

CLIMATE CHANGE

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CLIMATE CHANGE



HOW HBCUs ARE PROTECTING THE ENVIRONMENT



MOST AMERICANS (62 percent) say climate change affects their local community, according to Pew Research. Most of the groups surveyed in the American Trends Panel also said significant impacts include floods and storms (70 percent), harm to wildlife and their habitats (69 percent), damage to forests and plant life (67 percent), or droughts and water shortages (64 percent). More frequent wildfires and rising sea levels eroding beaches and shorelines were also cited by equal percentages (56 percent of those asked) as significant impacts on their local communities.

Three-quarters of Americans (77 percent) agree that priority should be given to wind and solar power and hydrogen technology rather than increasing the production of fossil fuels. In addition, large shares of the public (72 percent) said they use fewer plastic bags, straws, and cups or reduce their water consumption (68 percent) to help the environment. About half (51 percent) of Americans say they are driving less or using carpools, while one in four Americans said they try to live in ways that protect the environment.

HOW HBCUs ARE PROTECTING THE ENVIRONMENT

In 2018, researchers at **North Carolina Agricultural & Technical State University** were awarded a National Science Foundation (NSF) grant to investigate the impact of particles on

cloud formation. The project probed the properties of particles in emissions and what happens when the particles meet mineral dust from the Sahara, the largest hot desert in the world. The project was designed to enhance research in atmospheric sciences at historically Black colleges and universities. HBCU researchers collaborated with Colorado State University, a leading atmospheric science institution, to model health impacts and collect samples aboard maritime research platforms on National Oceanic and Atmospheric Administration (NOAA) ships.

“Household pollution from biomass burning contributes to nearly 3 million premature deaths per year,” said Google Scholar and professor **Solomon Bililign**, the principal research investigator at N. C. A&T. “Having a better understanding of the health impacts of pollution due to biomass burning should help improve household burning conditions in the developing world.”

In 1981, “Warming Warning,” a documentary on the effect of pollution of the atmosphere with

carbon dioxide, shook the world. A study that addressed toxic waste sites was also published in Florida. In response, the Center for Environmental Equity and Justice was established in the School of the Environment (SOE) at **Florida Agricultural and Mechanical University (FAMU)**.



Students from FAMU monitored water quality in correlation to oyster ranching.



S. Keith Hargrove, academic dean of the College of Engineering at **Tennessee State University**.

“Environmental science is the area of biological, chemistry, and physical sciences to study the environment and its impact on humans and other living species. It involves examining natural resources such as water, air, soil, and the Earth with respect to the interactions of animals and quality of life,” he explained. “Environmental engineering is an application of science (environmental) to create industrial policies, operations, technology, and infrastructure to provide a more inhabitable and safer environment for a better quality of life. The degree programs, for both majors, centers on the above concepts and in practice.”

Raghava R. Kommalapati, Ph.D., is the director of the NSF-funded CREST Center for Energy & Environmental Sustainability at Prairie View A&M University. He is also a professor in the department of civil and environmental engineering in the Roy G. Perry College of Engineering at Prairie View A&M. Below are excerpts from a conversation with *US Black Engineer* magazine this summer.

“We have been offering courses in environmental engineering for more than two decades, but the focus recently has somewhat moved towards environmental sustainability. Of course, everything that we do in life can be done more sustainably. The focus of our research center is related to environmental sustainability in the broader field of energy. In other words, I focus on sustainability as it relates to energy production, and it includes both fossil fuels and renewable energy. Everything we do in the center has a focus on sustainability. We have mainly three research thrust areas. Some folks are working on converting biomass into ethanol, which is added to gasoline. But in our current phase, we are looking at converting biomass (like energy crops) into hydrocarbon fuels that we can directly put into the car. You do not need to mix it up with gasoline. We are producing hydrocarbon fuel that goes into the vehicle directly.

“Our years of active research engagements through funds from the National Oceanic and Atmospheric Administration has kept us in the forefront of training generations of students in ecosystem characterization, ecological processes, forecasting and modeling, and human dimensions,” says **Victor Ibeanusi, Ph.D.**, dean of the School of the Environment. “Every season, we take our undergraduate students at the School of the Environment on a boat trip to Apalachicola Bay and Spring Creek, where we monitor water quality in correlation to oyster ranching to study the effects of the dwindling freshwater to the bay and climate change impacts to

oyster ranching.”

ENVIRONMENTAL SCIENCE VS. ENVIRONMENTAL ENGINEERING

According to the Bureau of Labor Statistics, the employment of environmental engineers is projected to grow 3 percent from 2019 to 2029, about as fast as the average for all occupations. However, the employment of environmental scientists and specialists is projected to grow 8 percent from 2019 to 2029, much faster than the average for all occupations.

