. ENVTL. LAW CTR., *DISMANTLED* (2016), <https://www.southernenvironment.org/nc-report-chapter2>.

⁵ 7 *Iconic Views at Risk from Climate Change*, U.S. DEPT. OF INT. NEWS (Oct. 6, 2016, 6:01 PM), <https://www.doi.gov/blog/7-iconic-views-risk-climate-change>.

⁶ N.C. COASTAL RES. COMM’N SCI. PANEL, *SEA LEVEL RISE ASSESSMENT REPORT 6* (2015).

⁷ *Id.*

⁸ *Id.*

the predictions and the spatially varying nature of sea level along the coast of North Carolina.⁹

The Panel considered three scenarios for the rising sea levels in North Carolina: the levels will continue at existing rates, increase at a more significant rate in response to climate change, or the levels will decrease.¹⁰

The beach itself is what attracts a majority of the tourists in North Carolina.

Unfortunately, there are current and future threats that have and will continue to compromise the integrity of the beaches. For example, sea level rise is causing beach erosion on the North Carolina coast.¹¹ Also, storms themselves contribute to significant short-term changes in shorelines with more dangerous wind, waves and storm surge.¹² As global temperatures rise, storms will occur more frequently and with greater intensity.¹³ This will result greater beach loss and coastal change.¹⁴

North Carolina's coast is more than a treasured natural beauty. Coastal tourism is a major economic driver for the state.¹⁵ If nothing is done to alter current climatic trends, climate change stands to severely impact our economy. State laws and policies both now and in the future will help to determine the fate of North Carolina's coast and ultimately the success of the tourism industry.

⁹ *Id.*

¹⁰ *Id.* at 25.

¹¹ N.C. DEP'T OF ENVTL. QUALITY: DIV. OF COASTAL MGMT., COASTAL EROSION STUDY 4 (2016).

¹² *Id.*

¹³ *Id.*

¹⁴ *Id.*

¹⁵ David L. Edgell & Carolyn E. McCormick, *Understanding Climate Change and Impacts on Tourism in the Outer Banks of North Carolina*, SCHOLARWORKS@UMASS AMHERST 6 (2011), <http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1701&context=ttra>.

II. Economic Importance of Tourism in Coastal Towns

A significant part of North Carolina's economy relies on tourism.¹⁶ Although many parts of the state benefit from tourism, North Carolina's coastline is a prime attraction for many tourists. Tourism in North Carolina is a \$1.7 billion industry, and Outer Banks tourism in particular accounts for over one billion dollars and 20,000 jobs.¹⁷ Dare County, which contains the Outer Banks, Duck and Nags Head, reported the largest per capita impact from tourism in 2013 as compared to rest of the state.¹⁸ Dare greatly surpassed all other counties with \$27,290 in tourism-related per capita revenue.¹⁹ Several other coastal counties fall within the state's top ten list for per capita tourism revenue.²⁰

III. Predicted Losses Due to Climate Change

The most significant effects on the tourism industry in coastal towns of North Carolina include loss in land, property value and recreational value within the next 30 to 75 years.²¹ More specifically, the loss of sandy beaches will reduce recreational swimming and shore fishing which attract a number of tourists.²² Further, the various species of fish that attract many of the tourists will cease to exist as a result of climate change.²³ Essentially, all recreational beach activity would be eliminated in locations of the coastline most impacted by rising sea levels.²⁴ In

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ Rebecca Tippett, *NC in Focus: Economic Impact of Tourism*, CAROLINA DEMOGRAPHY (Jul. 16, 2015), <http://demography.cpc.unc.edu/2015/07/16/nc-in-focus-economic-impact-of-tourism/>.

¹⁹ *Id.*

²⁰ *Id.*

²¹ John C. Whitehead et al., *New Study Finds Carolina Coastal Economy Vulnerable to Sea Level Rise*, UNIV. NEWS: APPALACHIAN STATE UNIV., (Jun. 21, 2007), <http://www.news.appstate.edu/2007/06/21/nc-coastline/>.

