BOARD OF REGENTS

SUMMARY OF ITEM FOR ACTION,
INFORMATION OR DISCUSSION

TOPIC: Triennial Report on Status of Agriculture Programs at UMCP and UMES (2008-2010).

COMMITTEE: Education Policy

DATE OF COMMITTEE MEETING: June 1, 2011

SUMMARY: UMCP's College of Agriculture and Natural Resources and UMES's School of Agricultural and Natural Sciences work with the Maryland Agricultural Extension Service (MAES) and Maryland Cooperative Extension (MCE) to provide a comprehensive array of research, service, and teaching related to Maryland's needs in agriculture. In fulfilling the Regents' 1993 mandate, UMES and UMCP jointly prepared a reprise of their funding, activities and planning for the past academic year. The report was submitted annually.

On the basis of several successive annual reports that seemed to indicate satisfactory progress in collaborative efforts and responsiveness to Maryland's needs, the Chancellor requested a review of the issues that originally precipitated the dramatic administration rearrangement of 1993. That five-year summary report, reviewed by the Committee in September, 1999, showed a situation that was both positive and continually improving. The Committee agreed that the many signs of health suggested that an annual report may have outlived its usefulness. To make sure that progress is maintained, the Committee recommended that special reports on agriculture, in an abbreviated form, be provided to the Regents on a biennial basis.

The first biennial report was received by the Committee in March 2002. After a very positive response to the fourth biennial report in March 2008, the Committee agreed that it might be appropriate to change the reporting schedule from every two to every three years, and that unless there were particular problems in the interim, the Committee would look forward to the next report in the Spring of 2011.

Representatives of UMES and UMCP will be available at the Committee meeting to respond to any questions and/or to elaborate on any aspect of the report being presented today on the status of agriculture programs between 2008 and 2010.

ALTERNATIVE(S): This is an information item.

FISCAL IMPACT: This is an information item.

CHANCELLOR'S RECOMMENDATION: This is an information item.

COMMITTEE RECOMMENDATION: Received as information. DATE: June 1, 2011

BOARD ACTION: DATE:

SUBMITTED BY: Irwin L. Goldstein 301-445-1992 irv@usmd.edu

2008-2010
REPORT TO USM BOARD OF REGENTS

STATUS OF AGRICULTURAL AND NATURAL RESOURCES PROGRAMS AT UMCP AND UMES

I. INTRODUCTION

The Board of Regents, on August 27, 1993, returned responsibility for the Maryland Agricultural Experiment Station (MAES) and University of Maryland Extension (UME) to the College of Agriculture (now the College of Agriculture and Natural Resources), University of Maryland, College Park (UMCP). In October 1993, the board directed that the presidents of the University of Maryland, College Park (UMCP) and the University of Maryland Eastern Shore (UMES) submit a report on the status of agriculture and natural resources in Maryland summarizing the state of agricultural instruction, research, and service in the University System of Maryland, with a particular focus on collaborations. In 1999, the Board directed that reports be submitted biennially. However, the Board approved the request in 2008 that such reports be submitted triennially.

As the state's two land grant universities, UMCP (1862) and UMES (1890) work to ensure a prosperous future for Maryland agriculture and natural resources by generating knowledge; transferring new discoveries to our citizens; and educating tomorrow's agricultural, environmental, and natural resources scientists and leaders. The College of Agriculture and Natural Resources (AGNR-UMCP) and the School of Agricultural and Natural Sciences (SANS-UMES), with their partners in research – Maryland Agricultural Experiment Stations (UMCP and UMES) and outreach (University of Maryland Extension) – share this primary mission of conducting instruction, research, and outreach that serves the people, communities, and economic well-being of Maryland.

This report focuses on efforts to develop collaborative programs contributing to our mission. It provides updates on Academic Programs, University of Maryland Extension, and the Agricultural Experiment Stations, with a brief summary of MAES and UMES–AES competitive grant awards for FY 2008 to 2010 and includes an update on distance education and international programs.

II. ORGANIZATIONAL STRUCTURE

Dr. Cheng-i Wei, dean of UMCP's College of Agriculture and Natural Resources (AGNR), also serves as the director of the Maryland Agricultural Experiment Station (MAES) and University of Maryland Extension (UME). Dr. Adel Shirmohammadi assumed the position of associate dean and associate director of AES on July 1, 2009 following a national search; Dr. Nick Place is associate dean and associate director of UME; and Dr. Leon Slaughter is associate dean for Academic Programs at UMCP. Before the placement of Dr. Shirmohammadi as associate dean for AES, Dr. Cheng-i Wei oversaw the experimental station programs during the period of November 2007 to June 2009. The dean, associate deans and support staff are all located in Symons Hall on the College Park campus. Similar to many colleges of agriculture nationwide, the dean serves as the chief administrative officer for resident instruction, research, and extension programs. This organizational structure provides a central point of management and results in effective integration of program and budgetary functions.

During this reporting period, Dr. Gladys G. Shelton was interim dean of the School of Agricultural and Natural Sciences (SANS) and also served as interim research director for 1890 land grant programs (UMES-AES). Dr. Shelton had administrative authority for resident instruction and research, and she reported to the vice president for academic affairs, Dr. Charles Williams. The Department of Agriculture, Food and Resource Sciences is headed by Dr. Robert Dadson, acting chair, and Dr. Arthur Allen serves as an associate research director for agricultural programs and reports to the dean. Dr. Nina Lyon-Bennett, acting chair of the

Department of Human Ecology, assists with the administration of human ecology research programs. The Ph.D. program in Food Science and Technology is administered by a director, Dr. Jurgen Schwarz, and is housed within the Department of Agriculture, Food and Resource Sciences. The environmental sciences programs, also in SANS, are housed in the Department of Natural Sciences, which is chaired by Dr. Joseph Okoh.

