



The Wilmington Report

Climate Change Solutions for North Carolina

Saturday, October 14, 2017

Sponsored by the Faculty and Students
at Dobo Hall

Sierra B. Coomer
editor

CLIMATE CHANGE IS HAPPENING NOW ACROSS NORTH CAROLINA and around the world. In order to promote stability to the world's climate and preserve a healthy and safe world, we, the students and faculty of the University of North Carolina at Wilmington, have joined with local scientists and academic professionals, to examine the economic and environmental impacts of climate change to our area.

The following report summarizes the major themes of this conference and examines the threats posed by climate change to the Wilmington region. It concludes by recommending solutions that can stabilize and protect our area into the future.

We submit this report with an appeal that you will consider how our world is changing and embrace those actions that allow for a healthy and liveable world so that future generations may thrive in the decades and centuries to come.

Participants and Speakers

Governor Roy Cooper

Introduction to the Challenge of Climate Change in North Carolina

Dr. Jose Sartarelli, UNC-Wilmington Chancellor

Greetings and Welcome (not shown)

Bill McKibben (via video link)

Powering the World on Solar, Wind and Water

Dr. Mark Jacobson (via video link)

The Transition from Fossil Fuels to Clean Sources of Energy

Dr. Narcisa Pricope

Sea Level Rise and Projected Impacts on Wilmington Infrastructure

Dr. Alina Szmant

Effects of Human Overpopulation and Climate Impacts on Coral Reefs

Admiral Len Hering, (RAdm., USN Ret)

Climate Change as a National Security Issue

Dr. L. Kyle Horton, MD

Effects of Offshore Drilling on Coastal Communities

Dr. Harvard Ayers

The Jacobson Solution and A Call to Action

Mss. Keni Reinks and Sierra Coomer, Conference Coordinators

Climate Change as the Challenge of our Time: A Call to Awakening

Governor Roy Cooper



Welcome Comments from the Statehouse

Hi, I'm Roy Cooper,

I'm glad to hear that so many of you have come to Wilmington for the North Carolina Climate Solutions Conference.

Your knowledge and passion will help North Carolina find solutions to the economic and environmental challenges that we face.

So much of **North Carolina's economy depends on clean air and water** and preserving our natural beauty. That is why I am committed to protecting our natural resources and improving our environment.

I've made sure that North Carolina has joined the U.S. Climate Alliance, a bi-partisan alliance of fifteen states because I know that we'll benefit from reducing pollution.

“North Carolina's commitment to a clean and healthy environment is good for our people and good for our economy.”

North Carolina's commitment to a clean and healthy environment is good for our people and good for our economy. I'm proud that our state now ranks number two nationally for installed solar capacity and is home to over 34,000 clean energy jobs.

I am also opposed to offshore drilling because it is a threat to our economy, our environment and our coastal communities. North Carolina should instead focus on improving renewable technologies.

Thanks for playing such an important role in moving North Carolina forward and protecting our environment.

Bill McKibben



Climate Change: The Challenge of our Times

Speaking via video link Bill McKibben, the founder of the 350.org climate movement, shows how North Carolina can shift from a reliance on fossil fuels to solar and wind power. In this presentation to the Wilmington conference on climate solutions, he describes the importance of using the abundant sun and wind that we have in the Carolinas and using these cheap energy sources rather than the expensive fossil fuels that are a legacy of the past.

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Hello to folks in Wilmington, North Carolina, right there along the gorgeous Wrightsville Beach where we took my daughter several years ago and where she took her first steps into the ocean. That's a place that has always had a special happy place in my heart.

I am so grateful that you are engaged in this fight for renewable energy, and I want to talk about that for a few minutes....

As you may know I wrote my first book about climate change almost thirty years ago, and as many of us predicted then, it has gotten worse and worse and it is a bad sign that the ice caps of the planet are melting at an accelerating rate, and it is a bad sign that the oceans out there, and all **the oceans in the world are becoming thirty percent more acidic** than they were forty years ago. It's a bad thing that some huge percentage of the world's coral reefs have been destroyed in the past couple of years.

I can go on and on and fill up the entire day with depressing information like this. I am not going to because I want to talk about the more hopeful side of all of this because you now have the opportunity to do something really remarkable.

“Clean solar and wind power are already substantially cheaper than oil, gas or coal.”

When I started writing about all of this, we knew that we had to replace fossil fuels, but we weren't really sure how we were going to replace oil and coal and gas. But now it is clear. The engineers have done their job with a vengeance. In the last ten years we have seen the price of solar panels and wind power just plummet down to the point where even before you take into account the devastating price that fossils exact on the community, and even before you calculate the costs of subsidized coal, gas and oil, clean renewable energy is already as cheap or cheaper than they are. And one of those places where this is especially true is the Carolinas.

You guys have a lot of sun and you have a lot of wind. What in the heck are you waiting for? I am really glad to hear that you people in Wilmington are talking seriously about this push for **100% clean, renewable energy**.