²² *Id.*

²³ *Id.*

²⁴ *Id.*

recreational activity alone, the predicted effect is projected to be \$3.9 billion loss over the next 75 years.²⁵

Further, while tourism is a major part of the coastal economy, an increase in the number of people on the coast worsens the negative impacts of climate change.²⁶ More people typically means more infrastructure which destroys the natural environment.²⁷ Also, more people combined with more frequent and dangerous storms not only destroys infrastructure, but also make evacuation more difficult.²⁸

IV. Current Laws and Regulations

State and local laws are vital to protect the coast against the impact of climate change both now and in the future. Over the years, both the state and local governments have sought to enact legislation to protect the North Carolina coastline.²⁹ The Coastal Area Management Act of 1974 (“CAMA”) currently serves to protect the North Carolina coast.³⁰ The purpose of the CAMA is to combine the forces of the local and state government in coastal areas to help plan for the future.³¹ Under CAMA, the state government is responsible for defining the areas of environmental concern which CAMA seeks to protect.³²

CAMA delegates authority to the Coastal Resources Commission to develop, adopt and amend State guidelines for coastal areas.³³ In particular, the statutes set forth under CAMA seek to preserve the natural areas of the North Carolina coast.³⁴ For instance, under

²⁵ *Id.*

²⁶ David L. Edgell & Carolyn E. McCormick, *Understanding Climate Change and Impacts on Tourism in the Outer Banks of North Carolina*, SCHOLARWORKS@UMASS AMHERST 6 (2011), <http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1701&context=ttra>.

²⁷ *Id.*

²⁸ *Id.*

²⁹ Coastal Area Mgmt. Act, 7 N.C. GEN. STAT. § 113A-101 (1974).

³⁰ *Id.*

³¹ *Id.*

³² *Id.*

³³ *Adams v. N.C. Dept. of Nat. and Econ. Res.*, 249 S.E.2d 402, 295 N.C. 683 (1978).

N.C. Gen. Stat. § 113A-129.1, certain areas are to be left undeveloped and are only available for research, education and other consistent public uses.³⁵ Both the Commission and the North Carolina courts have been able to enforce the intent of the statute to ensure its effectiveness in protecting the coastline.³⁶ For instance, in the early 1990s, the Commission approved a permit allowing the drilling of wells on coastal reserves for operation of public water supply, but the North Carolina Court of Appeals later revoked the permit as it was found to violate the Act.³⁷ This shows that CAMA is an essential piece to preserving, maintaining and improving undeveloped coastal land and water in order to allow for public use.³⁸

Furthermore, CAMA provides remedial measures by requiring restoration of resources to the fullest extent practicable and correcting unauthorized development if a permit would have been denied by the Commission.³⁹ The costs of restoration of unauthorized development is not balanced against benefits of coastal wetlands, even when the remedy is determined after the violation is found, the restoration is required.⁴⁰ Regardless of size, CAMA protects coastal wetlands by ensuring they are properly restored when a violation occurs.⁴¹ Restoration, preservation and maintenance efforts all serve to not only keep the beaches beautiful, but also prevent erosion and habitat destruction that comes as a result of climate change.⁴²

In recent years, however, there have been changes to the overall environmental laws and policies in the state. Most notably beginning in 2011 when the current majority took over the North Carolina General Assembly, some of the environmental protections put in place by state

³⁴ Coastal Area Mgmt. Act, 7 N.C. GEN. STAT. § 113A-101 (1974).

³⁵ N.C. Gen. Stat. § 113A-129.1

³⁶ Friends of Hatteras Island Nat. Historic Maritime Forest Land Trust for Preservation, Inc. v. Coastal Res.Com'n of State, 117 N.C. App. 556, 452 S.E.2d 337 (1995).

³⁷ *Id.*

³⁸ *Id.*

³⁹ State ex rel. Cobey v. Simpson, 423 S.E.2d at 759, 333 N.C. 81 (1992).

⁴⁰ *Simpson*, 423 S.E.2d 759, 333 N.C. 81.

⁴¹ *Id.*

⁴² N.C. Coastal Fed'n, <http://www.nccoast.org/protect-the-coast/climate-change/> (last visited Oct. 17, 2016).

government over the years have been weakened, and the state's coastal policies are no exception.⁴³

Tourists are drawn to North Carolina for its natural shorelines, contrasting with the overbuilt, hardened northeastern coast.⁴⁴ However, in 2011 the ban on coastal hardened structures was repealed, allowing for terminal groins.⁴⁵ Groins run perpendicular to the shoreline and trap sand on the updrift side of the structure, starving the downdrift side.⁴⁶ While North Carolina has used groins in the past to control erosion, groins disrupt the natural movement of sand, to the detriment of wildlife habitat and marine resources by destroying their natural habitat.⁴⁷ These structures also increase a coast's susceptibility to storm damage by causing the ocean to flow over the land at other locations, known as overwash.⁴⁸ In 2011 and 2015 the N.C. General Assembly passed legislation allowing for six more terminal groins to provide for inlet stabilization and erosion control.⁴⁹ This statute allows the additional groins to be permitted if they meet the requirements outlined in the statute.⁵⁰ Increases in the number and frequency of storms from climate change and groins and other hardened coastal structures serve to potentially further beach erosion allowing for the opposite intended affect.⁵¹

Beach renourishment, in other words adding sand to beaches, is another option that many coastal towns are using to preserve the North Carolina coast. Various beach communities have resorted to such measures, but sometimes the property owners with beachfront property are not

⁴³ SO. ENVTL. LAW CTR., DISMANTLED (2016), <https://www.southernenvironment.org/nc-report-chapter1>.

