

## II UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE

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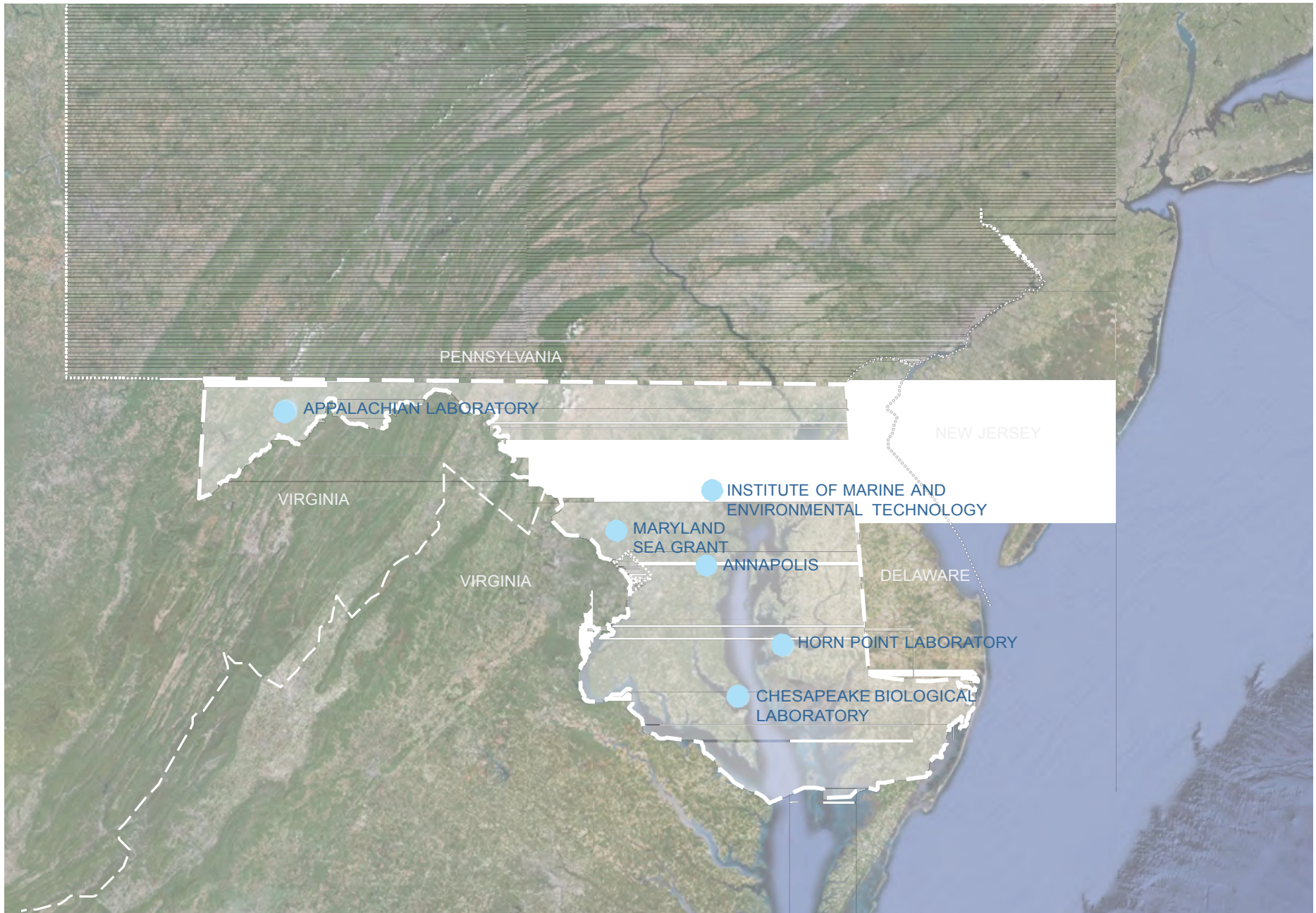



Illustration 1.1  
UMCES Site Locations

NOT TO SCALE 



## 1. UMCES Institutional History and Background

### 1.1 UMCES Overview

Through its four laboratories across Maryland, the University of Maryland Center for Environmental Science (UMCES) is a research, education, and service institution of the University System of Maryland (USM) and a world leader in the science of coastal environments and their watersheds. The Center's faculty advances knowledge through scientific discovery, integration, application, and teaching, that results in a comprehensive understanding of our environment and natural resources, helping to guide the State and world toward a more sustainable future. Through its role as the responsible institution for administration of the Maryland Sea Grant College and numerous collaborative programs with other institutions, UMCES leads, coordinates, and catalyzes environmental research and graduate education within the University System.