In the last year, it has become a talking point that this is the scale of change that we need for the physics to catch up with the rise of climate change. Place after place has now endorsed this 100% renewable idea. Some of the places were obvious. Everybody knew we could get places like Berkeley and Madison, Wisconsin, and perhaps Portland, Oregon to say, yes, we are for 100% renewable energy, but it is with great delight to see that it is happening in Atlanta, and Salt Lake City, and San Diego. There are several things going on: One, everybody realizes that this is possible now because they have watched prices come down. Two, people are understanding the incredible job opportunities that this provides. Already far more people are working in the solar industry than in the coal or gas industry. And there will be many more because it is going to take a lot of work before there are solar panels on the south facing roofs of this country, of new buildings with solar panels as we harness the sun and wind. That's good work. That's work that can't be done by robots and it's work that can't be outsourced to China. Nobody is going to put their house on a boat in order to get the solar panels on top.

“Already far more people are working in the solar industry than in the coal or gas industry.”

This work is so important and so obvious that a good question is why aren't we already a long ways toward being there? The answer is there are some people who want to keep us from getting there. Those people work for the fossil fuel industry. They are willing to allow immense damage to the planet in order to keep their business model going a while longer. We know this for a fact now because of great investigative reporting over the last few years that has made it clear that, say ExxonMobil, one of the biggest oil companies, knew everything there was to know about climate change back in the 1970s and 1980s. They knew it so well that they started building their own drilling rigs to accommodate for the sea level rise that they knew was coming! They didn't tell anyone else though. They spent hundreds of millions of dollars building the architecture of deceit and denial and disinformation. This kept us locked in a completely stupid and phony debate about whether or not climate change is real, a debate in which they knew the answer even before the debate began. But if you have that much money and that much political power, you can be successful.

Everybody around them and around the country might have noticed a few years ago when the North Carolina legislature prohibited talking about sea level rise. I wish that that had worked to keep sea level rise at bay. I am glad, since it didn't, that you are taking steps to do the right thing. Know that there are people all over the world who are on the same page as you and they are rooting for you. And I very much look forward to my next trip to Wrightsville Beach and to seeing the coastline powered by the sunlight that bathes those beaches each day and that washes across your area.

Good on you all for making this important effort. Thank you.

Dr. Mark Jacobson



From Fossil Fuels to Clean Renewable Energy

Mark Jacobson is a professor of civil and environmental engineering at Stanford University. His career has focused on better understanding air pollution and global warming problems and developing large-scale clean, renewable energy solutions. Toward this end, he identifies solutions through state and country roadmaps that help the transition to 100% clean, renewable energy. He proposes that the world shift to 100% renewable wind, water, and solar power to address the causes of climate change. His plan has the additional benefit of removing air pollution from fossil fuel pollution is known to cause respiratory illness, heart disease and asthma, and over 6 million premature deaths annually around the world.

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I'm Mark Jacobson sending you a message from California. I want to thank you for attending the North Carolina Climate Solutions Conference. I want to emphasize that **the solutions being discussed at your conference are all entirely possible**. It is entirely possible to transition not only in individual states, including North Carolina, but across the United States and the entire world to 100% clean renewable energy for all purposes.

We've developed plans for 139 countries around the world, including also all 50 states, and we also think the remaining countries of the world can apply these plans as well. These plans call for the transition of 100% of all energy to entirely clean renewable sources running on wind, water, and solar power.

*“The idea is to electrify everything.
We can have electrified heating, cooling, industry,
transportation, agriculture, and everything else!”*

The idea is to electrify everything. We can have electrified transportation, heating, cooling, industry, agriculture, forestry, and fishing. We will have the electricity from solar or geothermal power, for example. **The electricity will be provided entirely by wind, water, and solar power** (WWS).

The benefits of such a transition are humongous. For starters, by electrifying and providing the electricity with clean renewable electricity, we eliminate about 13% of all energy worldwide that's used for mining, transporting, and refining fossils rules....

We can get another 7% reduction in demand due to energy efficiency projects and reducing energy use beyond what's expected in business as usual. So there we have almost 43% reduction of power demand just by making this transition. That remaining power we propose to be powered by wind, water and solar.

The other benefits of this transition to clean energy would eliminate human emissions of not only greenhouse gases and pollutant particles that affect climate.... We would eliminate emissions that cause 4 to 7 million deaths from air pollution each year worldwide and hundreds and millions of more illnesses. The benefits are first, we'll get carbon dioxide levels down and then temperatures will respond later. We expect that this transition, if we eliminate 80% of fossil fuels by 2030 and 100% by 2050, then by 2100 we may get CO2 back down to 350 parts per million. Temperatures then will respond subsequently to that. Air pollution deaths will go down and eventually will be eliminated as well. These improvements will occur immediately in terms of air pollution.

This would make countries more energy independent because they would no longer have to search overseas for energy. Each country will supply all its own energy, or trade with nearby countries. We have solar on people's rooftops, and wind turbines that are decentralized. This means it will be difficult for a natural disaster or a terrorist attack to cause large scale power outages. The effect of hurricanes will lessen because these plants will make regions not only energy independent, but more resilient.

“The barriers to clean energy are only social and political.”

I want to leave you with a positive note. This transition can happen, and ultimately it will happen. It is just a question of how fast it happens. To that end we really need lots of collective will power. It's technically and economically possible to make this transition. The barriers right now are only social and political. But cities and states are transitioning. Lots of companies are transitioning around the world to 100% clean renewable energy.

