

Coastal Living

By: Kenneth H. Nelson, P.E.



Photo during construction of the storm surge barrier east of New Orleans after hurricane Katrina. NELSON designed the lift gate for one of the navigation openings in this structure.

Anyone who lives along the coast of the Gulf of Mexico becomes of necessity an amateur meteorologist and geomorphologist. To avoid the economic loss and life safety hazards of being trapped by flooding due to storm surge, rain, or river flooding, one has to learn the factors that cause these events and the ways that local landforms concentrate or mitigate their effects. There is a saying here that “If you live on the water, you will occasionally live in the water.” Unfortunately, recent weather events have shown you don’t have to be located right on the water to suffer major losses due to extreme

events. Storm surge from hurricanes has reached many miles inland, and river flooding due to historic rainfall has caused once in five hundred year levels of inundation in areas far from the river banks. We learn to live with these hazards and adapt our structures to minimize losses due to them, but constant vigilance is necessary when the forces of nature are gathering.

When a tropical system approaches the Gulf coast, it is not uncommon to hear people standing in line at a grocery store wishfully discussing the protective effect that a southerly dip in the jet stream or high upper level wind shear may have on disrupting the

storm. Between bagging groceries, you may also hear surprisingly detailed opinions on the direction of wind approach, the water temperature in the Gulf, the speed of movement of the system, and the position of blocking high pressure systems. Commuters discuss which roads are likely to be closed due to standing water on the pavement, and what type of vehicles might be able to get through based on the water depth. People become accustomed to “keeping a weather eye” on the situation and adjusting their routine to avoid loss. Close attention is paid to broadcast weather reports, and everyone has their favorite websites for tracking approaching storms. The hyper locality of the flooding is dependent on the landforms, and the changes in geomorphology seem to have accelerated in recent years. Most geologic processes take eons to occur, but we have observed the effects of coastal land loss make flooding events more common in the span of just decades.

Our company has been in existence in New Orleans for 72 years, our family has maintained a home in the delta of the Pearl River in Mississippi for 85 years, our grandparents built their home in New Orleans 102 years ago, and our ancestors settled in New Orleans approximately 170 years ago. In that time, we have seen many storm systems pass through, and the threat of flooding has visibly increased. We have watched the levees of the


THE CONSULTANT®
WALDEMAR S. NELSON AND COMPANY
 Incorporated

Engineers and Architects

 1200 St. Charles Ave., New Orleans, LA 70130
 Telephone: (504) 523-5281 Fax: (504) 523-4587
 www.wsnelson.com

 2 Northpoint Dr. - Suite 300, Houston, TX 77060
 Telephone: (281) 999-1989 Fax: (281) 999-6757

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Swimming pier in delta of Pearl River inundated by south wind. Water is at least a foot higher than during similar events 20 years ago.

Mississippi River be raised ever higher, the coastal marshes erode, and the urban areas get paved over, all of which have changed how water moves and accumulates. In the delta of the Pearl River, when a south or southeast wind blows for just a day or two, water in the river rises about a foot above the level it did just twenty years ago. We believe this is caused by the loss of coastal marsh areas downriver. The sustained southeast winds from recent slow moving tropical systems pushed water far inland in Louisiana

and caused flooding in areas once thought safe. When you reach the crest of a bridge or ascend a high building in New Orleans, the flat terrain and loss of marshland makes it quite apparent that there is very little buffer left between us and the Gulf of Mexico.

Moving far enough inland to get away from the potential onslaught of flooding puts you out of range of a lot of commercial activity dependent on the

coast, so we have had to adapt to living on, and occasionally in, the water. The primary defense against flooding is elevating structures and important equipment. While this may keep structures out of the water, it subjects them to higher overturning forces due to hurricane winds, thereby raising the cost of construction. Also, the force of flowing water and waves on the support columns must be considered. The Federal Emergency Management Agency (FEMA) publishes maps that give predicted levels of flooding for an event with a 100 year probable return interval, and there are design codes that address how to predict the forces on structures due to the wind and water in such an event. When we design a structure in a coastal region, we make it strong enough to resist at least the minimum conditions prescribed by the codes, but we sometimes design for harsher conditions if the facility is considered important enough to warrant the increased cost. A tremendous amount of money has been spent since hurricane Katrina to upgrade the defenses against flooding around New Orleans, but even the billions spent on this effort cannot totally guarantee protection. In acknowledgement of this fact, the system of structures and levees overseen by the



Lower Plaquemines Parish was still flooded from the storm surge of hurricane Katrina a month after it made landfall.

