



UNIVERSITY OF DELAWARE

**EARTH, OCEAN &  
ENVIRONMENT**

# *The Changing Earth:*

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*Working Together for a Sustainable Future*

TEN YEAR-STRATEGIC PLAN  
2020-2030

## Letter from the Dean

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UNIVERSITY OF DELAWARE  
**EARTH, OCEAN &  
ENVIRONMENT**

*Dear Colleagues & Friends*

*Scientific challenges are becoming exceedingly complex as the Earth enters the Anthropocene epoch—a period of hydrological, climatological, and biological changes, diverging from previous cycles of global dynamics. Influenced by the interactions between humans and our environment, many of these changes have had adverse effects of global significance. Furthermore, the limited availability of resources critical to human life as well as the current lack of local institutional capacities to deal with the challenges of climate change create an ever-increasing urgency for intervention.*

*The College of Earth, Ocean and Environment (CEOE) at the University of Delaware is built on a foundation of excellence in basic and applied science, with a 50-year legacy of multidisciplinary education, research, and service in atmospheric, geological, marine, environmental, and social sciences. Bridging disciplinary and interdisciplinary expertise, technological innovations, and big data, the College is well-positioned to catalyze systems-level and convergence thinking to address Earth's present and future grand challenges. Through this strategic plan, CEOE will build upon existing strengths to provide a transformative educational experience for our students that deepens their understanding of Earth from a systems approach and the coupling of human natural systems, while providing them with variable pathways for success. We will recruit and retain outstanding faculty and staff and translate our research to solutions for society while building an environment of inclusive excellence.*

*At this college, we have the opportunity to address vital issues facing our world. From geologic hazards, to water and food security to coastal resilience—and especially understanding, mitigating, and adapting to a changing climate—the most urgent problems of our near future are ones that CEOE is uniquely equipped to study and influence. Looking ahead to the next 10 years, this document provides a roadmap for how we can maximize the good we can do as a college and a community of scholars. If we fully embrace and strive to fulfill our potential and our mission, CEOE will certainly make a real and profound difference in the world we all share.*

A handwritten signature in blue ink, appearing to read 'Estella Atekwana'.

Dr. Estella Atekwana  
Dean, College of Earth, Ocean and Environment



UNIVERSITY OF DELAWARE

**EARTH, OCEAN &  
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## *Vision*

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CEOE seeks to be a leader by advancing the scientific understanding of the ever-changing coupled Earth and human systems through interdisciplinary research and teaching. CEOE seeks to ensure that our science serves society by informing policy and engaging communities at the local, national and the global levels.

## *Mission*

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Through leading-edge interdisciplinary research and education, CEOE explores and addresses complex issues of planetary-scale sciences of the Earth's systems, supports resiliency for long-term sustainability, and prepares future generations of leaders, all in partnership with academia, government, businesses and communities.



UNIVERSITY OF DELAWARE

## **EARTH, OCEAN & ENVIRONMENT**

### *Goals*

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Within the context of a changing higher education landscape, the College is examining how it can best build upon its legacy of excellence in fundamental and applied research, and exemplary education, while continuing to explore new thematic, interdisciplinary areas that engage students, scientists, stakeholders, and decision-makers. To do so, over the next 10 years, the college will focus on the following goals:

- Goal 1 | Delivering Exemplary Academic Programs that Inspire Students and Produce Impactful Leaders**
- Goal 2 | Sustaining and Advancing Innovative Research and Discovery**
- Goal 3 | Investing in Capital Infrastructure**
- Goal 4 | Realizing Substantial Advantages from Diversity in Education and Research Environments**
- Goal 5 | Enlarging Local to Global Engagement through Partnerships and Education**
- Goal 6 | Strengthening Development and Amplifying the Network of Alumni**

The College community is defining a bold future together with a collective commitment that will continue producing cutting-edge scholarship, anticipating global trends, and translating scientific findings that are impactful at the state, national, and international levels. Focusing on these six goals and the College's vision and mission, our faculty, students, and staff will continue to demonstrate excellence in research, education, and service.

## Goal 1 | Delivering Exemplary Academic Programs that Inspire Students and Produce Impactful Leaders

The primary objective of the College is to educate students to become engaged citizens and future leaders who understand disciplinary complexities and can apply quantitative and qualitative reasoning for collaborative problem-solving. Both the demographics of students and the job landscape are rapidly changing. The College will develop a multiple-pronged, dynamic strategy that will strengthen existing degree programs and will offer hybrid and online degree programs, certificates, and micro-credentials. In this way, the College will continue to prepare a more diverse and equitable student body and to address current scientific and societal issues as well as the dynamic employment opportunities. By hiring and supporting talented faculty, along with undergraduate and graduate advisory services, students will be encouraged to pursue complex research questions, to forge effective career paths, and to engage in lifelong learning.

### Undergraduate Programs

Earth Science Education (B.S.)  
Environmental Science (B.S.)  
Environmental Studies (B.A.)  
Geography (B.A.)  
Geography Education (B.A.)  
Geological Sciences (B.A. or B.S.)  
Marine Science (B.S.)  
GIScience and Environmental Data Analytics (B.S.)  
Meteorology and Climatology (B.S.)

