



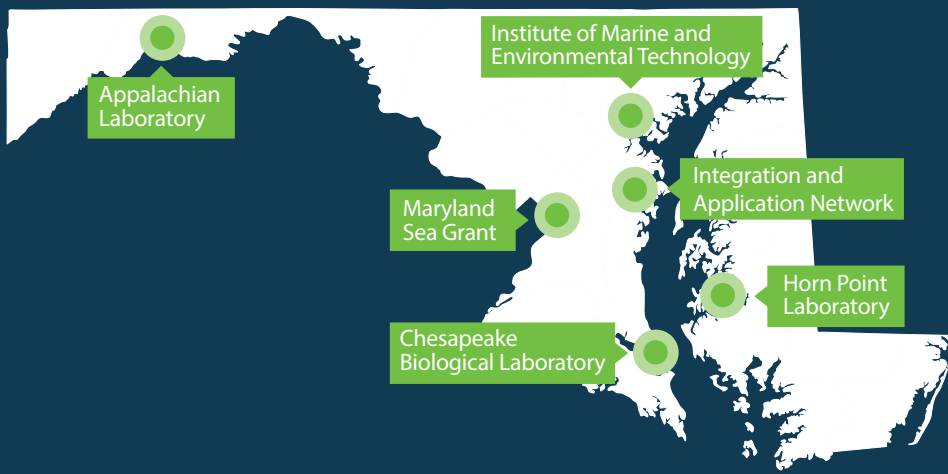
University of Maryland  
CENTER FOR ENVIRONMENTAL SCIENCE

2016 ANNUAL REPORT

# UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE

UMCES is a leading research and educational institution working to understand and manage the world's natural resources.

Comprised of the Appalachian Laboratory in the mountains of western Maryland, the Chesapeake Biological Laboratory at the mouth of the Patuxent River, the Horn Point Laboratory on the Eastern Shore, and the Institute of Marine and Environmental Technology in Baltimore, UMCES scientists provide sound advice to help state and national leaders manage the environment and prepare future scientists to meet the global challenges of the 21<sup>st</sup> century.



**Headquarters:** Cambridge, Maryland

**Year founded:** 1925

**Faculty members:** 100

**Graduate students:** 85

**Research laboratories:** 4

## Leadership

A trusted scientific advisor to state and national leaders, our scientists provide unbiased research to inform public policy. UMCES has been a key leader in the Chesapeake Bay restoration effort.

## Innovation

We work across disciplines and in diverse settings—from the Appalachian Mountains to the Arctic, from fisheries management to climate change—seeking solutions that improve people's lives and our natural world.

## Education

Our top-notch faculty trains the next generation of environmental leaders. Graduate students work side by side with their mentors to connect their passion for the environment to a greater good.

A globally eminent research institution aimed at advancing scientific knowledge of the environment, UMCES is one of 12 institutions within the University System of Maryland.

# FROM THE PRESIDENT

After nearly 27 years as president of the University of Maryland Center for Environmental Science, I announced my intention to step down this year, making room for new leadership of this exceptional institution and for me to focus my energies on research and publications.

Appointed UMCES' only fifth chief executive in its 90 years, I have been proud to lead an institution with an excellent reputation for Chesapeake Bay science to global prominence in coastal watershed science and its application. I have watched our highly capable research facilities grow at each of the Center's four laboratories, making UMCES even more effective at searching for scientific solutions to the most challenging environmental problems, both close to home and around the world. Long recognized as Maryland's foremost authority on environmental matters, UMCES has become a national and international leader. I am especially honored to have been able to shepherd our long-standing graduate program in the marine and environmental sciences in attaining accreditation.



Innovative science is our foundation, our identity, and our tradition. It underpins the credibility of all we do. Our priorities remain scientific discovery, rehabilitating large ecosystems like the Chesapeake Bay, and addressing the regional challenges of climate change. We will continue to recruit outstanding graduate students and faculty to empower innovative research.

UMCES' work is now more important than ever, and we are vigilant in preparing to meet the challenges and responsibilities that confront the environmental sciences. There is still much work still to be done, and UMCES is poised to play its part.

I trust that all of our friends will provide the same encouragement and unwavering support that I have received during these many years. Our best years are surely ahead of us.

Regards,

A handwritten signature in black ink, reading "Donald F. Boesch". The signature is written in a cursive, flowing style.