U.S. Army Corps of Engineers is aptly titled the “Hurricane and Storm Damage Risk Reduction System”. The degree of risk reduction is directly correlated with the cost, and it will take a commitment from the entire coastal zone to achieve significant improvement in our safety. The geomorphology of the Netherlands is similar to portions of the Gulf coast, and after a devastating storm in the 1950’s flooded large areas of the country and resulted in great loss of life, the Netherlands government embarked on an ambitious program to reduce the risk of a repeat of the tragic event. The scale of their effort was astounding; but the survival of their country and economy were at stake, so they had to do it or perish. We who live along the Gulf coast are faced with a similar challenge to maintain our way of life and ability to earn a living. If we want to continue inhabiting the coastal areas with the many benefits and economic opportunities that it provides, we will have to embark on an effort of the scale that the Netherlands did. They and we have built large structural barriers to prevent flooding, but we in south Louisiana also need to work on restoring the health of the marshes along the coast and the barrier island chains further out in the Gulf of Mexico. The islands and marshes act



Degraded coastal marsh in the delta of the Mississippi River

as shock absorbers against the onslaught of ocean storm surges, and the levees and structural components of the system are the last lines of defense. We have a great sediment resource in the Mississippi River that could be used to rapidly build marsh area through dredging or fresh water diversions, but the effects of salinity changes in estuarine nursery areas for fish and shellfish must be considered

when undertaking such projects. With our decades of experience designing projects in coastal and offshore environments, we are currently pursuing opportunities to participate in the Herculean task of rebuilding the deltas and marshes of the Gulf coast. We need to move forward with these coastal restoration projects, or the population will have to start retreating from the coast.



Andy Morrison was invited to talk with Strack Intermediate School in Klein, Texas about Engineering careers. He provided an hour long entertaining discussion on what engineers do, reasons for studying engineering, salaries at different levels of careers, what the major disciplines are and what they do. Andy also discussed how engineers fit into the team, how they are educated and advantages of advanced degrees. The students seemed really interested, and Andy kept it fun, yet informative, and answered some great questions.

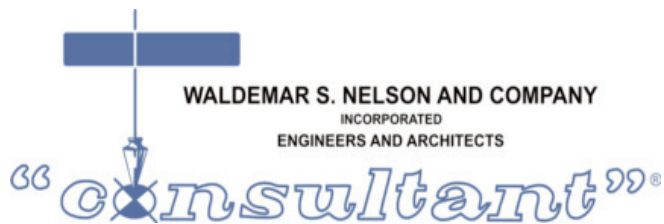
“Andy did awesome - I thought he had done this before many times, but this was his first time talking with students! They loved it!”

~ Mrs. King (educator)

NELSON Engineer Talks With Students About STEM



Andy Morrison giving presentation at Strack Intermediate School in Texas.



1200 ST. CHARLES AVENUE
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2nd Quarter, 2017



The Good The Bad and the Boiled
Winner - Best Decorated Booth
Ken Nelson and Karin Levesque (Center) congratulate the team

Team: Casey &
Leanne Geohegan,
Justin Bertheaud, Jeff
Reed, Nathan Linhardt,
Orin Dodge, Martin
Patterson, Anabel
Salinas and
Luan Van Tran



The winning Western Decorated Booth - 2017

Crawfish Mambo - 2017

NELSON had two teams boiling crawfish in the 2017 University of New Orleans "Crawfish Mambo" event. Both teams did great! Crawdat Nation boiled an impressive 1800 pounds of crawfish, and The Good The Bad and the Boiled team won the prize for best decorated booth.



Crawdat Nation
Team: Angela & Garry Fehn, Keith & Karon Bravender, Woody & Diane Logan,
Michelle Jones, Tonya Coleman, and Anthony Beard