### Graduate Programs

Climatology (Ph.D.)  
Geography (M.A., M.S., Ph.D.)  
Geological Sciences (M.S., Ph.D.)  
Marine BioSciences (M.S., Ph.D.)  
Marine Policy (M.M.P., M.M.P./J.D., Ph.D.)  
Oceanography (M.S., Ph.D.)  
Physical Ocean Science and Engineering (M.S., Ph.D.)  
Water Science and Policy (M.S., Ph.D.)

### Certificate Programs

Geographic Information Systems (GIS)  
Minerals, Materials and Society  
Wind Power Science, Engineering and Policy

## Undergraduate Programs

- **Grow the undergraduate enrollment.** We will increase and diversify our undergraduate enrollment over the next 10 years under the leadership of the Senior Assistant Dean for Student Services. Strategies will include high school pipeline programs (e.g., summer camps, dual enrollment, engagement with high school counselors) and articulation agreements with community colleges, in collaboration with UD's Division of Enrollment Management. Broadening regional engagement strategies through partnerships with other on-campus units and community organizations will expand our reach and streamline departmental visit process (e.g., Coast Day Prospective Student Event). The College will broaden these tributaries into underserved communities and non-traditional students (e.g., less on-campus time, on-line and hybrid degree programs, and access to scholarships). Providing clear communications on return on investment will be linked to these outreach programs.
- **Expand experiential learning opportunities.** We will increase the number of students engaged in faculty-led research and promote various existing field education experiences that complement degree programs and the spirit of discovery, including at-sea opportunities, geology field courses, the Lewes semester-in-residence program, and senior thesis opportunities. CEOE's longstanding Research Experience for Undergraduates (REU) program for summer internships (funded by the NSF Division of Ocean Sciences) is a proven strategy for enriching student education. Affinity Programs, such as Innovation and Community Engagement Scholars in other colleges and the newly proposed Climate Scholars, will also be promoted for active learning opportunities outside the classroom. We recognize that collaboration with the Development Office is needed to grow available funds for experiential learning opportunities, including year-long research experiences for undergraduates abroad.
- **Optimize student services, including academic advising and mentoring.** We will fully launch a student success center, under the Senior Assistant Dean for Student Services, to provide a one-stop location for academic advising and co-curricular programming that assures compliance with University and College policies, provides intensive support for students facing academic difficulty, and certifies degrees. The

College will hire a full-time professional undergraduate advisor who will complement these services, encourage greater consistency across the College, and communicate the availability of services. We will provide professional academic support services to increase retention and graduation rates and prepare students to be globally competitive over their lifespans. The student success center will continue to monitor and evaluate the support ecosystem for incoming first-year students, such as the Living Learning Community and Enviromentors. Also, we will increase the number of students applying for external scholarships (e.g., NSF graduate research fellowship, Rhodes, Truman, Marshall, Fulbright and Goldwater scholarships), by providing workshops and assistance to enhance application success.

- **Evaluate, revise, and modernize the degree programs, including 4+1 and online courses.** The three academic units will develop 4+1 programs to facilitate the entry of interested undergraduate students into graduate programs such as the newly launched B.S./M.S. Program in GIScience and Environmental Data Analytics. These developments will offer rich opportunities for undergraduate students to matriculate with graduate degrees and diversify their options. We will continuously harmonize the undergraduate curricula to reflect the rapidly changing educational landscape, evolving societal challenges, and job market demands. Degree titles that do not match market perceptions will be modified with the involvement of the academic units. New online courses will be explored for winter and summer sessions, with appropriate resources and technology requirements.
- **Expand educational opportunities to non-traditional students.** Changing demographics dictate that flexible and innovative academic programs should be developed to enhance access to education targeted to non-traditional students or those that cannot participate in traditional, on-campus classes. This will require multiple delivery strategies, including hybrid and online programs, online certificates, and micro-credentials. This sea change in education will be developed with existing and new partners: in-house university resources (e.g., online video capabilities of the Faculty Commons); in-state institutions (e.g., Delaware State University and DelTech); and other universities around the world. Wherever possible, these educational programs will be coupled with entrepreneurial and outreach activities that attract motivated students.
- **Develop students to be life-long learners.** The three academic units will train our students to be prepared and agile to address rapidly evolving scientific methods and questions and navigate changing job landscapes. Both strong disciplinary and quantitative skills and non-technical skills will be emphasized in consultations with professional scientific organizations, industry, and government partners. Applying problem-based learning (PBL), the faculty will emphasize course work with critical thinking, teamwork, project and time management, and quantitative skills (e.g., data science and computational). CEOE will also take advantage of the expertise and consultation services of UD's Center for Teaching and Assessment of Learning (CTAL) for elevating our programs.

## Graduate & Professional Programs

Our goal is to become a first choice for graduate students and postdoctoral fellows. CEOE builds on the quality and success of the graduate students that are, in turn, inextricably linked to faculty leadership, the scope of their research, and state-of-the art facilities and laboratories. We will build on current strengths and diversify student pipelines, bridge communication between the two campuses in Newark and Lewes, and expand professional development experiences. In collaboration with Graduate Programs Coordinators, the following strategic priorities will help in achieving these goals:

- **Increase graduate student enrollment.** In collaboration with the Assistant Dean for Graduate Student Services, the departments and school will develop a best practices recruitment strategy to be implemented

at regional and national meetings. We will work with UD's Development Office to seek more opportunities and fellowships for supporting graduate students and also seek to increase the number applying for national research fellowships (e.g., NSF, DoD, EPA, and national laboratories). With global outreach programs coordinated with UD's Graduate Admissions Office, we will increase the number of international students and diversify further the graduate student body.