**Dr. Donald F. Boesch**  
President

**MISSION:** The University of Maryland Center for Environmental Science has a unique statutory mandate to conduct a comprehensive scientific program to develop and apply predictive ecology for the improvement and preservation of Maryland's physical environment. This mission is accomplished through research, education, and public service.



## PRESIDENT DONALD BOESCH LEAVES HELM AFTER 27 YEARS

President Donald Boesch announced his intent to conclude his leadership role at the University of Maryland Center for Environmental Science this year.

Appointed UMCES' fifth chief executive in 1990, Don Boesch has led an institution with an excellent reputation for Chesapeake Bay science to global prominence in coastal watershed science and its application, building highly capable research facilities at each of the Center's four laboratories and attaining accreditation for UMCES' program in graduate education in the marine and environmental sciences.

Thanks to his many years of leadership, UMCES has become recognized as the state's foremost authority on environmental matters that are critical to Maryland and the nation—from enhancing the health of the Chesapeake Bay to restoring our state's oyster population.

Involved in research on the Chesapeake Bay for more than 35 years, Boesch is one of the nation's most recognized experts in applying science to policies for the protection, sustainable use, and restoration of coastal ecosystems.

He is active in extending knowledge to environmental and resource management at regional, national and international levels. His leadership at UMCES has also had a positive impact on Maryland's environmental health, helping to fulfill the University System of Maryland's mission to enhance quality of life in our region.



**We invite you to honor his long service by making a gift to the Don Boesch Environmental Leadership Fund, which will support fellowships and bolster ongoing research on the Chesapeake Bay watershed.**

**Donate at [umces.edu/boesch-fund](https://umces.edu/boesch-fund)**

# CAREER ACHIEVEMENTS



He has been an official advisor to federal agencies, the Chesapeake Bay Program, and five Maryland governors. He is a member of the Governor's Chesapeake Bay Cabinet and was recognized as "Admiral of the Chesapeake" in 2015. He has also long served as Vice Chancellor for Environmental Sustainability for the University System of Maryland.

Nationally, he was appointed by President Obama to the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling in 2010 and has a long record of service to the National Academy of Sciences, serving as chair of the Ocean Studies Board and member of the Committee on America's Climate Choices and Advisory Board of the Gulf Research Program. He is currently on the Leadership Council of the Joint Ocean Commission Initiative and the Advisory Board for BONUS: Science for a Better Future of the Baltic Sea Region.

A biological oceanographer, he has conducted research in coastal and continental shelf environments along the Atlantic Coast and in the Gulf of Mexico, eastern Australia, and the East China Sea. He has published two books and nearly 100 papers on the marine ecology and oceanography of estuaries, wetlands, and continental shelves, and on oil pollution, nutrient over-enrichment, environmental assessment and monitoring, and science policy.

Dr. Boesch has also been proud to establish and present the President's Award for Excellence in Application of Science to a deserving faculty member each year. The award honors exemplary applications of science that have had a positive impact on environmental protection and management.

**In the past 25 years, UMCES has undergone a remarkable transformation and is recognized as the state's foremost authority on environmental matters that are critical to Maryland and the nation. Dr. Boesch's accomplishments number many:**

- ▶ Research grants more than tripled and significantly diversified with multiple agency and private and philanthropic sponsors. This allowed UMCES scientists to expand their research into new and emerging topics critical to understanding Maryland's environment.
- ▶ He initiated the Integration and Application Network to inspire and produce timely syntheses on critical environmental issues and identify solutions. They have produced the annual report card on the Chesapeake Bay for a decade.
- ▶ He led a partnership between the University of Maryland Baltimore County, the University of Maryland, Baltimore, and UMCES to form the Institute of Marine and Environmental Technology, located on Baltimore's Inner Harbor.
- ▶ He spearheaded the effort to design and construct the state-of-the-art research vessel Rachel Carson to help understand and monitor the Chesapeake Bay and coastal Atlantic Ocean.
- ▶ He led UMCES—a long-time partner in graduate education and classroom instruction with the University of Maryland—to receive accreditation to award joint graduate degrees in environmental science.

# YEAR IN REVIEW

A snapshot of news and research from our laboratories across the state.