We need to have this happen now at an order of magnitude faster, and to that end it's important to get information to let policy makers know what's possible, but also for people that are transitioning their own lives and their own homes.

So thank you all again for attending and thank you for listening, I hope we can affect this transition. it's a community effort and it requires everybody's help so the more that everybody can do the better and I look forward to a new world with all of you.

Thank you.

Dr. Narcisa Pricope



Sea Level Rise and the Anticipated Impacts on Wilmington's Infrastructure

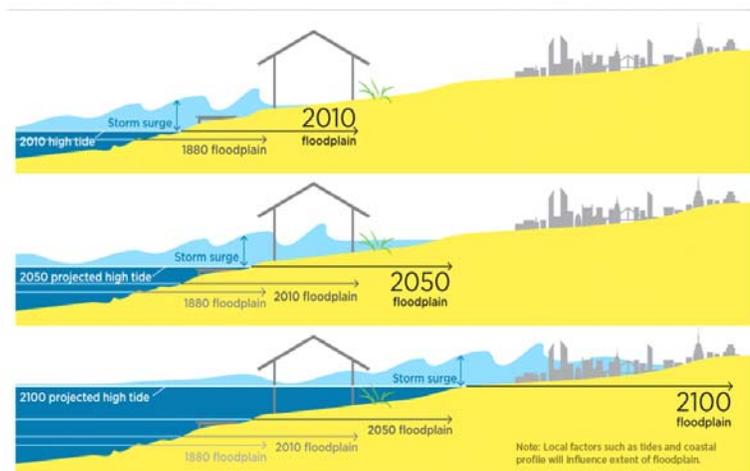
Dr. Narcisa Pricope combines a study of world geography with oceanography and climate science. In this presentation she examines the impact of sea level rise on the infrastructure surrounding the City of Wilmington. She describes the vulnerability of the region to storm surges from hurricanes that are now amplified by warmer oceans and higher levels of carbon dioxide. Her presentation concludes by identifying the specific changes that need to be made to protect this region and provide local flood protection measures.

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Global climate change is increasingly a prominent issue as atmospheric carbon dioxide and other green house gas levels rise, largely because of human activity.

In the next one hundred years, sea level rise is going to impact coastal communities around the globe. Rising seas will displace people from their homes and cause harm to the utilities and infrastructure that communities depend upon, thus creating the need for proactive planning measures. that often rely on geospatial modeling.

Storm surges and high tides will magnify the risks of local sea level rise. These surges are the potentially destructive increases in sea height that occurs during a coastal storm. As local sea level rises, so does the baseline, allowing for storm surges to penetrate further inland. With higher sea levels in 2050 and 2100, areas much further inland would be at risk of flooding.



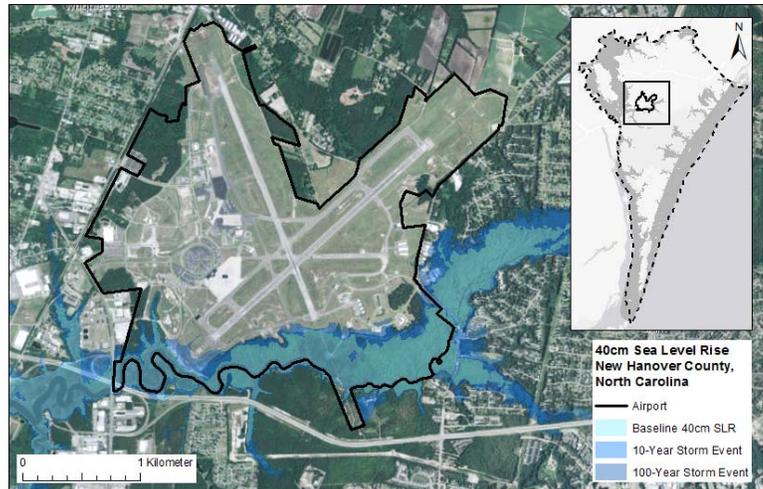
To comprehend sea level rise, know that the consequences will affect roads, stormwater structures, parks, the airport runways, superfund sites and the Port of Wilmington. The consequences to local transportation will be substantial. New Hanover county possess 1,770 miles of roads. At a modest and realistic 40 cm (or 16 inches) of sea level rise, the county will lose 15 miles of roadway. With a storm surge, this amount will increase. During a 10-year flood, 90 miles of roads will be flooded. And during a once in 100-year storm, 173 miles of city and county roads will be under water.

Just knowing the amount of roads that will be inundated does not fully describe the challenge of transportation as portions of roadways will become inaccessible. This means that the total of road loss will actually be larger than what is listed here.

Lets examine the effects of sea level rise on the Port of Wilmington. The elevation of the port ranges from sea level up to 14 feet. While the port is not managed by the City of Wilmington, the effects of the port being crippled because of sea level rise would have a significant impact on the larger community.

Wilmington International Airport would also be significantly impacted. With a 16 inch rise of sea level, the airport will lose about 184 acres of land. (See the map on the right).

Lets also look at the impacts of sea level rise on the nearby beach communities. When will these beach communities begin to experience the effects of sea level rise?