- **Enhance student success and better prepare graduate students for diverse career opportunities.** With the leadership of the Assistant Dean for Graduate Student Services, faculty and staff seek to strengthen graduate student education and research experiences and prepare them to be globally competitive for career pathways. Recognizing that a majority of our graduate students will find employment outside of traditional academic jobs, our graduate degree programs, in parallel with the undergraduate problem-based learning approaches, will emphasize writing skills, critical thinking, project management, and solving complex problems. In collaboration with the new Graduate College, we will enrich non-academic pathways with robust and holistic professional development programs, enhance presentation and communication skills, develop individual development plans, address wellness issues and engage with the alumni network for mentoring and career opportunities. The front line of support will continue to be faculty advisors as well as their graduate student peers. The College will collaborate with UD's career services to expand external internships and summer job opportunities for the graduate students to work with private sector partners, state and federal agencies, and national laboratories. To these ends, more holistic mentoring and career development approaches will be created.
- **Build and enhance the graduate student cohort.** Given the two campus infrastructures with separate faculty and classroom locations, we recognize that there are challenges in building a graduate community with synergies between degree programs and research endeavors. By nurturing an inclusive community with frequent social and professional dialogues (e.g., lecture series symposia, science cafes), the academic units will address the need for greater cross-unit interactions. Greater involvement of graduate students in College governance (e.g., in-house sustainability policies) plays a vital role in fostering a vibrant community for learning and discovery. These activities also support the overarching theme of this strategic plan to encourage cross-disciplinary and cross-college dialogues that help to build a nationally recognized program, including the climate change science and policy hub (*see page 9*).
- **Establish professional master's degrees and certificate programs.** The three academic units will continue to develop programs with greater emphasis on interdisciplinary science-policy themes, such as the Water Science and Policy degree and a new collaborative graduate program in microbiology (with the Graduate College, the College of Arts and Sciences, and the College of Agriculture and Natural Resources). Such initiatives, along with professional master's 4+1 degrees, will grow and diversify the graduate student population and enhance student success in addressing current scientific challenges and the evolving job market. CEOE will also invest in the development and marketing of professional certificate programs (e.g., Graduate Certificates in Minerals, Materials and Society, and GIScience) that provide opportunities for non-traditional students and respond to growing market demands in particular fields (e.g., Graduate Certificates in Robotics and in Wind Power Science, Engineering and Policy). We will translate classroom courses and certificates to online programs with appropriate resources and training for the faculty in collaboration with UD's Division of Professional and Continuing Studies (PCS).



## Goal 2 | Sustaining and Advancing Innovative Research and Discovery

Excellence in research and discovery is central to the identity of faculty and students in CEOE and establishes the drivers for engaging with local and global partners to find solutions to a number of society's most challenging problems. Core strengths emanate from all three academic units—the School of Marine Science and Policy, the Department of Geography and Spatial Sciences, and the Department of Earth Sciences—which are the foundations of the College's success. CEOE addresses many of society's challenges that require a deep understanding of the Earth as a system (biosphere, hydrosphere, atmosphere, cryosphere, and geosphere) and the responses to physical and human stressors. There is more to be done to understand deep earth processes and its linkage to surficial processes. Yet, we also recognize the need to explore more interdisciplinary and holistic approaches in order to advance discovery and innovation and address the increasingly complex environmental issues that affect society.

The Earth has entered a period of climatological change that departs from previous episodes of natural variation, resulting in major impact on the biogeochemical cycles of the planet over relatively short time scales. Faced with rising temperatures, retreating glaciers, sea level rise, highly damaging coastal storms, severe droughts, wildfires and more frequent flooding, there is an urgency to focus strategically on the daunting impacts of climate change. It has become clear that human activities have caused changes on a planetary scale, and these changes are increasingly tipping the world toward highly disruptive global environmental degradation while at the same time placing urgent demands on the planet's critical resources such as clean energy, water, and food. Confronting these challenges will require a convergence of ideas, approaches, and technologies from widely diverse fields of knowledge to stimulate innovation and discovery. The college, with its deep capabilities in climate science, environmental geochemistry, marine and terrestrial ecosystems and growing expertise in natural hazards and coupled human-environmental system analysis, has unique opportunities to catalyze and shape more collaborations across the College and the University. In this way, emerging complexities and existing knowledge gaps will be addressed. We fully expect that developing resources towards intra- and cross-college collaborations that move toward convergence research and approaches will also help to strengthen state and local community capabilities for mitigating and adapting to these growing global threats. Towards these ends, in addition to investing in disciplinary areas, we have identified a set of strategic priorities that will be a focus of our institutional efforts of the College over the next 10 years.