UMCES faculty members advise, teach, and serve as mentors to many graduate students enrolled in USM institutions, particularly through the System-wide graduate programs in Marine Estuarine-Environmental Sciences (MEES), in which UMCES has a leading role. UMCES also delivers its services through environmental science education programs for K-12 students and teachers, pertinent and timely information to the general public and decision makers, technology transfer to industries and the Maryland Sea Grant College.

UMCES contributes to meeting the legislative mandates of the University System of Maryland in numerous ways including: achieving national eminence as one of the world's premier research centers focused on ecosystem science; uniquely integrating research, public service, and education related to the sustainability of environment and natural resources of Maryland and the Chesapeake Bay region; leading the System's nationally ranked graduate program in marine and environmental science; recruiting and retaining a nationally and internationally prominent faculty; attaining research funding and private support far in excess of its state support; promoting economic development; conducting outreach to state and federal agencies; and collaborating with other higher education institutions in Maryland in advanced research and graduate education.



UMCES is among the few institutions in the world to examine a large ecosystem, the Chesapeake Bay and its watershed, in its entirety. UMCES' commitment to integrating environmentally sustainable thinking in all operations including all aspects of future planning is paramount to its mission.

UMCES also provides a unique approach to graduate education. By partnering with University System of Maryland (USM) institutions for classroom-based studies, UMCES is able to provide graduate students with a more intense, laboratory or field-based research education. Our graduate students do not learn about research solely from textbooks, instead, they work with their faculty advisor, learning from some of the best environmental researchers in the nation. This type of program provides a unique opportunity to prepare new kinds of environmental scientists needed to conduct research or scientific assessments on the complex issues of the future. Most of UMCES graduate students are enrolled in the Marine-Estuarine-Environmental Sciences (MEES) Program at the University of Maryland, College Park (UMCP.)

Providing professional research opportunities under the direct supervision of its leading faculty, UMCES annually supports more than one hundred exemplary graduate students through four collaborative programs:

- Marine Estuarine Environmental Sciences Graduate Program
- Environmental Toxicology
- Applied Ecology
- Conservation Biology and Wildlife/Fisheries Management

## 1.2 UMCES Locations: History and Background

### Center Administration (CA)

The UMCES Center Administration provides oversight to UMCES programs and facilities. CA coordinates all centralized reporting and maintains the financial, procurement, human resources, and sponsored program for the institution. CA is located in the former residence of Francis V. DuPont on the grounds of the Horn Point Laboratory. Integration and Application Network (IAN) group is part of CA and is also housed, in part, at Horn Point Laboratory.

### UMCES Annapolis Office

Established in 2006 by the Integration and Application Network group, UMCES Annapolis office is co-located with the National Socio-Environmental Synthesis Center



1. Center Administration at HPL



2. UMCES Annapolis Office

(SESYNC) at 1 Park Place in historic downtown Annapolis, Maryland.

The office is available for meetings, training courses and workshops designed to help foster scientific programs.

### UMCES Research Fleet Operations

The UMCES Research Fleet Operations (RFO) is the backbone of UMCES coastal science research programs, providing scientists with access to the Chesapeake Bay and its rivers.

The Research Fleet Operations consists of docking and maintenance facilities for the UMCES vessels which are located at Solomons Island, home to University's flagship Research Vessel Rachel Carson and several smaller vessels. This is located at CBL.

### Chesapeake Biological Laboratory (CBL)

Founded in a small waterman's shack in 1925, CBL is the oldest state-supported marine laboratory on the East Coast. It has been the stage for numerous landmark discoveries that serve as a foundation for environmental practices currently used to preserve and protect the Chesapeake Bay.

The Laboratory became affiliated with the University of Maryland as part of the Natural Resources Institute in 1961. In 1973, the Institute and Laboratory were made a part of the University's new Center for Environmental and Estuarine Studies that was subsequently renamed the University of Maryland Center for Environmental Science.

The Laboratory's mission is three-fold; promoting excellence in aquatic research, educating students of all ages, sharing the results of ongoing exploration with the larger scientific community and citizens of Maryland. Specific research programs at CBL include ecosystem restoration studies, fisheries sciences, and environmental chemistry/toxicology.

### Horn Point Laboratory (HPL)

The Laboratory established in 1973 at Horn Point, an 847 acres property donated to the city of Cambridge by Mr. Francis DuPont in 1962. The state of Maryland then gave the property to the University of Maryland to serve as grounds for an institution of environmental and estuarine studies.