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ BRAD KNOTT, N.C. DEP'T OF ENVTL QUALITY, MEMO ON BEACH EROSION STUDY REPORT 27 (Mar. 1, 2016), http://www.coastalreview.org/wp-content/uploads/2016/03/Agenda-Item-6_DEQ-Beach-Erosion-Study-Final.pdf.

⁴⁷ *Id.* at 20.

⁴⁸ *Id.* at 27.

⁴⁹ *Id.* at 2

⁵⁰ N.C. GEN. STAT. § 113A-115.1.

⁵¹ *Id.*

in favor.⁵² Beach renourishment is an example of a governmental action that some people believe interferes with their property rights. In 2003, the Town of Emerald Isle, North Carolina decided to renourish parts of its beach which arguably changed the property line of the plaintiffs in *Nies v. Town of Emerald Isle*.⁵³ The court in this case upheld the longstanding custom that the access to dry sand beaches is recognized as a public right in the public consciousness of North Carolina.⁵⁴ Further, N.C. Gen.Stat. § 77–20 states that at least some portion of privately-owned dry sand beaches are subjected to public trust rights.⁵⁵ The important ruling from the case held that there was no taking in the alteration of the property line due to the addition of dry sand.⁵⁶ This type of ruling in the North Carolina courts supports the coastal towns in their decision to renourish the beach and protect the beaches for public use, and therefore preserve and enhance tourism. More importantly, climate change itself is an issue that affects the entire public and, as such, all coastal policies should be directed with the environment in mind as it is the best way to protect coastal tourism.

Another North Carolina Statute enacted on July 1, 2015 entitled the “Multiyear beach management and restoration strategy plan” also supports beach renourishment as a way to combat beach erosion resulting from climate change.⁵⁷ The statute looks to depend on both geological and environmental assessments to determine the location of suitable materials for beach renourishment.⁵⁸ Beach renourishment is a locally operated and funded project, but the statute provides for priority state funding for such projects.⁵⁹ The North Carolina General Assembly also promoted inlet sand bypassing, the capturing of sand on the updrift side of the

⁵² *Nies v. Town of Emerald Isle*, 780 S.E.2d 187 (2015).

⁵³ *Id.* at 191.

⁵⁴ *Id.* at 196.

⁵⁵ N.C. GEN. STAT. § 77–20

⁵⁶ *Nies*, 780 S.E.2d at 202.

⁵⁷ N.C. GEN. STAT. § 113A-134.12

⁵⁸ *Id.*

⁵⁹ *Id.*

inlet and moving it to downdrift beaches, to allow for the replication of the natural flow of sand interrupted by inlets.⁶⁰ Using environmental assessments is an important way to ensure that beach renourishment is a step in the right direction when utilizing policy to combat climate change and prevent further coastal destruction.

Real estate development is another aspect of North Carolina's current coastal policy that requires a balance of promoting growth in tourism versus protecting the coast. Development has the potential to positively impact the state if planning is done in a proper manner. Namely, planning must take into account the risk of flooding based on the predicted levels of rising sea levels.⁶¹ In 2014, the U.S. Army Corps of Engineers adopted a planning process requiring every coastal project to be evaluated using the three sea level scenarios, and, if found not to be acceptable, a change is required on the project design.⁶² The adoption of this planning guidance applies to and therefore currently benefits North Carolina because it is required on every federal project.⁶³ Many developments, however, are not included in this planning guidance, and it has been a source of debate in the state in recent years as to exactly how or if there should be planning for rising sea levels resulting from climate change.

A few years ago, the North Carolina General Assembly made a decision not to consider climate change's rising sea levels when planning coastal infrastructure and future developments.⁶⁴ Effective August 3, 2012, the General Assembly enacted a statute stating that it does not intend to mandate the development of sea level policy as predicted by scientific research.⁶⁵ Under the statute, any planning guideline, rule or policy that cites rising sea levels

⁶⁰ *Id.*

⁶¹ N.C. COASTAL RES. COMM'N SCI. PANEL, SEA LEVEL RISE ASSESSMENT REPORT 31 (2015).