- **Establish a world-class CLIMATE CHANGE SCIENCE & POLICY HUB.** *Focusing on this complex thematic area will foster greater cross-department and cross-college collaborations and elevate the profile of climate change research at UD.* The hub will build a broad knowledge base grounded in rigorous analysis of the evidence that addresses the urgency of climate change and potential impacts on local and global ecosystems. Based on an assessment of the academic unit strengths and the majority of faculty research foci, five topics related to climate science are involved.

In early 2020, the hub will be launched by selecting leadership and interested faculty and research scientists with shared interests. The leadership (in collaboration with the three academic unit leads) will assess which of these thematic areas are most promising and where College faculty are best positioned to contribute. With appropriate incentives and seed money, the hub will identify near-term multi-institutional proposals in

### CLIMATE CHANGE SCIENCE & POLICY HUB

#### CLIMATE DYNAMICS

*oceans, atmosphere observations and modelling  
of past and future climate and its impact*

#### SOCIAL DIMENSIONS OF CLIMATE CHANGE

*urbanization, resilience, adaptation,  
human migration, policy*

#### CLIMATE IMPACTS ON HEALTH

*focus on water and food security*

#### SUSTAINABLE ENERGY TRANSITIONS

#### HAZARDS

*focused on climate related hazards*



collaboration with the UD Research Office and in cooperation with other colleges and universities. This will help the College to provide leadership in new areas, develop new degree programs, and catalyze new strategic hires.

- **Develop cross-college strategic faculty mentoring and hiring plans.** Coordinating faculty hiring plans across the College and university will leverage existing core strengths currently dispersed through the three academic units, and promote greater inter-connectedness between departments, work on emerging and frontier areas, and innovative academic programs. Each academic unit will develop and implement a comprehensive peer-mentoring program for faculty at all ranks. Academic units will also work with early-career faculty to formulate career development plans and enhance their competitiveness for prestigious awards (e.g., NSF CAREER; Sloan Research Fellowships), while at the same time coaching outstanding mid-career faculty and providing leadership opportunities for the next generation of faculty leaders.
- **Establish college research theme areas.** Thematic research areas will be established to leverage cluster hires, strengthen cross-college collaborations, enhance interdisciplinary research, and expand funding potential. These collaborative activities will help to elevate the national stature of our programs. Theme leaders will be selected by the Dean with input from the department chairs and director.
- **Support and facilitate convergence research initiatives that build upon disciplinary strengths and human-environment coupled thinking.** The College's three academic units will facilitate convergence research initiatives by generating opportunities for promising faculty and post-doc fellows. Existing research centers will be evaluated, and new research hubs of excellence will be launched that generate new ideas, facilitate intellectual collaborations, and offer multi-institutional proposal opportunities. Integrating physical, life, and social sciences will address Earth's grand challenges with all their complexities and uncertainties. With sufficiently long timescales, human and environment coupling is often central for defining sustainable and cost-effective strategies for anticipating and creating better governance and decision making. CEOE is already actively exploring the paradigm of coupled human-natural systems, and future efforts will build this capability with more cross-disciplinary dialogues, strategic hires, and new curriculum (e.g., Climate and Society Concentration in the Environmental Sciences degree).
- **Enhance national and global recognition of faculty research excellence.** The College's academic units will promote the contributions of faculty, enhance communication of research and discoveries, and boost the global awareness of research programs through web re-design and robust social media presence (e.g., through UDaily, external newsfeeds). Dissemination of research results across multiple scientific platforms is already a goal for the faculty and linked to promotion and tenure (P&T), but additional incentives may be needed. The departments and school leadership will encourage faculty at all career stages to seek out leadership opportunities in various scientific and international organizations. The College awards committee will actively canvass and identify meritorious faculty to ensure that highly qualified candidates are nominated for major UD, national, and international awards. Another essential objective of disseminating scientific results will be to enhance communication and engagement with local and global communities. These initiatives will contribute to the University's role as an economic driver for the state and the region.
- **Enhance innovation and entrepreneurship.** CEOE and the University have a legacy of innovation and entrepreneurship that involves a variety of partners, including public-private partnerships and start-ups (e.g., NIIMBL, First State Marine Wind, Nuvve's Vehicle-to-Grid technology, epigenetic biomarkers with GenPro). Looking ahead, it is clear that there is more potential for our faculty and students to provide solutions for a more sustainable future. Strengthening the faculty's relationship with existing programs, such as the eco-entrepreneurial certificate associated with Horn Entrepreneurship and the Office of Economic Innovation and Partnership (OEIP), will accelerate the transfer of ideas into the marketplace. The UD Makerspaces, engaging undergraduates in active learning, offer additional opportunities that will be enhanced and proactively marketed. University resources will be targeted to support motivated faculty and ensure that P&T documents reflect entrepreneurial contributions to scholarship.