Some coastal areas are already experiencing the impacts of sea level rise. Nuisance flooding typically occurs during king tides. **Wilmington is already flooding more frequently than any other city in the US** since 2010, and now floods on 49 days out of the year. An EPA study found that nearly every coastal city has experienced an increase in flooding since the 1950's.

“Wilmington’s infrastructure is not prepared to address sea level rise. The cost to the City will be huge if this concern is not addressed.”

The Wrightsville beach area is the most vulnerable region in NC. The value of the buildings within the area which would be inundated in a 100-year flood is over \$1 billion. If we include the total number of buildings within the 100-year flood zone across all of New Hanover county, the number of vulnerable buildings soars to 10,451. These homes and businesses have a total value of \$7,277,099,031.

It should be clear that even with a modest sea level rise, many roads and stormwater systems are at serious risk for inundation. A further risk is that Superfund sites scattered throughout the county may be under water by sea level rise, such as Southern Piedmont Wood Co. site downtown. This could be hazardous to citizens if contaminants at these sites make their way into the area’s waters which would be likely.

Dr. Alina Szmant



Effects of Human Overpopulation *and* Climate Impacts on Coral Reefs

Dr. Alina Szmant is Professor of Marine Biology at UNC-W's Center for Marine Science. She is a coral reef physiologist whose research focuses on the effects of climate change on marine systems as well as coral reefs. She explains why coral reefs around the world are now dying and traces this rising mortality back to rising levels of carbon dioxide as well as population growth and overconsumption.

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Let's be clear. The primary driver of climate change and coral reef bleaching and death are overpopulation and overconsumption!

Coral reef bleaching began to be observed back in the late 1970's and early 1980's when we began to see coral reef decline as an effect of human activity. Since then **coral reef bleaching has been increasing annually.**

Over the last two years, the severity of bleaching on the Great Barrier Reef has broken all previous records. Former Vice President Al Gore declared the demise of coral reefs as "the canaries in the coal mine." However, the largest indirect threat to coral reef stability is overpopulation. Around the world over 80% of coral reefs are now bleached or dying.

Coral reefs are some of the most beautiful and fertile systems on Earth. They are also some of the most endangered. Ocean and coral reef health not only require us to address the consequences of overpopulation and overconsumption to preserve the health of our planet, but especially to transit to clean systems of renewable energy."



There's a high positive correlation between population growth and deforestation rates. We have already eliminated over 50% of the forests on Earth.

"The keys to reducing our destructive impacts on coral reefs are to reduce population growth, consume less resources, and use 100% clean energy..."

In conclusion, the key to reducing the destructive impact we have on coral reefs' and their delicate systems is to reduce population growth, consume less resources, and use 100% clean energy to preserve the health and beauty of our home.

Rear Admiral Len Hering (USN, Ret.)



The Challenge of Global Sustainability

Rear Admiral Len Hering, (USN, Ret.) had a distinguished 32-year career as a Surface warfare officer. While serving in the U.S. Navy, Admiral Hering built a team recognized by the Department of Defense as the military's best in energy management, environmental protection and sustainable innovation. Within three years, his team reduced energy consumption by 42%, diverted 75% of Navy waste from landfills and reduced water consumption by over one billion gallons, saving tens of millions of taxpayer dollars. Admiral Hering installed wind, thermal, photovoltaic and conversion technologies at all levels in Navy facilities. President Bush awarded Admiral Hering with a Presidential Award for Leadership in Federal Energy Management in recognition of his efforts. His address today surveys the major threats facing society and helps us steer a course that will address these critical issues.

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I'm a war-fighter by trade. I hold a degree in Oceanography and Meteorology from SUNY Maritime. I hold a Masters degree from the Naval War College in International Relations and Strategic Studies and a Masters in Business Management from Salve Regina University.

I joined the Navy to see the world – and I did. I've been in sixty-three countries and 154 ports. I have sailed every ocean, and I've been on virtually every sea. I come to this discussion with a different approach, one that is based on experience. I want to inform people about today's issues and try to get them to understand where we are and where we're going. One of the things that you learn at the War College is how to design strategy. Strategic planning and the execution of that strategy are what a modern warrior does. Understanding the complexities of strategic planning involves understanding the environment – and everything that poses a risk that could affect your chances of success.

To be truthful, at this point in my life, it's not about me anymore. It's about my grandchildren and their generation. Here is a photo of three of my five grandchildren. I've come to realize that for the time that I have left on Earth, I need to focus my attention on informing those that will be making decisions ten years and twenty years down the road, that my generation has acted irresponsibly and that we have left future generations with the proverbial bag of "you know what" that they now have to figure out how to fix.



For those roughly my age, I'm sad to say, we're not having an adult conversation about the real issues facing our world. More importantly, we are so wrapped up in immediate concerns that we are not paying attention to what we're leaving for our grandchildren. We're failing and from a strategic perspective, Clausewitz and Sun Tzu [great military strategists] would say we are failing. **Our leaders have purposely excluded many complexities from consideration because they are perceived as too hard to address.** Any military strategist will tell you that when you fail to deal with tough situations and develop courses of action to avoid them, like our world now faces, you will fail.