“These fields are becoming more popular with the concern of the impact of climate change and corporate responsibility to the environment,” said

“The second focus in our center is wind energy, both onshore, which was what we did in our Phase I. In Phase II, we are focused more on offshore wind energy. We are looking at how we can support and sustain wind turbines and their foundations in the offshore environment. Remember, offshore foundations are quite different from those on the land, particularly related to reliability. We are making offshore wind more sustainable and readily available as a significant energy source.”

REUSE OF WASTEWATER

“The third focus, which I lead as the director in the research center, is how we can make some of the processes we use for energy generation, wastewater treatment, etc., more sustainable than they are right now. For example, one of the main problems with hydraulic fracking operations, which is a major source of oil and gas in Texas, we use millions and millions of gallons of water every day when we pump oil and gas from the fracking operations. This water becomes contaminated with organic materials because it comes out with oil and gas along with thousands of parts per million of dissolved solids (inorganic ions). This water cannot be reused, so many companies use what is referred to as deep well injection, where we will never see that water again. However, this



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process has resulted in increased seismic activity in Texas and Oklahoma. So, one of the things we are doing in our center is cleaning this water using membrane processes well enough to use it for agriculture or reuse it for other water applications, including fracking water.

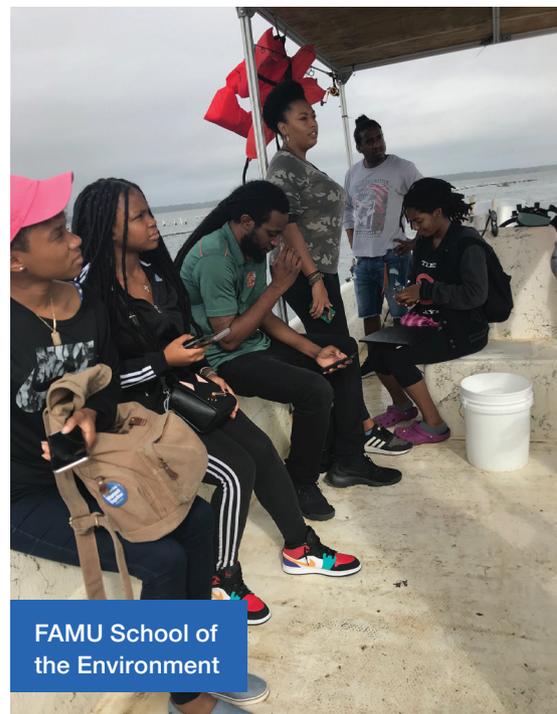
“We also have another project where we use membrane processes to reuse poultry process wastewater. When we process poultry meat, we produce tremendous amounts of high-quality water and create a problem finding enough clean water. We are using membrane processes to treat this

wastewater to such a high quality it can be reused in the poultry process. In other words, we make the process a clean, closed loop. So, you take a million gallons of water, and you can keep reusing this water without having to look for fresh water each time. These are some of the sustainability research aspects that our center is working on.

WHAT HAPPENS TO EMISSIONS?

“Our center is now in the second phase. We finished the first phase of \$5 million, and we are now in the second \$5 million funding. We are funded until 2024 to conduct this kind of research on our

FAMU School of the Environment



FAMU School of the Environment

campus: energy and sustainability aspects of energy. For example, what are some of the impacts of using gasoline in cars? Or any other energy production: coal power plants, natural gas power plants. What happens to these emissions? How do they impact the air quality? We have modeling work that we have done to study those aspects. For example, if we shut down a coal power plant in Houston and initiate a giant wind farm in south Texas, will that have an air quality effect in the Houston area? These are some of the things we are doing in our research.

“In our program, we have a Master of Science in engineering, with concentrations in civil engineering, mechanical engineering, chemical engineering, and environmental engineering. We are also looking at offering energy engineering concentration, which will include environmental sustainability.”

WHERE ENGINEERING MEETS SCIENCE

“As you can imagine, engineering is more application-oriented, meaning we use the concepts of science and design processes to clean water, wastewater, control air pollution, remediate contaminated soil, or other processes. So, it is more the application of scientific principles to solve everyday problems.



Michael S. Regan

“But if you look at the science, this may involve different sub-areas. Like toxicology, where people study the effect of other toxic chemicals on the human body. What kinds of impact can a particular class of chemicals have on human beings?

“Then there is ecology, which looks at some of the processes that impact all the environments surrounding us, for example, different life forms, starting with microorganisms to the animals, and human beings are part of this ecosystem. All these are interrelated parts of ecology and are one of the topics of environmental science. More specifically, you can break it down into biochemical processes and the interactions between human beings and microorganisms. So those are the issues that people in environmental science study. Those programs are usually part of the colleges of arts and sciences.