1. R/V Rachel Carson



2. Chesapeake Biological Laboratory



3. Horn Point Laboratory

The Horn Point Laboratory is located on the banks of the Choptank River, a tributary of the Chesapeake Bay on Maryland's Eastern Shore. The laboratory engages in interdisciplinary research with faculty engaged in research on the biology, chemistry, physics, and ecology of organisms and ecosystems from wetlands and estuarine waters of the Chesapeake Bay to the continental shelf and open waters of the world's oceans. Areas of scientific expertise include oceanography, plankton dynamics, marine macrophyte and wetland ecology, systems ecology, nutrient dynamics and eutrophication, physiological ecology of benthic invertebrates, benthic-pelagic interactions, and aquaculture.

### Appalachian Laboratory (AL)

The Laboratory, then called the Appalachian Research Laboratory, was created in 1961 as a field station of the Inland Resources Division of the University of Maryland's Natural Resources Institute. Located in western Maryland, the Appalachian Laboratory is at the farthest upland reaches of the Chesapeake Bay watershed within the state.

The Laboratory has continued to grow, expanding its faculty and student enrollment. In 1999, the laboratory was moved into a newly constructed 47,000 square-foot building and greenhouse, south of Frostburg State University. The research and teaching facility features state-of-the-art laboratories and equipment for examining terrestrial, freshwater and watershed ecology.

The AL faculty conducts research on the structure of terrestrial and freshwater systems and the ecology of their component species, contributing to the knowledge of the complete Chesapeake Bay system from upland stream to tidal tributary to the coastal Atlantic Ocean. Other disciplines include aquatic ecology, behavioral and evolutionary ecology, conservation and restoration ecology, landscape ecology, watershed hydrology and biochemistry as well as environmental education and outreach programs.

### Institute Of Marine And Environmental Technology (IMET)

The Institute of Marine and Environmental Technology (IMET) was established in 2010 in Baltimore's Inner Harbor by USM and partnering institutions. The IMET is located in Columbus Center, a facility managed by UMBC.

IMET capitalizes on the strengths of the University of Maryland Center for Environmental Science, the University of Maryland, Baltimore County and the University of Maryland, Baltimore to conduct marine and environmental research and create technologies designed to



1. Appalachian Laboratory



2. Institute of Marine and Environmental Technology

foster the protection and restoration of coastal marine systems and their watersheds.

By focusing on the sustainable use of natural resources and the improvement human health, UMCES at IMET brings the research, training and technology transfer capabilities of the partner institutions to Baltimore's Inner Harbor.

### Maryland Sea Grant College (MSGC)

Maryland Sea Grant College located in College Park was established in 1977 and focuses on the sustainable use, protection, and restoration of Maryland's marine resources and especially the Chesapeake Bay.

Since 2002, the Maryland Sea Grant College facility is located in a privately owned space currently sub-leased from the University of Maryland, College Park and administered by UMCES. The Maryland Sea Grant College draws on the talent and expertise of the state's universities and academic laboratories to foster innovative marine research, education, and outreach. Both on its own and in collaboration with its many partners, Sea Grant proactively addresses scientific, economic, and social challenges facing the Chesapeake Bay.