You might ask, "Okay, how does the military get involved?" Well, we've been thinking about this stuff for a long time. From my perspective the first question we should be asking is: How sustainable are we? "We've lived this way our whole life," you say. "This seems sustainable." Really? The truth is less than 10% of the world's population lives like Americans. The other ninety percent of the world's people wish they had just a fraction of what we have. But if even half the world were to live like us, it would not be sustainable.

"We're not yet having an adult conversation about the big issues facing our world."

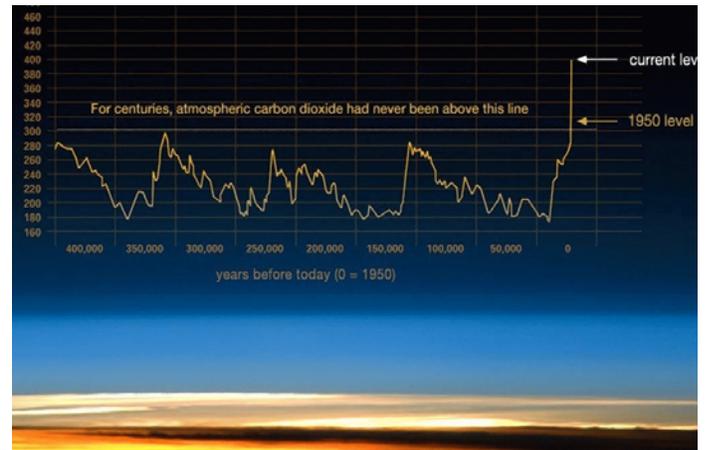
The first thing that Clausewitz teaches us is to examine all the things that an adversary might throw at you. You need to address them truthfully and admit when believed statements might be false. Here's the first one that I'll suggest: "Man has had no effect on the face of the Earth." Really? Look at the impact we've had. The Earth is roughly 5 billion years old. Humans, "homo sapiens," have only been on the earth for roughly 260,000 years. Truth is, we've had a huge impact and the greatest impact has taken place starting around the time of the second industrial revolution, about 1850.

Greenhouse Gases

The Earth is totally different from every other planet. It's different in part because we have these greenhouse gases that make up our atmosphere.

Why is this important? Greenhouse gases (GHG) are necessary to maintain the balances within our atmosphere. They control the sun's rays and heat entering and exiting our atmosphere. GHGs form the blanket that retains moisture and makes our Earth different from other planets. The problem today is we humans are adding more greenhouse gas to our planet than it is able to handle. Our atmosphere is no longer maintaining a balance and we are seeing different environmental conditions unfold. Understand that these greenhouse gases are essential. Without them we would be no different from the moon. If greenhouse gases didn't exist, we would have more than a 150° C temperature swings between day and night. Today the problem is that as greenhouse gases increase, earth's ability to release the heat absorbed daily is compromised. You might ask, if it comes in okay, why can't it exit the same way? The answer is complicated but it has to do with frequency differences in the heat exchange. **The bottom line is our atmosphere is warming up.** That's global warming in a nutshell.

Why is that important? We're moving into unprecedented territory. Our atmosphere is now at over 400 parts per million of carbon dioxide. That figure is important because over the past 400,000 years, carbon in the atmosphere has never been above 300 parts per million. We are now moving into unprecedented territory. Remember, man has only been around for 260,000 years.



The Plight of the Oceans

Why are the oceans so important? How do ocean's health affect the strategic picture? First, acidification, caused mostly by sequestration of CO₂, has a major impact on the earth's coral reefs. It's referred to as bleaching. Many are dead and every year thousands of square miles of coral reefs are bleaching and dying. Coral reefs house more biodiversity than any other biome on earth.

While GHGs acidify our oceans, in the last fifty years, we have depleted 85% of the adult fish from the ocean. This is important because around the Pacific Rim, nearly 70% of all of the dietary protein comes from the ocean. Millions survive strictly from what the oceans provide. **We're fishing it out and we're killing it.**

In fact scientists have now declared 250,000 square miles of oceans to be dead. A lot of this is due to acidification and human pollution. The regional geopolitical instability that can result when a critical source of food is lost is staggering. It will, and is, having a drastic effect on how nations who rely on the ocean for sustenance respond to one another.

If that isn't bad enough, our oceans have become our trash basket. Some estimate there is as much as 850 trillion tons of human debris in our oceans. How do we fix this? Every year we add billions of tons and it's not the maritime industry that is the problem. It's us ashore. Alarmingly, we are spending hundreds of thousands of dollars asking ourselves in scientific studies why we should ban plastic bags from the coastline when **the single greatest ocean contaminant is plastic.** This is important because it's destroying entire life strains. Plastic has no half-life. It never returns to the environment and once in the ocean, it remains there virtually forever.

This is a Pacific albatross that just reached its first year. These birds and many more are perishing by the tens of thousands because they live on dead or dying surface fish during their initial year of life. To them our plastics look like dead fish. Sadly, once it's ingested, it cannot be digested or expelled. There's no way for them to process plastic. It gets stuck in their gullet and this is what happens. These ocean ecosystems are vital for life on earth. So why are we not more concerned that we are killing it?



This human-caused instability can be seen in many regions of the world. If you think the Chinese are interested in the South China Sea because they want to claim rights they haven't

cared about for nearly a century, you're wrong. The Chinese are there because they've fished out and poisoned the North China Sea. They want those islands so they can extend their economic zone and control fishing rights. By doing so, they can fish with immunity and deny others fishing rights. Acts such as this will become major destabilizing forces in the immediate future.

