**An Update on Climate Change**

by Sarah Ashton & Jim Metzler, DDWS Advocacy Committee Co-Chairs

According to a 2018 report issued by the U.S. government, as a result of global warming we can expect to experience a range of effects including continually rising tidal levels, stronger hurricanes, and, since they are driven in part by warmer water, more harmful algal blooms. All these effects will adversely impact the J.N. "Ding" Darling National Wildlife Refuge.

In February, the Captiva Island Yacht Club's environmental committee hosted a presentation and discussion of climate change led by Dr. Tiffany Troxler, who is a research associate professor at the Southeast Environmental Research Center at Florida International University.

This article is based primarily on Dr. Troxler's presentation, which featured data that focused on Southeast Florida. Dr. Troxler stated that while there may be some regional differences, the situation facing Southwest Florida is very similar to the situation facing Southeast Florida.

**Background**

Rising Sea Levels

One of the impacts of global warming is that the sea level around Florida is roughly 8 inches higher than it was in 1950. According to Dr. Troxler, Florida's sea level is projected to rise another 6 inches in the next 10 years. She also previewed a soon-to-be-published report that quoted a range of studies indicating that the sea level in Southeast Florida will rise between 10 and 21 inches by 2040.

Contributors

Dr. Troxler presented data provided by NOAA that indicated that the two biggest contributors to rising sea levels over the last 20 years have been an addition of water from melting glaciers and ice sheets (a.k.a., meltwater) and the thermal expansion of seawater due to raising temperatures. The data indicated that over the last 20 years meltwater has been the more significant contributor but that on a going-forward basis the relative contribution of those two contributors is uncertain.

Regional Factors

The impact of climate change will vary geographically. For example, earth's gravity changes due to massive quantities of ice melting. As a result, water levels in Alaska are going down because the land is rising. In contrast, in part due to removing large quantities of natural gas, land in Louisiana is lowering which compounds the impact of sea level rise. Here in Florida, the slowing down of the Gulf Stream has accelerated sea level rise in Southeast Florida.

Impact

Dr. Troxler stressed that the effects of climate change are already here. One example she gave was sunny day flooding, which is a situation where streets flood during high tides. According to NOAA, between 2000 and 2019, sunny day flooding events jumped by 190 percent in the Southeast, and by 140 percent in the Northeast. She also stated that sea level rise is not just an issue for coastal communities because rising seas also raise the level of ground water, which means that inland communities are becoming more susceptible to flooding.

Another impact of climate change is compound flooding. This refers to extreme flooding that results from the interaction of multiple drivers including sea level rise, river discharges, precipitation, and waves.

Recent research has determined that there is often a link between the drivers. For example, the co-occurrence or close succession of a heavy precipitation event and a storm surge is driven by a common cause: deep low-pressure systems. See more. In 2017, Jacksonville, Florida, experienced compound flooding as a result of the combination of a storm surge and high discharge from the St. Johns River during hurricane Irma. See more. A video showing the impact of compound flooding on a Miami neighborhood in 2017 can be found here.

**The Path Forward**

Having discussed some of the challenges associated with climate change, Dr. Troxler identified some of the steps that the city of Miami has already taken relative to combatting sea level rise and reducing the impact of flooding. Those steps include:

- Creating the *Miami Forever Climate Ready Strategy*, the goal of which is to build a resilient and sustainable future for Miami by preparing for, adapting to, and mitigating current and future climate risks
- Appointing a Chief Resilience Officer in 2016
- Joining with Miami-Dade County and the city of Miami Beach to create the *Resilient305 Strategy*. This strategy is designed to encourage a broad range of groups to work together to better prepare for an increasing occurrence of shocks, such as hurricanes, and infrastructure failures, as well as to better mitigate stresses, such as sea level rise and sunny day flooding. See more.

On a going-forward basis, Dr. Troxler asserted that we must move away from an environment in which systems are designed to be either resilient or sustainable to where systems are designed to be both sustainable and resilient. One example she gave was that the decision to construct the Herbert Hoover Dike and release water down the Caloosahatchee and St. Lucie rivers was driven by the goal of creating a resilient solution to protect the Clewiston area from flooding. A side effect of this solution is that there has been a massive amount of saltwater intrusion into the southern Everglades, which has permeated the supply of drinking water and threatened the sustainability of living in south Florida.

According to Dr. Troxler, being able to implement solutions that are both sustainable and resilient requires implementing solutions that are adaptive, diverse, ecologically based, and that minimize the consequence of failure. She highlighted the fact that coastal ecosystems such as mangroves, seagrass meadows, and tidal marshes adapt naturally to changes in the environment. In addition, recent research indicates that coastal ecosystems are particularly good at drawing carbon dioxide from the atmosphere and storing it for hundreds to thousands of years.

Dr. Troxler gave the example of a storm drain in an urban area and referred to this type of solution as grey infrastructure. The storm drain is designed to do one thing – control the flow of excess amounts of water. She contrasted that to a green solution comprised of a combination of small retaining ponds and appropriate plants. Similar to the grey solution, the green solution controls the flow of excess amounts of water. The green solution, however, also provides other benefits such as carbon sequestration, water quality regulation, air quality regulation, and increased habitat and biodiversity.

**Conclusion**

Climate change is a major threat to our environment that thankfully is being taken seriously locally. For example, Captiva has created a sea level rise resiliency committee, with the aim of looking at the question

of whether Captiva needs to develop a future plan to fortify the island against the rising waters. See here. Sanibel has been addressing climate change in several ways. For example, in 2019 Sanibel ran a forum on Sanibel's coastal vulnerability to sea level rise and increased storminess which included identifying eight community engagement teams. On Thursday, March 5, there will be an event at SCCF's Bailey Homestead on Sanibel that will feature two presentations relative to climate change. One presentation is titled "Adaptive Coastal Design & Resilient Urban Landscapes: The Dutch Approach." It will be given by Dr. Steffen Nijhuis, Delft University, The Netherlands. The second presentation is titled "Incorporative Planning in Coastal Environments: Putting It All Together" by Dr. Brian Cook, University of South Florida.

There is also some activity at the state level. In August 2019, Governor Ron DeSantis announced the appointment of Dr. Julia Nesheiwat as Florida's first Chief Resilience Officer (CRO). Florida is one of the first states in the nation to have a CRO. The governor has tasked Dr. Nesheiwat to prepare Florida for the environmental, physical, and economic impacts of sea level rise.

**In Case You Missed It:**

Florida Senate Bill 178, which would keep state-financed builders out of coastal areas unless they first conduct sea level impact projection, is beginning to face opposition. See more.