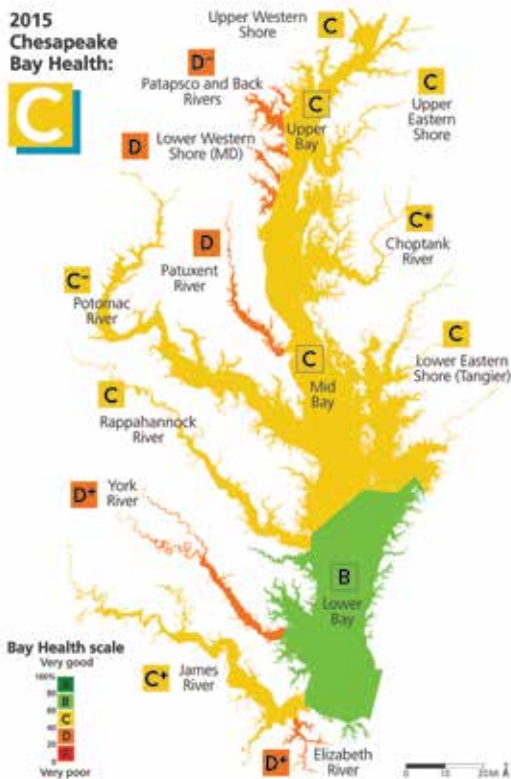
**Professor Russell Hill**, a leading researcher in marine and applied microbiology and director of the Institute of Marine and Environmental Technology, received the 2016 [USM Regents' Faculty Award for Excellence in Mentoring](#), the highest honor that the Board bestows to recognize exemplary faculty achievement.

"I love a lot of things about my job but nothing more than the privilege of interacting with graduate students and playing a role in shaping their careers," said Russell Hill. "Our graduate students are a constant source of inspiration for me."



The **Chesapeake Biological Laboratory**, the first public marine lab on the East Coast, unveiled a state-of-the-art building dedicated to the lab's founding director, Reginald Truitt. The 14,000-square-foot research facility boasts five research labs and one-of-a-kind experimental facilities, including a reverse osmosis system that makes tap water chemically pure for experiments and fine temperature controls that allow scientists to conduct experiments with Arctic clams in freezing water or coral reef fish in balmy conditions.

"There is not another research lab like this in the region and few with these capabilities nationwide," said Chesapeake Biological Laboratory Director Tom Miller.



The overall health of Chesapeake Bay improved in 2015, according to scientists at the UMCES' Integration and Application Network, which has been monitoring progress on Bay restoration for nearly a decade. The largest estuary in the nation scored a C (53%) in 2015, one of the three highest scores since 1986.



**Jaqueline Grebmeier** was given the [President's Award for Excellence in Application of Science](#) for her exceptional and sustained contributions to the understanding of the Arctic. A research professor and biological oceanographer

at the Chesapeake Biological Laboratory, she has been working for more than 30 years to understand how Arctic marine ecosystems respond to environmental changes.

"Jackie is a scientific thought leader on one of the most rapidly changing ecosystems in the world's oceans," said Don Boesch, who has recognized faculty annually with the award for 17 years.

**Walter Boynton**, longtime professor and estuarine ecologist at the Chesapeake Biological Laboratory and a fixture in the world of Bay science for more than 40 years, was chosen to



receive the [Mathias Medal](#) to recognize his distinguished career of scholarship and public service. Awarded jointly by Maryland Sea Grant College, Virginia Sea Grant, and the Chesapeake Research Consortium, the honor recognizes outstanding scientific research that contributes to informed environmental policy in the Chesapeake Bay region.

# RESEARCH HIGHLIGHTS



## Genetic evolution of dinoflagellates mapped for first time

A four-year effort by a genetic research team from a dozen universities uncovered for the first time the biology and evolution of dinoflagellates, tiny but complex organisms primarily known as marine

plankton. Even though they are a key species in the environment, they have long been misunderstood due to their large, complex genomes.

“Now we understand how they are related, what they look like,” said **Tsvetan Bachvaroff**, a molecular geneticist at the Institute of Marine and Environmental Technology. “It’s their genomic flexibility that has given them the advantage to evolve.”

photo credit: Eric Matson AIMS



## Human-caused global warming began earlier than expected

The increases in temperatures we are witnessing today started about 180 years ago, confirming previous findings that human activity is the cause of modern global warming. These new findings have important implications for assessing the extent that humans have caused the climate to move away from its pre-industrial state and will help scientists understand the future impact of greenhouse gas emissions on the warming climate. The international research project compiled data from natural archives of climate, such as coral skeletons that can record the temperature of the oceans like a thermometer, spanning the last 2,000 years.