We truly don't understand the scope of this problem. On an island off the coast of Midway after a storm, a small portion of the North Pacific plastic gyre remains on the beach. These are remote islands. Nobody will ever pick this trash up. We've done nothing to begin cleaning this up.

Worldwide Deforestation

For decades we've heard that humans are destroying forests around the world. But today **global deforestation is a real crisis** for a different reason: Climate change. Because of human action and the fact that climate change is happening so fast, there are regions that are now in their fifteenth year of drought. Drought together with forest fires are responsible for several times more deforestation every year than logging.

“As climate conditions change on a global scale, instability is exacerbated to a different level...”

In a recent study scientists estimate some sixty thousand plus acres a year are dying in sub-Saharan and Central Africa. This is because the trees and the habitat simply do not have the water to sustain life. Deforesting is happening three times faster than what we've ever seen before. But **forests are carbon sequestration giants. Their loss is significant.**

The truth is, we have done a terrible job of preserving our environment. Just during my lifetime, and I'm now sixty-three years old, more animals, flora and fauna, have gone extinct than in the previous 1,800 years. At one point in American history there were 60,000,000 bison. Today there are barely four thousand in the wild. Just two hundred years ago, there were roughly 26,000,000 African elephants. Today they are in fast decline and number in the tens of thousands.

Population Growth

What is causing these effects? It's the human population explosion. For years, we in the military have been highly concerned about the growth rate in the undeveloped world. More precisely, we're concerned about the conflict that the undeveloped world will inevitably force upon the developed world as we are forced to solve their problems. From 1850 to today, we've gone from 1.5 billion to 7.2 billion and we're going to add another 2.4 to 2.7 billion in less than forty years.

In the industrialized world we're growing at 3.2%. The rest of the world is out of control and most of this growth is happening in regions where governments have the least capacity to support that growth. At this rate of growth, there's potentially going to be 9,700,000,000 people on Earth. That's the equivalent of adding a new India and a new China to the planet. If you've visited other places around the world, and seen the devastating effects that overpopulation has on government stability, you recognize that overpopulation is more than just numbers.

Global Food Supply and Rising Hunger

As conditions change on a global scale, especially when you factor the potentials for climate change, instability is inevitable. If things aren't bad enough, **the world's food supply will decline and refugee problems will continue to grow**. We need to figure this out because Americans throw out more food every day than the entire continent of Europe consumes in a day.

Imagine, we throw out 40% of everything that we grow. What is worse is that this food goes into our waste stream, accelerating and exacerbating the methane gas in biodecomposition. To put that amount into perspective, that's the equivalent of farming every inch of a landmass the size of Mexico — planting it, watering it, farming it, harvesting it, packaging it, and then throwing it all away. That's where we are.

More importantly, look how many people go to bed hungry every night in America. Imagine what it's like in the rest of the world? Americans don't have a clue about what hunger is. I've been there. You have no idea what it's like to be among hundreds of people who have not had a full meal in days or even weeks. Mothers clutching their starving and dying infant because they are unable to produce the milk to keep them alive. That's hunger. And there are millions if not tens of millions of them across the globe. And every day it's getting worse.

Today, we are having difficulties holding off global hunger. If you understand what this means, we're going to have to produce more food in the next forty years than we have in the past ten thousand years. Even if we lived at the standard which is not America's, we will still need the equivalent of 4 more planets to grow sufficient food to meet that demand. We need to recognize that the food supply and other resources over which we are in conflict are all finite and limited.

A Flood of Refugees

This is a refugee camp just north of Kenya. There are 482,000 refugees in this camp. Every day there are roughly sixty deaths among children five and under. They suffer from lack of clean water, lack of food, and from disease. We have no clue what it's like but this is only going to get worse on a global scale.



Every single year, thousands of Bangladeshi are forced off their land because of sea level rise. They normally end up in Dhaka, the single most densely populated city in the world. This is in a country with zero economy and zero capacity to take care of them. I witnessed the damage and devastation in Operation Sea Angel 1 after a tsunami killed 40,000 Bangladeshis in 1991. There is nothing more devastating than going into a region where literally half the population lives in cardboard shacks. And when a storm blows through, there is nothing left of them.

We can trace the regional problems that have led to the civil war in Myanmar to the refugee problem of Bangladesh. The region is stressed and these individuals are not welcome in the surrounding nations. They will not be welcome in India, which has its own population explosion. They won't be welcome in Pakistan, Laos, or Cambodia, and they are already causing a problem in Myanmar. So in a very short period of time, the world will need to figure out what we are going to do with thirty million homeless people.

Clean Drinking Water

Now we get to the problem of drinking water. We can't live without water for more than 72 hours. And 85% of the world's population lives in areas that have a propensity for pollution and degradation in their fresh water sources. Things are bad and getting worse. There are people who walk as much as six miles a day to get water. Alarm bells have tolled across the globe, but nobody listens. For example, Sao Paolo, Brazil, is a world mega city. **Thirty-five million people are now without an adequate water supply.** Because of a lack of pollution controls and failed conservation measures, this is the first population in our history where governments are looking at how to depopulate. This is sending the economy into crisis and the government into turmoil.