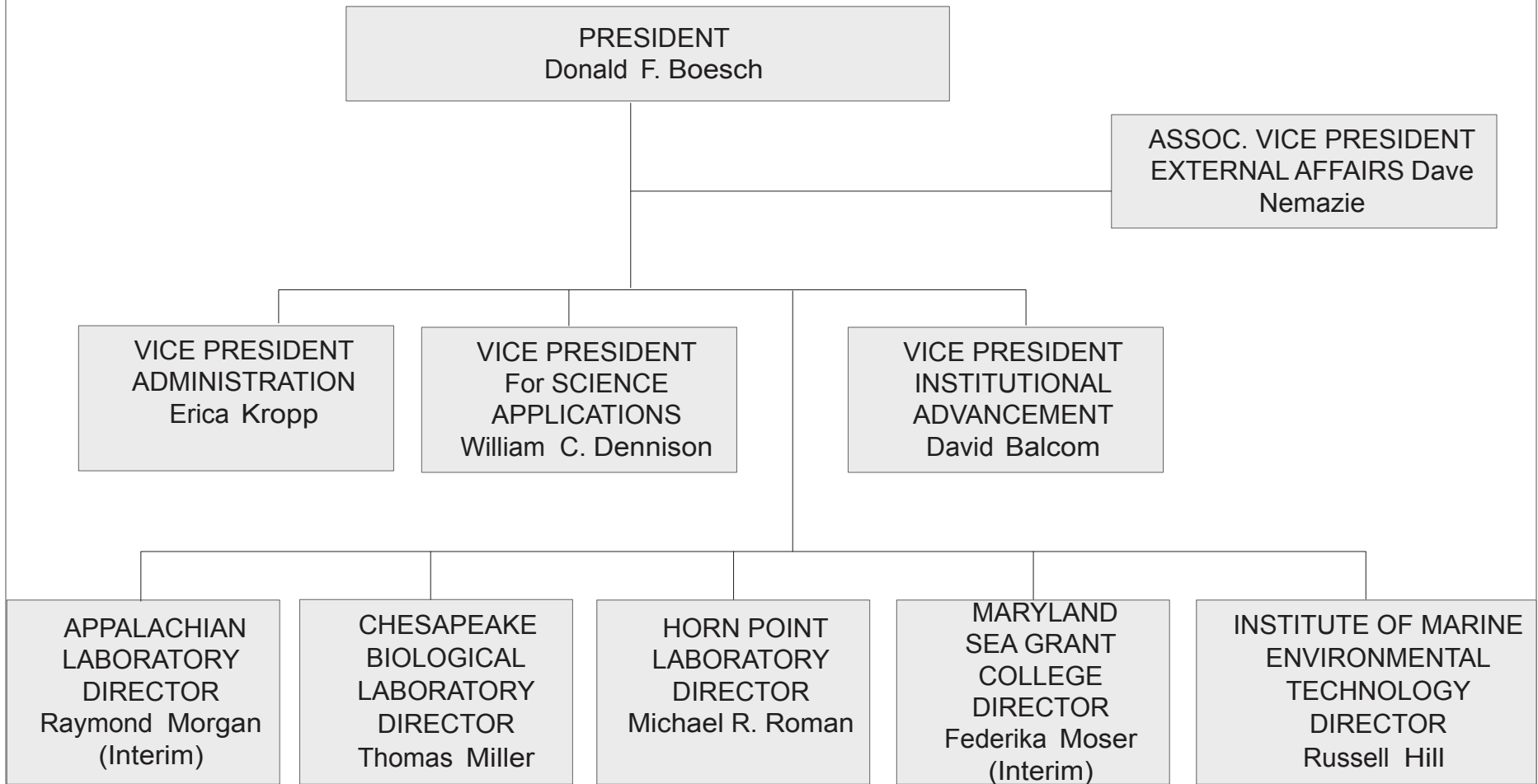
Educational programs support graduate fellows who work directly with Sea Grant-funded researchers, and sponsor undergraduate summer students in the Research Experiences for Undergraduates program. Through an Aquaculture-in-Action curriculum, online interactive lessons, and science fellowships for teachers, Sea Grant has helped raise the bar on environmental science education.



3. Maryland Sea Grant College



# UNIVERSITY OF MARYLAND CENTER FOR ENVIRONMENTAL SCIENCE ORGANIZATIONAL CHART





## 2. Summary of Previous Master Plan

### 2.1 UMCES Previous Needs and Remaining Challenges

The previous master plan covering 2002 – 2012 focused on a number of areas needing improvement for the various UMCES sites. In general those needs as defined in that earlier plan included the following:

- Improved and expanded laboratory facilities
- New library spaces for both CBL and HPL to replace outdated and cramped facilities
- A new research vessel
- New Information and Communications facilities for CBL
- Additional educational space
- Various facility renewal projects to meet the ongoing aging facility needs

Some of the projects have been completed and in some cases other projects were defined, funded and completed in the past 10 years, but a majority of the funding and projects have not been completed. The most significant impact for UMCES overall has been:

- Lab space is in many cases not well suited to current research and needs major upgrades or renovation.
- Facilities are expensive to operate and require retrofitting with newer energy-efficient technologies to reduce energy cost and better support the overall environmental mission of UMCES.
- Continued lack of space for modern library facilities both for the proper storage and retrieval of various media and especially for study and collaboration space, which is essential to an institution like UMCES engaged in interdisciplinary research.
- While there is some space available on the two larger campuses, CBL and HPL, the types of spaces and buildings that are available do not match up with the requirements for new space needs. This points to the need for major renovations to many existing facilities.

## 2.2 Capital And Facility Renewal Projects Completed or Still Pending

The previous UMCES Facilities Master Plan identified a number of major capital projects which have been delayed due to lack of funding. The summary below shows the projects from the 2002 - 2012 plan that have been completed and that remain to be completed.