## Goal 3 | Investing in Capital Infrastructure

A first-class capital infrastructure is essential for attracting and retaining intellectual leadership and for enabling the College to address research and academic priorities more effectively. A high priority of this strategy involves a capital infrastructure fundraising campaign orchestrated with the UD Development Office and with University-level advice and resources. The following strategic priorities will address a number of these challenges:

- **Establish a CEOE infrastructure advisory committee.** Given the urgent infrastructure needs across both campuses, establishing a College space committee will be a top priority. This committee will outline policies at the College level and advise the Dean and unit heads. Establishing a transparent process for office and laboratory space allocation priorities to address specific internal challenges and personnel needs will be undertaken at the unit level. The committee will liaise with the UD Master Plan and Facilities, Real Estate and Auxiliary Services on the main campus to help evaluate the quality of the spaces, prioritize renovations (including deferred maintenance), and enhance operational efficiency through space-saving measures. Strategies to maintain and enhance the prominence of existing laboratories will be identified (e.g., Robotics Discovery Laboratories, Environmental Isotope Science Laboratory). Wherever possible, suggested renovations and new construction will incorporate sustainable design elements and will showcase leadership in climate resiliency to inspire students, researchers, and the community. Accordingly, coastal vulnerabilities at the Lewes campus will be examined, and near-term plans developed.
- **Develop multi-purpose laboratory and teaching spaces.** The immediate challenges are related to new laboratory space in Newark for additional hires and teaching laboratory spaces on both campuses. To address some of these needs with limited resources, we will move towards a model of shared, thematic research spaces. This will facilitate collaborations for competitive research programs while alleviating some of the space problems. Also, there is a need to acquire new spaces and to modernize others. We will build a seawater laboratory on the Lewes campus to elevate our national visibility. For the Newark campus, we will focus on the development of a new footprint centered around a geochemistry laboratory and renovate existing laboratory space. In addition, we will continue to modernize classrooms with enhanced connectivity-enabling technology and leverage access to research labs. We will increase teaching space with the development of a teaching annex on the Lewes campus that will also provide meaningful hand-on experience and improved public demonstrations.
- **Enhance greater connectedness between the Newark and Lewes campuses.** Faculty offices, laboratories, and classrooms are now spread across several buildings in Newark and a separate campus 90 miles away in Lewes. The distribution and quality of the physical spaces create some difficult challenges and are impediments to the future growth of the College. Central services are only located in Newark, limiting some student support systems. Often faculty have long commuting times and larger carbon footprints to teach and facilitate collaborations. The Lewes coastal location, on the other hand, provides students and faculty with ship time, field laboratories, and opportunities for local engagement with policymakers and citizen scientists. We will collaborate with the office of the Executive Vice President to expand the university's footprint in Lewes to support community learning and engagement, such as with the Osher Lifelong Learning Institute, while expanding UD's programmatic areas on the Newark campus. The College will partner with the Office of the Vice President for Information Technology to enhance the instructional technology (IT) infrastructures in the classroom and laboratory spaces that are providing improved connectivity between campuses.
- **Sustain the legacy of ship-based research, education, and experiential learning.** Ship- and small vessel-based research are an important legacy of CEOE's history of research and discovery and continues to be a showcase for experiential learning opportunities in marine science. In order to sustain ship operations, the College will leverage the *R/V Hugh R. Sharp* as a recruiting tool asset for seagoing faculty and develop

robust marketing and development plans to diversify the funding portfolio of the University's *R/V Sharp* and *R/V Joanne Daiber*. Sustaining ship operations that support our research portfolios and academic programs is central to the College's strategic priorities.

- **Expand living and learning community in Lewes.** The infrastructure advisory committee will work collaboratively with UD's Real Estate and Development Department and long-range planning to enhance the University's footprint on the Lewes campus. Through public-private partnerships, we seek to provide new living facilities for students in Lewes. This will also enhance the recruitment of top graduate students and allow an expansion of our semester-in-residence to include students from other colleges.

## Goal 4 | Realizing Substantial Advantages from Diversity and Equity in Education and Research Environments

Diverse campus experiences improve the educational growth of all students on campus by promoting inclusion and social equity and by preparing students for the diverse world they must navigate upon graduation. Diversity is a core value and guiding principle for the university and CEOE's education and research mission. Diversity and inclusion mean both the recognition and appreciation of different backgrounds, values, and ideas, as well as a commitment to ensure that all people are treated equally. Increasing the diversity of faculty, staff, and students in ethnicity, culture, race, religion, and gender requires a targeted and sustained program across the College. As a priority, the College will attract underrepresented minority students. The College also recognizes that there is currently a lack of in-house expertise and resources to move us forward. The College will work with UD's Office of Equity and Inclusion to access their resources and to seek advice on proven strategies that increase the diversity of the faculty and other role models that will lead to a greater diversity of the students. To this end, we will focus on the following strategic priorities:

- **Increase faculty and staff diversity.** We will increase the diversity of the faculty and staff through targeted recruiting and focused retention strategies. All CEOE search committees will participate in implicit bias training at all levels and will partner with the NSF-funded UD ADVANCE Institute for advice on faculty searches and best practices to increase the diversity of candidates. In order to increase the represented minority applicant pool, search committees will actively recruit faculty by interacting with minority-serving institutions and organizations. The Dean's Office will assess the effectiveness of CEOE's Diversity Committee with the heads of the three academic units to ensure diverse memberships in all department-level committees, including implicit bias training for graduate student committees. The Dean's Office will establish an initiative for diversity values in research projects and provide leadership roles to faculty.
- **Attract and recruit underrepresented students.** We will recruit and retain diverse students, in collaboration with the UD Admissions Office, by expanding the external funding sources and leveraging alumni donations. Scholarships and other funding sources will be needed to attract and recruit diverse represented minority students and post-doc candidates. CEOE will partner with Historically Black Colleges and Universities (HBCUs) as part of a revitalized pipeline program. By attending the SACNAS (Society for Advancement of Chicanos/Hispanics and Native Americans in Science) conference, we will recruit M.S. and Ph.D. students from the high-achieving and diverse attendees. These strategic priorities will be coordinated with the UD Development office to address any fundraising gaps (e.g., post-doc minority fellowship program, lower costs for the residential summer camp, registration fees to attend the annual Women in STEM conference). The commitment to these strategic priorities will be realized in collaboration with the Office of Equity and Inclusion and external diversity experts as resources are available.
- **Cultivate a welcoming and inclusive community.** Diversity policies will be developed with respect and appreciation of human differences. College policies, in alignment with Title IX compliance, will be completed and disseminated throughout the governance structure. All CEOE employees (staff and faculty) will be expected to stay knowledgeable on Title IX compliance. A College Code-of-Conduct and annual bystander intervention training will provide common-sense guidelines and a framework by which to monitor and report any inappropriate incidences. These guidelines will extend beyond the classrooms and laboratories to other informal professional development gatherings, such as social engagements and social media.

## Goal 5 | Enlarging Local to Global Engagement through Partnerships and Education

The College seeks to ensure that research findings and student experiences have positive and significant effects, particularly on local communities. Professors and researchers are well poised for developing sound science related to society's challenges. The College has outstanding opportunities to work closely with administrative units within the College as well as other affiliated groups that can assist with promoting and translating reliable science for state and local governments and communities to address critical needs and to fashion creative solutions and adaptations (see box). The strategy is two-pronged: first, deepening engagement with faculty and researchers in meeting the evolving demands of regional stakeholders related to coupled human-environmental systems, such as developing hazard mitigation plans and supporting natural resource sustainability in the Delaware watershed and beyond; and second, linking the outreach strategies closely to the educational mission. We will focus on the following strategic priorities:

- **Facilitate deeper connections to enhance outreach.** This focus on critical societal issues grows out of CEOE's research and education missions that are closely linked to state, federal, and international agencies and stakeholder groups around the world. Department chairs, in conjunction with the Dean's Office and CEOE faculty, will identify emerging research topics that address challenges associated with the new climate change science and policy hub as well as other scientific thematic interplays. CEOE's faculty will continue to forge stronger links with internal groups (see box) and external partnerships around the globe.

The College is fortunate to have valuable in-house institutions that already engage with Delaware's communities and focus on a host of critical issues, including those related to coastal resiliency and hazard management, water supply and management, and state climatology services. These platforms include Delaware Sea Grant (DESG), Delaware Geological Survey (DGS), and the Center for Environmental Monitoring and Analysis (CEMA). We will engage these entities to leverage existing resources and expertise for impactful community interactions on various topics (e.g., reducing plastic debris in the ocean, training teachers in climate science, organizing knowledge exchanges on offshore wind, and easier tracking of endangered species for the fishing community). The college also has administrative relationships with Scientific Committee on Ocean Research (SCOR), Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS), and Osher Lifelong Learning Institute (OLLI) that will be strengthened.

- **Foster collaborations and catalyze innovations across the University.** CEOE will cultivate stronger relationships within the College as well as with faculty across the university. Relationships with both internal and external institutions and across industrial, academic, and federal partnerships will facilitate the fulfillment of our mission. CEOE faculty are part of emerging interdisciplinary research areas that are based upon core strengths in fundamental sciences. Some examples of these strategic opportunities include the National Institute for Innovation in Manufacturing Biopharmaceuticals ([NIIMBL](#)), Delaware Environmental Institute ([DENIN](#)), Established Program to Stimulate Competitive Research ([EPSCoR](#)), Disaster Research Center ([DRC](#)), and the Data Science Institute ([DSI](#)).
- **Enhance engaged scholarship by encouraging faculty and students to address local community concerns.** By facilitating broader dialogues with internal partners (mentioned above) and faculty, shared research questions addressing societal challenges and potential local impacts will continue to be identified. Meaningful engagements and communication about environmental challenges affecting communities and policymakers are current priorities for many faculty (e.g., risks of more frequent flooding, coastal and beach erosion, ocean acidification, sustainable communities, and horseshoe crab

protections). The Dean's office will identify specific incentives (such as merit awards and Faculty Excellence in Scholarly Community Engagement Awards) recognizing successful leadership and partnerships. Students will also benefit by participating in these outreach strategies and will be encouraged to take a more active role with their faculty advisors through internship opportunities with internal engagement units (e.g., DESG, DGS) and with the public, non-profit and business sectors. The College will broaden engagement with local communities to serve as an active partner and institutional resource in building capabilities in adaptation and resilience and in sharing complex scientific information. Engagement and communication will also be a centerpiece of the climate change science and policy hub.

