

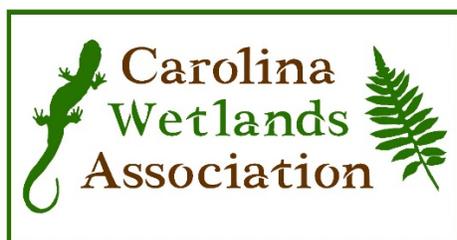
White Paper: Wetlands and Climate Change

December 2020



Prepared by the Carolina Wetlands Association

www.carolinawetlands.org



Abstract

Climate change is the rise in average surface temperatures on Earth, mostly due to the burning of fossil fuels. Climate change is causing intensifying storm activity, rising sea levels and creating more frequent floods and droughts in the Carolinas and worldwide. Recent, significant storm events in North and South Carolina include Hurricane Florence (2018), Hurricane Matthew (2016) and Hurricane Floyd (1999).

Increased storm activity is having a huge economic and environmental impact on our coastal and inland communities in the Carolinas. Hurricane Matthew caused an estimated \$4.8 billion in damages. Hurricane Floyd caused between \$7 and \$9.4 billion, and the damage from Hurricane



Aerial view of Hurricane Florence (2018) heading for the Carolinas. Photo: NASA

Florence was estimated to be nearly \$17 billion – more than Matthew and Floyd combined.

Wetlands play a critical role to help mitigate increased storm activity caused by climate change by retaining floodwater, stormwater and storm surges. Because of their critical importance during these storm events, wetland protection and conservation is essential to combating the effects of climate change in the Carolinas.

Problem Statement

Climate change is here. As defined by NASA, climate change refers to long-term changes in the average weather patterns that have come to define Earth's local, regional and global climate¹. Climate change causes increased temperatures and storm activity, contributes to rising sea levels, elevates storm surges and causes more frequent flooding.

The economic impact of recent, intense storm activity in the Carolinas has been devastating over the last 10 years. In 2018, Hurricane Florence produced a record storm surge of 9 to 13 feet and caused catastrophic flooding inland for days². More than 50 people died across the region; 42 in North Carolina alone. North Carolina's Governor Roy Cooper estimated Florence's damage in North Carolina at \$17 billion—an amount more than Hurricane Matthew and the previous historic hurricane, Floyd in 1999, combined².

Flooding not only causes property damage, but also impacts public health and overall well-being in our communities³. Flooding can destroy a home, leaving it uninhabitable. There are also numerous hidden dangers in flood waters that create a public health risk: live wires, broken glass, and sharp metal as well as bacteria and other pathogens⁴.

Background

There is general agreement amongst the scientific community that climate change is real. Also referred to as global warming, climate change is causing a rise in average surface temperatures on around the globe¹.

2019 was the warmest year on record in North Carolina. In the Carolinas, scientists have observed an increase in annual average temperature by 1.0° F since 1895. In North Carolina, the last 10 years (2009 - 2018) represented the warmest 10-year period on record⁵. In Charleston, South Carolina, 2019 was the fourth-warmest year on record, which ended the warmest decade to date⁶.

In addition to rising temperatures, climate change is intensifying storm activity, rising sea levels and causing more frequent floods and droughts worldwide. The Carolinas have experienced several major hurricanes in the last 5 years, including Hurricane Matthew (2016), Florence (2018) and Dorian (2019). These hurricanes caused widespread flooding in dozens of coastal communities, resulting in billions of dollars in property damage.

Extreme flooding events occurred during hurricanes Matthew (2016) and Florence (2018) in North and South Carolina⁵. Florence was a historic storm, breaking 28 flood records across North and South Carolina⁷. Some of the flooding records are over 75 years old, including the Northeast Cape Fear River near Chinaquapin, NC (78 years) and the Little Pee Dee River at Galivants Ferry, SC (77 years).

Solution

Wetlands play an absolutely critical role in mitigating the impacts of climate change, by retaining floodwater, stormwater and storm surges. Wetlands also store, or sequester, excess carbon in the atmosphere through photosynthesis⁸. Carbon dioxide in the atmosphere is absorbed by wetland plants during photosynthesis and is retained in the plants' biomass (roots, shoots, tree bark and leaves) and in the soil as soil organic matter.