### Completed Projects:

#### Appalachian Laboratory:

- Irrigation
- Landscape Upgrades

#### Chesapeake Biological Laboratory:

- Land acquisition
- Solomon's House Renovation
- Restoration of the Research Pier, (currently under design)
- Truitt Laboratory Addition

#### Horn Point Laboratory:

- Environmental Information Center
- Aquaculture and Restoration Ecology Laboratory (AREL)

### Projects Not Completed:

#### Appalachian Laboratory:

- Lab Addition
- Field Labs

#### Chesapeake Biological Laboratory:

- Truitt Laboratory Replacement
- Information and Communication Services Building
- Outreach Building

#### Horn Point Laboratory:

- Renovate The Morris Marine Science Laboratory

To those existing projects there have been added new capital project needs and a number of major renovation projects brought on by aging facilities.

## 3. Current Status: Challenges and Opportunities

### 3.1 Challenges

This master plan has been structured to address the following overall challenges faced by UMCES that have been identified as part of this facility master plan exercise:

- Unpredictable funding availability and timing.
- Multiple and distant locations of the UMCES Labs.
- Large diversity of research and the continuing evolution of the science of environmental research and education.
- Many facilities that are largely built upon sites that were residential in nature and have been adapted over time to education and research purposes.

These four major issues influence and drive the recommendations contained within this master plan.

### 3.2 Opportunities

UMCES also has many opportunities that help define its mission and contribute to unique qualities that are essential to the institution and give it meaning and purpose. Those issues will in turn help define the types of capital and facility renewal projects for UMCES for the next 10 years.

- Environmental studies and research are topics of growing interest and importance to the State of Maryland, the nation and the world at large. There will be increasing demand for the type of research and training that UMCES provides to both serve the academic research community as well as the general public which needs to be better informed and made aware of the science behind many of the most pressing issues of the day.
- The geographic distances between UMCES campuses have forced the institution to adopt innovative technologies to enable its scientists to provide graduate instruction as well as to better collaborate and exchange information using a much lower carbon

footprint. This trend has every sign of continuing as new technologies allow scientists to more easily share and transmit information.

- Trends in technology growth and the digitizing of a great deal of research data should also enable UMCES to take certain resources like its library, its periodical collection, and its research data archives and share it across campuses much more easily than ever before.
- The adoption and deployment of increasingly sophisticated and inexpensive collaboration technologies that work for both individual researchers and larger groups will spread the demands from the Interactive Video Network (IVN) system to the overall campus computer networks. Increasing bandwidth and a more robust and reliable computer network will be required to meet these demands.
- The location of UMCES' campuses where critical research can be close to or even a part of the ecosystem that it is studying creates a distinct advantage.
- UMCES can further distinguish itself by emphasizing aspects of sustainability that relate more directly to the UMCES research mission. Overall trends in sustainability point to the increasing importance of water quality issues, topics that UMCES addresses every day in its research.
- The proximity to the Chesapeake Bay and its watershed and the scale of the campuses makes it easier to reach out and engage the public and to fulfill both its broader education mission and its service goals.

UMCES has truly unique sites and landscapes within the Chesapeake Bay watershed and will accentuate those assets in its facility planning efforts and projects over the next ten years.



### 3.3 Existing Building Conditions

The quality of the physical plant has a direct and immediate impact on programs and academic initiatives undertaken at each site. Many of the Center's heavily used structures were in existence prior to the formation of UMCES, often with non-research purposes in mind. Since capital construction does not offer immediate remedy for many current problems, the laboratories look to facilities renewal projects to maintain a plant commensurate with their programmatic needs in research, service, and education. In addition, renovating existing facilities is one of the single most efficient sustainable strategies that can be employed. It reuses building and infrastructure resources already on site and prevents large quantities of solid waste from being trucked away for disposal. It is important to emphasize that addressing the needs of aging facilities before they become too old to save is important to the environmental mission of UMCES.

Each site will be discussed in turn in separate chapters and the corresponding Building Condition Codes applicable to the existing facilities will be covered for each site.

## 4. Strategies For Future Development

### 4.1 Planning Overview

Continued success and the achievement of the Center's potential requires a flexible and creative strategy for future development that does not depend on growth in State general funding alone. The strategy, which involves all phases of UMCES operations, from research and education to facilities and administration, is based on strengthening existing research, service, and education activities while improving administration and operations through internal redeployment of existing resources and generation of non-State revenues. Because of the general climate of annual decreases in financial resources for the University, including the base of State support and projections of self-sustaining revenues, defined development may be difficult to meet. However, important research thrusts, growth in graduate education, operation of new facilities, and renewal of existing facilities will still require additional State resources.

Planning is an effective method for dealing with problems and change; hence, it must be dynamic rather than static. In order to provide continuity in the development process, a set of overall goals and planning principles are required. These form a framework to accommodate physical change across the entire institution within the framework of the UMCES Strategic Plan. The following goals and principles are intended to guide the physical development of the Center toward the stated objective: A systematic approach to understanding the environment and its relationship to man and his activities.