- **Enhance science literacy within the local communities across Delaware.** Several popular informal educational programs are provided in cities and towns across Delaware, such as Coast Day, the SMSP Ocean Currents Lecture Series at the Lewes Campus, and OLLI. Although these types of initiatives reach a broad spectrum of stakeholder communities, a deeper reach into underserved communities is nonetheless needed. A sustained marketing program that leverages these partnerships to build greater support for science literacy will be a priority for CEOE.
- **Expand engagement around the world.** The College seeks to have a significant influence on international scientific institutions and research projects around the world. With the exchange of knowledge across the three academic units and the international task force, CEOE will explore collaborations with other universities (e.g., MOUs for joint degree programs and international student exchanges) and private industry (e.g., technology R&D). A greater faculty reach into global institutions and communities will also expand our potential interactions with new international students. Key strategic priority areas for the College, based upon existing core competencies include the following:
  - *Climate Change Science and Policy Hub.* Launching this Hub will be one of the most important initiatives of the College, focusing on some of the most perplexing scientific challenges of the coming decades. Drawing upon significant strengths across the College that already span the globe, the Hub will build upon existing expertise that ranges from meteorological and climate services, ecosystem vulnerability, and new governance structures related to geohealth and sustainable energy transitions. The Geography and Spatial Sciences Department and SMSP both have extensive research programs in the Arctic and Antarctica. The Hub will work to enable these international collaborations and to significantly advance our scientific capabilities further.
  - *New collaborative research partnership with developing nations.* Many of the fundamental and applied scientific focus areas of the College may lead to possible research interfaces and to a foundation for effective cooperation with selected developing regions. Interested faculty will explore new footprints with various platforms (e.g., Green Climate Fund, UD's existing MOU with the Global Green Growth Institute), considering a wide variety of research topics (e.g., the geopolitics of food systems) and regions (e.g., Central America and Sub-Saharan Africa).
  - *Small Island Developing States (SIDS).* The College will build upon the existing relationship with the United Nations Sustainable Development Solutions Network and the work of the Mangone Center to develop internationally recognized expertise for research and practice around the challenges of SIDS.



## Goal 6 | Strengthening Development and Amplifying the Network of Alumni

The College's development strategies and alumni relationships are essential pillars for its continued success and the ability to raise external resources for meeting our goals. Cultivating, mentoring, and connecting with our students, (e.g., the graduate student cohort programs) lays the groundwork for enhancing community and philanthropic ties. Communicating our story effectively and broadening engagement strategies will expand the College's reach across a variety of audiences (including alumni and volunteers, friends and community, corporate partners, and private foundations). The following priorities will help to fulfill overarching development goals and alumni relations in collaboration with the UD development office:

- **Enhance engagement with alumni and friends.** Many faculty actively participate in events, including Delaware to the World, SMSP's Ocean Currents lecture series, Coast Day, UD Day in DC, and Osher Lifelong Learning Institute. Broader and sustained reach into national and international networks will require more coordination and commitment that effectively leverage faculty and student relationships. The College will work closely with the UD development office to produce a roadmap to enhance engagement and create initiatives such as mentorship programs with new graduates and other alumni.
- **Foster existing relationships across the region.** Beyond alumni and friends, there are untapped opportunities to engage more broadly with regional, Mid-Atlantic, and national communities. The College wants to serve its communities as an active partner and institutional resource in building capabilities in adaptation and resilience and by sharing complex scientific information that affects their communities, such as more extreme storms and high-tide flooding. Faculty and staff will leverage existing relationships across the region with tactical support from the development office. Another priority for success is to mobilize a regional community council from professional and intellectual networks that translate to a wider net of CEOE philanthropy.
- **Increase resources for faculty, undergraduate, and graduate student support.** Recruiting diverse students from different cultures and less privileged communities will require greater investments in their talents and ambitions by diversifying faculty and marshaling resources for scholarships. Philanthropic support through Delaware First will help to establish a newly endowed scholarship or support an existing one; this will help UD to fulfill its mission of providing a world-class education for its students. We will also explore how to leverage existing relationships related to sponsored research that may lead to enlarged scholarship funding. CEOE will work with the UD development office to expand faculty funding portfolios and to include corporate and private foundation funding sources.



## Ongoing Assessment of Progress

- The Dean's Office, in collaboration with the three academic unit heads, will create implementation roadmaps for this strategic plan that builds upon strategic hiring plans (and Self-Assessment Programs), including budget and funding commitments. The Dean's office will have an ongoing assessment process that utilizes the three academic unit heads and the Leadership Team (see Appendix 2 for membership) in the review of this Strategic Plan and subsequent roadmaps. The annual leadership retreat will assess the key metrics supporting this strategic plan. These metrics will include but are not limited to progress in fundamental and interdisciplinary research areas; enhanced student success, inclusiveness, and recruitment on both the undergraduate and graduate levels; and more effective partnerships for community and global engagement. Barriers to and opportunities for realizing the strategic plan will be discussed and solutions identified with the College leadership and the Human Resources Manager. Students, particularly graduate students, will be consulted wherever appropriate to formulate solutions and strategies for their success.
- An early priority for the College will be progress on development of a climate change science and policy hub. The Dean's Office will orchestrate initial planning steps with the three academic unit leads, including identifying leadership and defining the availability of seed funding. Interested faculty with shared thematic areas that best intersect with current and future research will be recruited. In collaboration with UD's Research Office, potential multi-institutional proposals where CEOE has considerable success (e.g., NSF) will be targeted to map priority funding for existing research strengths, such as coupled natural and human systems, human dimensions of the Arctic System, UN Sustainable Goals and Innovations at the Nexus of food and water systems (GeoHealth grand challenge). Also, other colleges (and external universities) with complementary climate change science expertise will be identified and engaged in partnering.
- Progress on the continuous improvement process and highlights of the annual assessments will be presented to CEOE faculty, staff, and students annually.