“In some cases, they may have a particular school where they may be looking at some of these environmental issues. They might call it the School of Environmental Sciences. Different universities offer these things in various colleges. But engineering is generally located in the College of Engineering, and we typically do not go into pure science issues. We limit ourselves to engineering because we use scientific principles and apply them to different processes or treatments.

“For example, an environmental scientist can develop a process that an engineer may take that process and then use in a real-world application. As a researcher, I am in between these two disciplines, science and engineering. I teach engineering, but I do research where I study the science and create processes, and then as an engineer, I take that process and see if I can use it in a real-world application. My role as a researcher brings me closer to science.”

PEOPLE YOU SHOULD KNOW

Michael S. Regan, a North Carolina A&T State University graduate, developed a passion for the environment while hunting and fishing with his father and grandfather and exploring the vast lands, waters, and inner Coastal Plain of North Carolina. He graduated with a bachelor’s degree in earth and



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environmental science. As administrator of the Environmental Protection Agency, he is responsible for helping to advance the Biden-Harris administration’s commitment to combating climate change, restoring the role of science and transparency, and promoting environmental justice.

Born and raised in Baltimore, MD, **Symone Johnson Barker** grew up in Cherry Hill. In an interview with Ray Kennedy of CCG Media, she spoke of playing in Middle Branch Park as a little girl but unaware that a nearby river led to the Chesapeake Bay. Johnson Barker started watching animal shows on Saturday mornings and began noticing the bugs and birds in her neighborhood. During high school, she volunteered at the National Aquarium in Baltimore as an exhibit guide. Her job involved talking to people about what they were seeing, and the role inspired her to become a marine scientist. One of her role models at Hampton University was Dr. Deirdre Gibson, chair of the department of marine and environmental science at the historically Black college and university (HBCU).

SUSTAINABILITY FINANCE ADVISOR

The Gulf Coast Equity Consortium is a five-year project designed by **Dr. Robert Bullard**, distinguished professor of urban planning and environmental policy at Texas Southern University, and Dr. Beverly Wright, executive director of the Deep South Center for Environmental



Justice. Members of the consortium are leaders of community-based organizations and professors at HBCUs. In 2019, Entergy Corporation and the U.S. Business Council for Sustainable Development (U.S. BCSD) invited local businesses to discuss the new Gulf Coast Carbon Collaborative. . BCSD was founded in 1992 to control greenhouse gas emissions in the Gulf Coast region and the risks posed by climate change. Entergy delivers electricity to 2.9 million utility customers in Arkansas, Louisiana, Mississippi, and Texas.

Prairie View A&M University, the second oldest public institution of higher learning in Texas, is working on an energy and environmental project with NRG Energy, Inc., one of its corporate partners. In his current role at NRG Energy, **Tarique Rashaud** serves as a sustainability finance advisor on methods to secure sustainable energy project financing. He also sits on the Industrial Advisory Board of Prairie View A&M engineering and contributes to the US BCSD as co-lead of the Gulf Coast Carbon Collaborative.

“The Gulf Coast Carbon Collaborative leverages industries, non-governmental organizations, and academia to increase understanding and adoption of decarbonization strategies,” Rashaud said. “Through this managed platform, stakeholder companies share details about their decarbonization goals and work together to develop multi-industry projects on electrification, carbon

capture and storage, hydrogen, nature-based approaches, and low-carbon technologies.

“In facilitating these goals, a critical U.S. Business Council for Sustainable Development initiative is to engage and leverage the research capabilities of HBCUs to help unearth transformational solutions for the Gulf Coast Carbon Collaborative focus areas of hydrogen, nature-based sequestration, electrification, carbon capture, and storage, nuclear, and low-carbon technologies.

“As a Prairie View A&M University engineering alum and champion for NRG Energy Inc’s PVAMU STEM Collaborative, I am aware of the PVAMU engineering research capabilities and realized the synergies between the U.S. Business Council for Sustainable Development—Gulf Coast Carbon Collaborative goals and PVAMU’s subject matter expertise and research.

“The U.S. Business Council for Sustainable Development leverages the National Institute for Inclusive Competitiveness to enact a broader HBCU engagement strategy. In brief, the U.S. Business Council for Sustainable Development—Gulf Coast Carbon Collaborative recently engaged PVAMU in developing the framework for a Solar + Soils Solution, which couples renewable energy technology with mycoremediation (a form of bioremediation) of (contaminated sites) in low- and moderate-income communities and utilizing renewable energy for resilience and climate risk predictive analytics.

“Without question, in my opinion, to achieve the Biden-Harris climate change goals and global United Nations Sustainable Development Goals, a more inclusive tent of research minds is necessary. HBCUs present an underutilized resource that must be engaged to make these lofty goals a reality.”



Jackson State



Jackson State