### 4.2 UMCES Goals

The following defined goals for physical development respond to UMCES mission and program direction:

- Be a leader in the implementation of sustainable development practices and reduced greenhouse gas emissions.
- Project an image appropriate to the University System of Maryland, UMCES, and its service to the people of the State of Maryland, U.S. and the world.
- Pursue land use development balancing the functional needs of the programs with the preservation and enrichment of the natural environment and aesthetic attributes.

- Accommodate the needs of the broader community and the public through educational outreach.
- Place facilities to encourage interpersonal relationships, stimulate the exchange of ideas, and create an overall sense of community for the institution.
- Design and construct facilities appropriate to programs associated with research, education, and service and with as much flexible space as possible.
- Ensure architectural expression, disposition of buildings, and site improvements that are in harmony with the scale and character of the local ecosystems, community, region, etc.

### 4.3 UMCES Planning Principles

To achieve these goals the following specific planning principles are defined to guide the physical development of the campuses and the individual facilities within them.

- Take the lead in integrating green design as a holistic approach in the development of land, the design, construction, and maintenance of facilities. This can help attract and retain employees, protect end-users' health, and achieve long-term cost benefits. As the premier institution in Maryland for environmental science education and research UMCES should lead the way and focus on issues of particular environmental concern to the Chesapeake Bay and its watershed.
- Employ careful and creative planning towards a better defined sense of an academic research campus, to serve the research activity areas, protect the natural features, and reflect and reveal the character of each site.
- Promote a campus community environment at each location. Provide this by locating facilities closer together and improving the design of exterior spaces and paths as well as providing spaces within the facilities that encourage collaboration and chance meetings.
- Foster both formal and informal exchange among the students, faculty, and staff from

all disciplines. Program space at a campus scale (outdoors), and within individual facilities (open accessible meeting and collaboration spaces) should be allocated to that end.

- Utilize engineering and design innovations to improve environmental quality and conserve materials and energy. Include “Green Design” principles that are consistent with the Maryland Green Buildings Council Report dated November 2011 and national sustainable design standards as outlined by the United States Green Building Council, (USGBC) LEED building evaluation system. Campus development and operations to be based on the Smart Growth Initiative and the Chesapeake 2000 Agreement, the latter for advancing the restoration of the Chesapeake Bay and addresses green buildings, green power, and energy efficiency, and water conservation requirements .
- Innovative materials and environmentally sound construction should influence physical development as well as the regional characteristics of the site and buildings. Wherever possible use local building materials to help reflect the character of the region and reduce transportation costs.
- Design and construct building space with the maximum flexibility feasible so that over the lifespan of a facility, 40-60 years, changing research needs can be accommodated. This will primarily affect decisions regarding building structure, (bays and planning modules), and building infrastructure design, (HVAC, electrical, plumbing, cabling, etc.).
- Treat outdoor service, storage, and work compounds as usable and positive outdoor space with attention to functional arrangement, security, and visual appearance.
- Include accessibility by people with disabilities should be an integral component of the planning and design of buildings and site improvements (i.e. parking, roads, walks, landscaping).
- LEED Silver should be the minimum requirement for certification level with a target of LEED Gold certification and a minimum of 35% energy savings over the current energy code compliant standard for all new projects and major renovations.
- Academic/research/support projects (i.e. infrastructure) and land acquisition should be funded primarily by state appropriations and supplemented by funds from other sources as may be necessary.



## 4.4 Facilities Implications

The adequacy of existing facilities in terms of physical condition, programmatic suitability, mechanical support systems and the sufficiency of space are critically important issues to all three major research laboratories as well as the other UMCES locations. Inadequate levels of capital funding for new facilities and major renovations, as well as insufficient funding for deferred maintenance, have led to serious problematic conditions such as:

- Continued use of non-purpose-built facilities for laboratory and other uses not originally anticipated.
- Aging and inadequate laboratory facilities.
- Aging physical plant using obsolete heating, air conditioning, and plumbing systems that lead to higher than expected energy use and operating costs.
- An overall lack of purpose built collaboration and gathering spaces.

These conditions jeopardize the ability of UMCES to carry out its mission. Strategies for physical development at the UMCES research laboratories to correct facilities deficiencies are outlined in the individual sections focusing on each respective laboratory.

## 4.5 Space Needs and the Impact of Space Guidelines

As previously stated and outlined in UMCES original Facilities Master Plan 1992-2002, the 2002-2004 Update, and the 2002-2012 Update, the space guidelines and allowances do not adequately convey the operations of UMCES. The guidelines for assessing space needs and determining space eligibility for a wide variety of space types were not developed to assess the needs of special purpose institution as UMCES and much of the space needed requires separate justification.