# APPENDICES

## Appendix 1. The Planning Process

The overarching objective of the strategic planning process was to define aspirations that will guide a CEOE vision for the next 10 years, including interdisciplinary and impactful research areas, student success, and community engagement.

The CEOE strategic planning process began in October 2018 with a formation of a committee appointed by Dean Atekwana and co-chaired by Professor Fabrice Veron, deputy dean, and Bonnie Ram, interim director of strategic initiatives and partnerships of CEOE (see Appendix 1 for members). A three-phased process was developed for this planning process beginning in Fall 2018.

- **Phase I.** The objectives of the first phase (October 2018-February 2019) were to assess core strengths, refresh the vision and mission statements, identify opportunities to sharpen undergraduate and graduate enrollment strategies, consider University-level presidential priorities, and explore scientific grand challenges that would help to weave common threads across the three units. While the departments and the school have recognized core strengths and a robust legacy of fundamental science and applied problem-solving and disciplinary educational programs, the committee recognized that CEOE also has considerable strengths and history related to climate change research and training.
- **Phase II** (March 2019- August 2019) The faculty committee, along with insights gained from separate faculty interviews, identified a set of grand challenges that were based upon strategic hire plans, research grants, and publications. There was a recognition that most of these strengths related to climate science and the climate change science and policy hub idea was born. Working groups were formed around a set of four grand challenges and potential goals were discussed related to student success, diversity and inclusiveness, and community engagement. In light of our substantial basic science research interests, other thematic areas were identified for further considerations such as biogeochemistry, GIS, and big data. A College-wide survey was also conducted and comments were reviewed and incorporated into a revised draft. Throughout the planning process, the co-chair Ram attended faculty meetings in each of the three academic units and other committee meetings to keep CEOE leadership and faculty informed and engaged. Also interviews were conducted across and external to CEOE, including alumni, undergraduate, and graduate students groups, and the Dean's Advisory Council (DAC). Another revised draft plan was produced and circulated to the committee for review and comment in May 2019. During the summer, committee comments were reviewed and the several versions of the plan were revised again.
- **Phase III** (September 2019- December 2019). The objectives of this phase involved a continuation of the review and comment process of the draft plan (V9) by the broader College, including staff, faculty, students, and researchers. This phase also targeted engagement with internal and external partners such as DESG, DGS, CEMA, and the Dean's Advisory Council (DAC) for review and comment. In the late fall, a revised draft plan (V9) was circulated to the broader College with a brief survey to obtain comments. A draft was also distributed to select university reviewers, academic unit leads, and the DAC. These comments were then reviewed and incorporated into the final document (V10).

## **Appendix 2. Members of the CEOE Strategic Planning Committee**

Dr. Estella Atekwana, CEOE Dean  
Dr. Fabrice Veron, CEOE Deputy Dean, Committee Co-Chair  
Bonnie Ram, Interim Director, Strategic Partnerships, Committee Co-Chair

Dr. Saleem Ali  
Dr. Eliot Atekwana  
Dr. Jennifer Biddle  
Dr. Jeremy Firestone  
Mark Jolly-Van Bodegraven, Director EPE  
Dr. John Madsen, Acting Chair, Department of Earth Sciences  
Dr. Sue McNeil, Chair, Department of Civil and Environmental Engineering  
Dr. Keeley Powell, Assistant Dean, Undergraduate Services  
Dr. Neil Sturchio  
Jon Swallow, Director, Marine Operations  
Ex-Officio – Dr. Mark Moline, Director, SMSP and Dr. Del Levia, Chair, Geography and Spatial Science

### **Dean’s Advisory Council**

Dr. Lee Anderson, Professor Emeritus  
Karen Carlson  
Dr. Luis Cifuentes  
Jeffrey Jacobs  
Dr. Brandon Jones  
Ralph Leon, Co-chair  
Dr. Ann Masse  
Stephen Rahaim  
Dr. Gary Schmelz  
John Talley, Co-chair  
Dr. Evan Ward  
Ming Xu

### **Leadership Team**

Dr. Estella Atekwana, CEOE Dean  
Dr. Fabrice Veron, CEOE Deputy Dean, Committee Co-Chair

Mark Dobbins, CEOE Business Officer  
T.J. Cournoyer, Senior Director of Development  
Dr. Kathy Coyne, Director, DESG  
Paul Dumigan, Director, College Computing Operations  
Mark Jolly-Van Bodegraven, Director, EPE  
Kelli Kerbawy, Assistant Dean, Graduate Services  
Dr. Del Levia, Chair, Geography and Spatial Science  
Dr. John Madsen, Acting Chair, Department of Earth Sciences  
Dr. Mark Moline, Director, SMSP  
Dr. Keeley Powell, Senior Assistant Dean, Student Services  
Bonnie Ram, Interim Director, Strategic Partnerships, Committee Co-Chair  
Dr. David Wunsch, Director, Delaware Geological Survey