*"We are looking at an environment that is fast changing.
It will take great intentionality for humanity to adapt."*

In Australia they faced a critical decision several years ago. It was either food, people, or livestock. Situations like this are now happening everywhere and it's going to be a destabilizing element that will cause conflict.

Climate Change

We've got to talk about climate. Virtually all climatologists agree that the climate is changing faster than it has at any time in the past 65,000,000 years. Please note, weather and climate are two different things. **With climate change drastic weather events will occur far more often.** As the temperature of our atmosphere increases, so does our climate which results in more drastic and destructive weather conditions. The increased voracity of our recent storms is due primarily to the warming atmosphere. Harvey was the strongest Atlantic hurricane in recorded history; Maria, the strongest storm in the Caribbean. And this is the fifth consecutive year in which temperatures have reached new heights, and it is going to get worse. Future storms are going to be much more significant. Strange weather events and uncommon occurrences are inevitable.

Sea Level Rise

Now we've got to discuss sea level rise. This is an issue that is not being considered to the extent that is needed. Even in California, nobody wants to recognize the potential impacts are a lot more than we want to believe. From an oceanographic perspective, many institutions have studied this problem. There are studies from FEMA. NOAA put out a report in 2012; there's a 2014 IPCC report, and then there's the Sweet et al report, which is called "H++." And H++ is the formulation of possibilities for sea level rise if all the ice should melt to reach up into the extremes.

What's causing sea level rise? It's the non-sea ice in glacial form that is melting at an unprecedented rate – the Greenland, Chilean, Himalayan, Alaskan, and Antarctic glaciers. These remnants of the last great ice age will not be around twenty to forty years from now. This landlocked glacial melting is where sea level rise comes from. If Antarctica begins to melt, we've got a really big problem because that's what H++ forecasts. The ice that's on the Antarctic continent is not calculated in the mass of water in our oceans. But the consequences are huge,

because H++ is more than six feet. If we experience the fullness of H++, we're talking thirteen feet or more. So what does that do? Well, we've still got to figure that out.

If these science forecasts are anywhere near correct, close to 100 million individuals will be displaced by 2100. That's the moderate forecast, not the extreme forecast. We should be concerned, as 20% of the world's population lives along the ocean coast. Remember, it is not just sea rise that we have to be worried about – it's storm surges – which further exacerbates sea levels. If sea level rises to the projected minimum of three to four feet, a Category Two storm in the Philippines will potentially create 12 million refugees overnight. Where will they go?

My friend Admiral Sam Locklear was the Pacific Fleet Commander. He testified before Congress that **"climate change is the greatest national security threat that we face."** That's a huge statement for a military commander to make. Imagine our top military commanders admitting the changes to the environment will have a destabilizing impact on our national security.

Despite all this, we still have those who are saying, "We've got plenty of time. We'll deal with it when it gets here." Well, let me tell you. "We don't have plenty of time. It is here now."

If you research the dynamics of security, the twentieth century was the bloodiest century in history. More than forty-one million military personnel on both sides lost their lives in combat.

Today, the non-industrialized world is moving at a growth rate six times faster than we did from the 1500's to 2000. They are moving from an agrarian fifteenth century mentality to an iPod in every pocket society. They're moving from what was yesterday a mud hut to something that you and I might live in and believe is prosperity. But is this sustainable? Do sufficient world resources exist to allow for this kind of growth? Today 13% of us utilize 70% of the world's resources. That shift in demand will result in conflict with the emerging world. If we do not change our behaviors, this is not sustainable. Our wants and our needs are way out of balance.

*"If we in the developed world do not change our behavior,
the world cannot become sustainable..."*

My son is now completing his eighteenth year of military service. During every moment of his service, this country has been at war. What hope does this hold for my grandchildren? If this is what a resource constrained environment has provided for us during the 20th century, and we don't start having an adult conversation, what does the 21st century hold for our grandchildren? How do we expect to solve these problems?

I will leave you with this. **America's security is at risk. Unless we act now to address climate change and resource disputes with the developing world, the U.S. will see conflicts over those assets.** We need to be more renewable and conscientious in how we use resources in everything from manufacturing to consumption. **For energy security, we must diversify into clean, reliable and renewable sources; infinite sources.** Americans across the country and people around the world are beginning to understand that energy security means innovation, diversity and resilience.

We will either take what God has given us – the capacity to use our intelligence and our ability to understand the many complex dilemmas facing us, and address these issues as adult

Dr. L. Kyle Horton, MD, MBA



The Effects of Offshore Drilling on Coastal Communities

Dr. Horton is a medical doctor and a candidate for the U.S. House of Representatives. She has passionately discussed her personal experience with offshore oil drilling. L. Kyle Horton M.D., M.B.A. is an internal medicine physician and advocate for veterans, environmental and health care public policy. She lives in Wilmington, North Carolina.

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Dr. Kyle Horton's extended family lost a life in the 2010 Deep Horizon oil rig explosion as well as ten other families after over half a million barrels of oil were spilled into the Gulf of Mexico. As a direct result, more than 22,000 jobs were directly impacted. The Deepwater Horizon oil rig explosion always stands as a reminder that when we spill, we also kill.