⁶² *Id.*

⁶³ *Id.*

⁶⁴ N.C. GEN. STAT. § 113A-107.1

⁶⁵ *Id.*

for regulatory purposes cannot be adopted.⁶⁶ The statute was enacted in response to a report done by the Science Panel of the North Carolina Coastal Resources Commissioner that predicted the coast levels could rise as much as 39 inches over the next 100 years.⁶⁷ The purpose of the law was to prevent communities from using this report to pass new ordinances.⁶⁸ In 2015, the Panel came out with a new report that predicted sea level changes only 30 years out.⁶⁹ The updated report received more widespread acceptance, but critics claim that the report does nothing to help with the planning of long-term public projects like hospitals that will be around for far longer than 30 years.⁷⁰ Although stricter ordinances accounting for rising sea levels might be more costly in the beginning, they will save costs of destruction in the future and more sustainably preserve tourism.

V. Recommendations for the Future

The most important question, however, is the best way to improve current laws for inevitable climate changes in hopes of mitigating the predicted negative impacts. Beach renourishment as mentioned earlier is an option that can benefit the coasts of North Carolina by preserving the beaches and not disrupting the natural movement of the beaches.⁷¹ Accepting a study that predicts rising sea levels thirty years out is a step in the right direction. Nevertheless, it is important that the coastal communities and the state as a whole adopt research practices that look further out than just thirty years. Being more proactive by properly planning in anticipation of the potential impacts of climate change will reduce the effects on coastal communities. Most

⁶⁶ *Id.*

⁶⁷ Dave Dewitt, *The State that “Outlawed Climate Change” Accepts Latest Sea-Level Rise Report*, WUNC (May 4, 2015), <http://wunc.org/post/state-outlawed-climate-change-accepts-latest-sea-level-rise-report#stream/0>.

⁶⁸ *Id.*

⁶⁹ *Id.*

⁷⁰ *Id.*

⁷¹ David L. Edgell & Carolyn E. McCormick, *Understanding Climate Change and Impacts on Tourism in the Outer Banks of North Carolina*, SCHOLARWORKS@UMASS AMHERST 6 (2011), <http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1701&context=ttra>.

important, efforts need to be made to educate local business owners on the coast of the importance of taking steps to not only reduce their environmental impact, but also plan for the future in hopes of reducing the impact of climate change on the coast.

The North Carolina Coastal Federation (“NCCF”) is an example of an organization that seeks to protect the coast.⁷² Its main focus is on advocating, educating and restoring.⁷³ In regards to advocating, it believes in encouraging involvement in one’s local community. Whether it is attending public meetings or contacting local officials, it is important for the public in coastal towns and across the state to be informed and involved in hopes of playing a role in the legislative process in order to protect the coast.⁷⁴ The education aspect is more of a long term investment by educating children of all ages both inside and outside the classrooms on both environmental sustainability and the importance of protecting the coast.⁷⁵ After all, some of the effects of climate change are occurring now, but the main effects will impact the younger generation so the investment now is well worth it. The last part of the Federation’s focus involves efforts to restore the shorelines and wetlands to their state prior to human activity and storms.⁷⁶ Aggressive efforts in the legislation are definitely needed to protect coastal tourism for years to come, but the effectiveness of community efforts cannot be overlooked either.

VI. Conclusion

Further action needs to be taken by the local communities and more importantly the state and federal government to protect tourism on the beaches of North Carolina. The NC General Assembly would greatly benefit by both adopting and collaborating with organizations like NCCF to develop a more progressive and comprehensive policy to protect the North Carolina

⁷² *Protect the Coast*, N.C. COASTAL FED., <http://www.nccoast.org/protect-the-coast/climate-change/> (last visited Oct. 17, 2016).

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ *Id.*

coast. Tourism plays a vital role in the economy, but if the topic of climate change is not addressed with well-defined policies, then there is a significant chance that the tourism industry in North Carolina will never be the same.⁷⁷ Even though tourists contribute to the negative climate change effects on the coastline, they also contribute to a massive tourist economy. Therefore, it is essential to find a balance that supports the tourism economy without sacrificing the beach environment that people enjoy.⁷⁸

All in all, this paper primarily focuses on the effects and responses to rising sea levels and shoreline erosion as a result of climate change. It is important to bear in mind that the effects of climate change are more far reaching than what this paper outlines, and some of the effects, especially on the tourism industry in North Carolina, may not yet be known. The study of climate change effects is one that is relatively recent and constantly changing. For that reason, it is extremely important for the legislative bodies in North Carolina to value and spend money on not only solutions for the beaches, but also scientific research to ensure that the solutions and plans being adopted are the best for North Carolina.

⁷⁷ David L. Edgell & Carolyn E. McCormick, *Understanding Climate Change and Impacts on Tourism in the Outer Banks of North Carolina*, SCHOLARWORKS@UMASS AMHERST 6 (2011), <http://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1701&context=ttra>.

⁷⁸ *Id.* at 9.