When an area floods with water, surrounding wetlands act like a giant sponge; living plants and even the dead plant matter along with porous soils can absorb the extra water. Wetlands also help slow down the movement of floodwater to surrounding areas – which would otherwise impact homes and businesses.

In coastal areas, marsh wetlands protect shorelines from erosion by buffering wave action and trapping sediments. They reduce flooding by slowing and absorbing rainwater and protect water



View of Lily Pond in May of 2015 within the Croatan National Forest in North Carolina. This wetland is well known for its capacity to retain water after storm events, slowly releasing the water back into the environment. Photo: Kristie Gianopulos

quality by filtering runoff. Coastal marshes can also migrate landward (Figure 1). Trapped sediments allow the marshes to rise in elevation, which helps mitigate the effects of sea level rise (SLR).

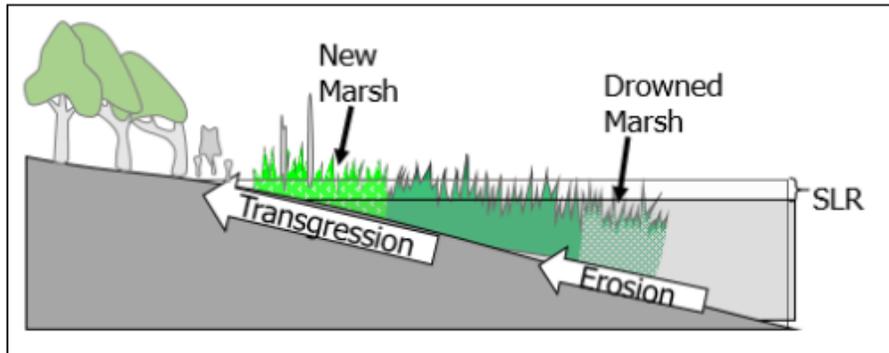


Figure 1. Landward migration of salt marsh with sea level rise (SLR). (Figure courtesy of DCERP 2 Final Report, 2018.)⁹

Because of their ability to mitigate sea level rise, absorb rainwater, retain floodwater and store atmospheric carbon dioxide, wetland protection and conservation is essential in the Carolinas.

Wetlands can be protected and conserved in a number of ways:

- By not developing or impacting wetlands (e.g., filling, ditching),
- By avoiding the installation of bulk heads or retaining walls along marshes, which impede marsh landward migration,
- By avoiding wetlands if planning a home, building, shed or farm field expansion, and
- By placing wetlands under protective easement (e.g., conservation easement).



View of a living shoreline along the Carolina coast. Photo: Restoration Systems

- If you live on waterfront property, wetlands can be protected by installing a “living shoreline” (see photo – left) – a mix of plant roots, sand and stone instead of man-made structures, like retaining walls, to stabilize the soil.

Conclusion

Climate change isn't going away. Climate change intensifies storm activity, and scientists predict an increase in tropical storm frequencies from 1-10% in coming years¹⁰.

Wetlands play a critical role to help offset the impacts of climate change by retaining floodwater, stormwater and storm surge. Wetlands also hold tremendous value as a climate change mitigator through their ability to sequester carbon within the organic content in the soil.

The impacts of climate change on local communities can be significantly lessened by protecting local wetlands. This can be done by:



View of a saltwater marsh in Francis Marion National Forest. Photo: Kristie Gianopolus, NC Wetlands

- Avoiding the development or impact of wetlands (e.g., filling, ditching);
- Avoiding wetlands if planning a home, building, shed or farm field expansion; and
- By placing wetlands under protective easement (e.g., conservation easement).
- If you live on waterfront property, wetlands can be protected by installing a “living shoreline” (see below photo, right) to stabilize the soil – a mix of plant roots, sand and stone instead of man-made structures, like retaining walls.

There are a number of existing wetland protection programs in place in the Carolinas, and these programs greatly benefit from volunteer contributions and involvement:

- North Carolina Department of Environmental Quality’s Division of Mitigation Services: <https://deq.nc.gov/about/divisions/mitigation-services>
- North Carolina Coastal Land Trust: <https://coastallandtrust.org/>
- South Carolina’s Department of Health and Environmental Control: <https://scdhec.gov/>
- North Carolina Coastal Federation: <https://www.nccoast.org/protect-the-coast/restore/wetlands-restoration/>

References

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