“Our addiction to fossil fuels accelerates climate change which brings a long list of consequences.”

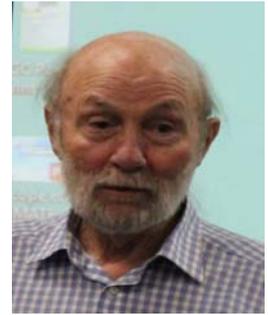
From the Outer Banks in the North to Sunset Beach in the South, North Carolina's beaches and coastal towns draw an estimated one million visitors annually. Additionally 1.4 million jobs depend on healthy ecosystems in industries like fishing, recreation and tourism. **The proposed offshore drilling will heavily impact local tourism in North Carolina.** The whales offshore will be impacted. Only 500 North Atlantic right whales remain and seismic blasting will terribly affect their navigation, breathing, and echolocation.

Our addiction to fossil fuels accelerates climate change which brings many consequences. Sea level continues to increase. New York and Boston could be submerged if sea level rises by six meters. Health effects from extreme heat events cause cardiovascular or lung problems directly from heat related illness. We can expect more civil conflict and mental health concerns like PTSD as a result of increased national security threats.

In the midst of deregulation of industry **we can expect an increase in fatalities to oil workers.** Clean up workers exposed to crude oil often suffer from acute short-term effects like burning eye, tashed, nausea dizziness, headaches, cough, and wheezing. It's an injustice to our environment and community to promote reckless job conditions within the oil industry.

Communities are burdened with unsolicited realities brought by offshore drilling. A native to Alaska, Esau Sinnok, stated “It really hurts knowing that your only home is going to be gone, and you won't hunt, fish and carry on traditions the way that your people have done for centuries. It is more than a loss of place, it is a loss of identity.” Coastal communities continue to step up to oppose offshore drilling nationwide.

Dr. Harvard Ayers



A Call to Action on Climate Change: The Jacobson Solution

According to world renowned climate scientist Dr. Michael Mann, we have about three years to begin a serious transition to clean and renewable energy such as solar and wind power. Other climate scientists estimate that we have perhaps ten to twelve years to finish the transition to 100% clean and renewable energy including the switch to electric cars as well as electric heating and cooling as our primary use of energy.

If we do not make this transition, Category 4 and 5 hurricanes, such as Harvey, Irma, and Maria that have caused so much terrible damage, will become the new normal. Droughts, starvation, sea level rise and water shortages will become much more serious. There is no question that **the number one cause of all these disasters is the use of fossil fuels** such as gas, coal, and oil, and their by-products such as gasoline and diesel.

“We have to transition to clean and renewable energy such as solar and wind power.”

The Jacobson Plan could potentially create about seven million new jobs through the construction of solar panels, wind turbines, research and development, and the installation and maintenance of these solar panels and wind turbines. Scores of jobs can be created by making homes, apartments, public buildings, and appliances more energy efficient. Why can't North Carolina become a nationwide leader in green manufacturing? **Just the intentional addition of wind power alone could account for 50% of North Carolina's energy needs.**

The Jacobson plan is a viable alternative and solution. It calls for 100% clean renewable energy in all energy sectors by 2050, and 80% by 2030. Each state plus 139 countries has an individual plan that he and his colleagues at Stanford University have designed. If we follow this plan, the world will avoid the dreaded two degree Celsius temperature rise which began roughly from the start of the Industrial Revolution. This plan has solid scientific-technological backing.

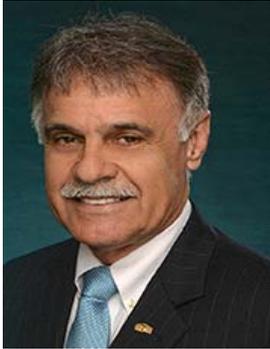
“An important cause of climate change is the rampant cutting and burning of our forests.”

An additional important cause of global climate change is the rampant cutting and burning of our forests. We can't continue the burning of forests for fuels, for so-called biomass here in NC and that we ship to Europe as wood pellets.

Many of you may not know that our southeastern forests have more of our trees cut than any other region in the world. Further, trees are the only feasible way for removing carbon dioxide (CO₂) from the air, and Nature does it for free. But **we also have to protect our forests.**

Acknowledgements

A special thank you to everyone who helped make this unique conference possible. We make particular mention and extend our heartfelt gratitude to the following individuals who played a major role in making this conference a successful educational event.



Dr. Jose Sartarelli
UNC-Wilmington, Chancellor



Ms. Keni Reinks
Executive Coordinator



Dr. Thomas Hart
Master of Ceremonies



Ms. Sierra B. Coomer
President, UNC-W Eco



Mr. Gahiji Lewis
Vice president, UNC-W Eco



Dr. Narcisa Pricope
Media Liaison



Prof. Roger Shew
Presentation on Energy



Dr. L. Kyle Horton MD
Presentation on health



Mr. Dóron Morgan
UNC-W videographer

Additional thanks to Governor Roy Cooper; Rob Coffin for publicity and promotion; Andrew Cannon for local publicity; Harris Holland for typing and transcriptions; many others for food preparations; Harvard Ayers for statewide promotion and publicity; Fred Krueger, coordination and publicity.