Since the UMCES mission and operating characteristics differ substantially from those of an undergraduate college or university, application of the guidelines to UMCES research-based programs results in low or no guideline allowances. A misconception that UMCES is not eligible for construction in a number of space categories has resulted from UMCES inability to generate appropriate allowances for certain kinds of spaces.

UMCES continues to require instructional space, such as lecture (HEGIS 110/115) or class laboratory areas as UMCES scientists teach over 100 graduate level students each semester within UMCES facilities. In some instances, this situation has resulted from Guidelines formulae which depend upon data not available; unfortunately, the inability to perform a space guideline computation due to lack of input data has been equated with a lack of space eligibility, despite the existence of activities requiring certain categories of space. The growth in educational needs will be addressed by both new instructional space and the continuing expansion of the IVN system which is used for many of the classes now taught at UMCES.

Another clear example of previously undefined space eligibility to which UMCES has been entitled on an ad hoc basis involves meeting room space (HEGIS 680/5). Because UMCES full-time degree earning students (FTDE) matriculate at other USM institutions, no allowance for meeting space was generated by the current space guidelines model even though UMCES frequently hosts seminars and conferences and utilizes residential space to accommodate conferees at each of its three Laboratories. Nonetheless, the functional justification for such space at UMCES Laboratories is compelling. Education activities associated with the dissemination of information to professionals require facilities dedicated to meeting and meeting-related functions, which include special furnishings, (typically tables with upholstered seating), state-of-the-art audiovisual equipment, and an environment designed for learning. Distance learning/research sharing is now available at each of the laboratories and in most cases is being used to full capacity. In addition to identifying quantitative space requirements for UMCES activities and programs, there is an equivalent need and concern for the qualitative requirements associated with the instructional, conference and meeting spaces. These spaces need certain acoustical and lighting criteria to function properly with the AV equipment that is integral to their function.

## 5. Capital Projects And Facility Renewal Projects

### 5.1 Capital Projects

The Facilities Master Plan provides a framework for initiating solutions to the multiple physical development issues confronting the three research laboratories on the properties under the auspices of UMCES. The documentation for each location focuses on academic programs and Center objectives, existing assets and deficiencies and identifies capital development projects required for the next ten years. Consideration has been given during preparation of the Facilities Master Plan to the UMCES's history and mission, existing and projected research, education, and service programs and clientele, administrative organization and staffing, the existing inventory of facilities. Capital Projects are the major strategic components in the plan, (over \$1,000,000), and are developed in conjunction with and supported by the Facility Renewal Projects.

### 5.2 Facility Renewal Projects

This Facilities Master Plan documents a need for increases in maintenance, operating, facilities renewal, and additional funds both to maintain the existing physical plant and to provide modern state-of-the-art research and support facilities through the renovation and upgrading of existing facilities. These required improvement projects, coupled with the associated infrastructure improvements, are essential to strengthen and enhance existing research programs, to provide a renewed identity and focus to each campus and to help UMCES overall achieve a more integrated sense of institutional purpose and identity. These projects will contribute substantially to reduced energy use and are inherently supportive of a sustainable design approach in that they re-purpose existing buildings and thereby reuse existing materials and reduce green house gas emissions that would otherwise go to all new construction projects.

## 6. Sustainability

### 6.1 Current Initiatives Related to Climate Action Plan

UMCES President Donald Boesch signed the American College and University Presidents Climate Commitment (ACU PCC) on December 18, 2007 with an effective date of January 15, 2008. A program report relative to this plan can be found at: (<http://rs.acupcc.org/progress/566/>)

An important part of that commitment is UMCES institutional Climate Action Plan (CAP) for becoming climate neutral, which includes:

- A target date for achieving climate neutrality as soon as possible.
- Interim targets for goals and actions that will lead to climate neutrality.
- Actions to make climate neutrality and sustainability a part of the curriculum and other educational experiences for all students.
- Actions to expand research or other efforts necessary to achieve climate neutrality.
- Mechanisms for tracking progress on goals and actions.

Current progress as reported in January of 2012 includes:

- Greenhouse gas inventories have been taken and goals were set for reducing emissions at each of the laboratories.
- Aging infrastructure has been upgraded to newer, more energy-efficient systems by working with Constellation Energy. Recently signed agreements will save both energy and reduce costs over the next 15 years.
- A commitment to construct all new campus projects to at least the U.S. Green Building Council's LEED Silver standard or equivalent.
- UMCES purchases or produces at least 15% of the institution's electricity from renewable sources.