“It demonstrates that the climate does respond quickly to greenhouse gas levels,” said paleoclimatologist **Hali Kilbourne** of the Chesapeake Biological Laboratory. “If we can change things fast now, it bodes well for the ability of the system to respond.”



## Cleaner air is driving improvements in Chesapeake Bay water quality

Improvements in air quality over the Potomac watershed, including the Washington, D.C., metro area, may be responsible for recent progress on water quality in the Chesapeake Bay. These unanticipated region-wide water quality benefits were brought about by reductions in harmful emissions of nitrogen dioxides following implementation of the Clean Air Act of 1990.

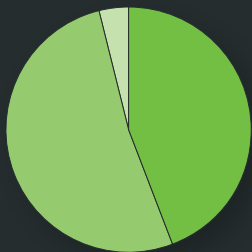
“Most best management practices—like a riparian buffer or retention ponds—only impact a relatively small area,” said **Keith Eshleman** of the Appalachian Laboratory. “You can think about the Clean Air Act as a best management practice that affects every square meter of the watershed.”



## Scientists partner with farmers and landowners to help reduce runoff

While water quality in some of the Chesapeake Bay’s tributaries has been improving, the Choptank River has been on the decline. **Tom Fisher** and his team from the Horn Point Laboratory are trying to figure out why. They are working directly with farmers and residents on the Eastern Shore to measure the impacts of best management practices like cover crops and stream buffers on water quality and looking for the best ways to combat harmful runoff from farms and lawns in the watershed. The monitoring program is part of a five-year project called People Land Water and is funded by the National Science Foundation.

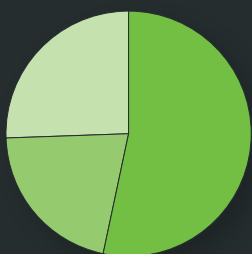
# 2016 FINANCIALS



## Sources of Revenue

- State Appropriations: 44%
- Grants: 52%
- Other: 4%

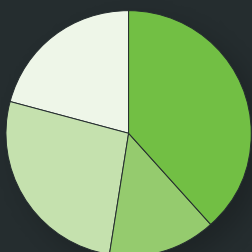
**\$48.4 million**



## Sources of Grants

- Federal: 54%
- State: 21%
- Private: 25%

**\$25.2 million**



## Sources of Federal Grants

- National Oceanic and Atmospheric Administration: 38%
- Environmental Protection Agency: 14%
- National Science Foundation: 27%
- Other: 21%

**\$13.5 million**

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The University of Maryland Center for Environmental Science mourns the loss of longtime Board of Visitors member Charles "Ted" Peck, who passed away at 91 on December 26. Ted retired as CEO of the major home building company The Ryland Corporation in Columbia and eventually maintained his principal residence near St. Michaels. He was a long-time contributor and participant in activities concerning the University System of Maryland, including service as Chairman of the Board of the USM Foundation. After moving to the Shore, he took a particular interest in UMCES. He took his responsibility as a member of the Board of Visitors seriously, attending meetings and events even when travel was difficult for him. He was also a generous philanthropic contributor and made many important contributions to community, cultural, medical, educational, and historical causes over the years.

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## IN MEMORIAM

Our beloved colleague **Erica Kropp** passed away November 14 after a short but very intense battle with acute leukemia. She worked for the University System of Maryland for more than 43 years, first at College Park and then

at UMCES, from which she retired as Vice President of Administration after 11 years. Her dedication to whatever she was asked to do was exemplary. She became more than just a professional colleague, but a true friend and a role model for a positive outlook on life. We will miss her.

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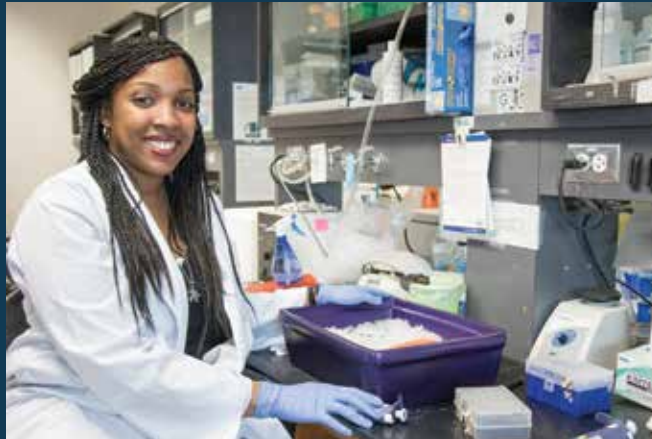
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