- UMCES is a member of the Maryland Green Registry.
- In addition to leading the Center's efforts, President Donald Boesch also leads the University System of Maryland's 12-campus sustainability effort as the system's Vice Chancellor for Sustainability.

## 6.2 UMCES Sustainability Goals and Initiatives

As part of an overall institutional focus on sustainable design practices related to Capital Projects and Facility Renewal Projects, UMCES will focus efforts on sustainable practices in four major sectors:

### Greenhouse gas Reductions

#### 1. Utility Emissions Reductions

- Apply alternative technologies and alternative fuel options to decrease overall emissions.
- Expand energy conservation through retrofits in existing buildings across campuses.
- Set a target of designing new construction and renovations to use 35% less energy than required by current energy code.

#### 2. Transportation

- Encourage walking and biking as a mean of campus commuting through incentives, bike lanes and walking paths, and the establishment of bike storage and repair facilities.
- Encourage, where feasible, a telecommuting policy for UMCES employees and students.
- Replace retired campus fleet vehicles with appropriate zero or low-emission vehicles.
- Increase use of videoconferencing for distance learning, meeting and communicating with geographically distant campuses and individuals.

## Storm Water Management and Domestic Water Conservation

- Focus on water security / water quality issues directly as they affect the particular campus sites in relation to the health of the Chesapeake Bay. What happens on each of these sites is a microcosm of how development affects water quality in the Bay.
- Implement sustainable design principles and innovative site design techniques to all future projects to minimize adverse environmental impacts on ecologically sensitive areas and the regional watershed.
- Build new projects on sites that have already been developed wherever possible and create additional green space.
- Reduce storm water runoff through on-site mitigation techniques such as rain gardens or green roofs, when appropriate.
- Install rainwater storage and reuse systems in new construction projects and major renovations when possible.
- Minimize irrigation through the use of drought resistant planting and properly selected soils.
- Reduce the total square footage of impervious surface area on campus by building parking areas that allow water infiltration. Investigate systems that allow water to be filtered and reused for other purposes.
- Upgrade toilets to low flow models and urinals to waterless models.
- Reduce lab water use by installing efficient appliances and closed circuit water cooling systems.
- Distribute information to the campus community that encourages efficient water usage.
- Create or allow for living shore lines wherever possible.

## Resource Conservation

### 1. Solid Waste and Green Cleaning

- Install multi-function recycling receptacles in all dormitories, classrooms, conference rooms, labs, appropriate common spaces.
- Increase amount of recycling options.
- Require the recycling of at least 95% of all eligible materials from demolition and construction waste as part of construction contracts.
- Implement pilot test for full line of green cleaning products.
- Work with vendors to maximize toner/ink cartridge recycling, and increase bulb/lamp recycling.
- Create incentives for students, faculty, and staff to refrain from excessive paper usage in campus printing facilities.

### 2. Material Use and selection for new projects

- Maximize use of eco-friendly and low volatile organic compound building materials.
- Select the use of material with high recycled content, carpet, drywall, steel, ceiling tiles.
- Select materials with certifications that attest to the material's total environmental impact including the manufacturing process, such as the Cradle to Cradle certified program, Green Seal, Ecologo and SMART certification my MTS.

### 3. Purchasing Goods, Services, and Food Products

- Develop a Life Cycle Assessment (LCA) program through better management of the product supply chain.
- Establish further alliances with purchasing cooperatives to combine purchasing power which will affect market changes and reduce the collective environmental footprint.

- Require purchase of Energy Star appliances whenever available.
- Implement recycled paper hand towels in all existing towel dispensers along with evaluation of other more resource efficient hand-drying options as needed.
- Implement conserving dispenser technology for disposable paper products.
- Pursue additional sustainable paper products.
- Educate the campus community concerning the environmental, social, and economic impact of their food choices in order to decrease their demand for non-sustainable food.

### Education, Civic Engagement and Communication

- Promote sustainable practices among campus community members through education and by example.
- Support student initiated sustainability initiatives.
- Increase the visibility of sustainability initiatives in UMCES publications.
- Develop a dynamic sustainability website.
- Distribute newsletter and other promotional materials electronically in collaboration with allied research programs.
- Place signs at appropriate places on campus to inform the community about sustainability initiatives relative to certain spaces or services.
- Cultivate closer relations with external media on environmental issues.
- Discover/show existing habitats and ecosystems on the campuses that are hidden or undiscovered. Use these to enhance the education programs and mission.
- Locate renewable energy projects to be seen and experienced as an integral part of each campus' educational outreach experience. Provide real-time data on how much power and environmental benefit they are creating.
- Use new facilities and major renovations to demonstrate green building and energy efficiency technologies.