The 1890 UME programs at UMES are well intertwined with UME programs at UMCP, thus the title **University of Maryland Extension (UME)**, in which both campuses administer programs jointly and independently but under the same Plan of Work. The 1890 UME is housed under UMES' Office of Academic Affairs, headed by Dr. Charles Williams and the UME Administrator is Dr. Henry Brooks. Because of the strong UME collaborative programming between the 1862 (UMCP) and the 1890 (UMES) land grant institutions, Dr. Brooks also carries the title of Associate Director for 1890 Programs under UME and, thus, also reports to Dr. Wei.

IlI. UMCP-UMES BUDGETS, PROGRAMS AND INTERACTIONS

Budgets

As illustrated by Figure 1, the FY2010 UMCP-AGNR budget was just above $66.5 million for academic programs, research, and extension (the latter includes the 1862 and 1890 campuses). The state appropriations for AGNR for Fiscal Years 2008, 2009 and 2010 increased roughly by 3.6%. This increase is based on a UME general fund restoration, House Bill 1515 in 2008, and mandatory cost increases for fringe benefits, fuel and utilities. All three fiscal years have been met with base budget reductions ranging from 1.1% to 2.5% as well as one-time funding reductions. The college, as others, has also been met with the challenge of no COLA or merit increases for the past three years. Based on the campus strategic plan, a 2% reallocation of general funds has resulted in a net loss of just under $280,000 for the college. State general fund appropriations have dropped to 78% of the AGNR budget with the balance coming from federal funds, county appropriations, state grants, cost recoveries and farm sales (Figure 2). County appropriations have grown only slightly by 1.8% due to the impact of state wide budget reductions. Federal appropriations showed significant growth in FY2008 due to the elimination of special interest funds being placed in the land grant formula funding; however, they were removed in FY2009. Overall federal appropriations have grown slightly by 7.9%, but are now being threatened by the current federal budget. Of the 620 total FTE in FY2010, actual faculty FTE's total 297, which includes 11 MCE faculty at the 1890 campus (Figure 3). These FTE numbers are reflective of three years of FTE returns to the state totaling 16, most of which were positions vacated by turnover or retirements, resulting in significant gaps in service both on and off campus.

Figure 1

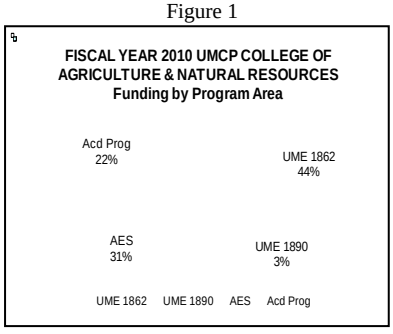


Figure 2

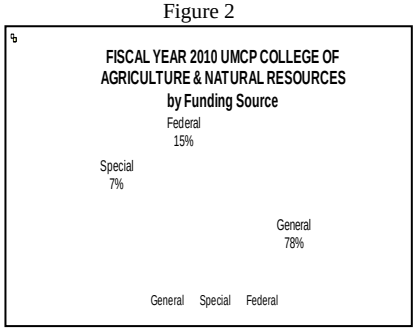
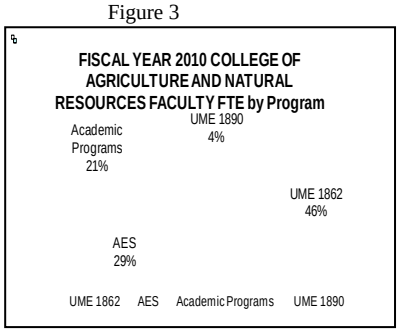


Figure 3



The 1890 research and UME programs at UMES presently receive $1,442,218 and $1,260,231 respectively, for a budgeted total of $2,702,449 annually from federal formula funds. The UME 1890 funding is reflected in the University of Maryland Extension (UME) budget. At UMES, sponsored research activity (competitive grants and cooperative agreements), acquired by Agriculture, Food and Resource Sciences, Human Ecology, Food Science and Environmental Science faculty, amounts to millions of dollars annually to support academic, research and extension programs.

An on-going major request of UMES to the Board of Regents, as it relates to the land grant program, is for assistance in acquiring the required state match needed for the continuance of federal formula funds. The National Institute of Food and Agriculture (NIFA) (formerly known as the Cooperative State Research, Education and Extension Service [CSREES]) of USDA added Section 3419 to Title 7, Subtitle B, Chapter XXXIV of the Code of Federal Regulations for the purpose of implementing new statutory matching requirements applicable to federal agricultural research and extension formula funds for 1890 land grant institutions, including Tuskegee University. This section requires matching funds from non-federal sources for formula funds authorized under section 1444 (Research) and 1445 (Extension) of the National Agricultural Research, Extension, and Teaching Policy Act for research and extension activities.

The distribution of formula funds is subject to a 1:1 match of non-federal funds. **Any amount unmatched with non-federal funds will be deducted from the annual federal allocation to the university**. UMES struggles with this required match and while the UMES-AES is presently utilizing general funds that support the academic land grant programs for this purpose, the current 1:1 match will be nearly impossible to maintain unless additional state funding is realized. Since the 1:1 match took effect, two faculty lines and four staff lines, funded through the UMES-AES match, have been lost. Proceeding on the promise of the Office of Civil Rights (OCR) money that never materialized, UMES established the Ph.D. program in Food Science and Technology – an extremely successful program and a much needed research and education area for Delmarva since poultry, seafood, and agricultural commodities drive the economy. However, the three faculty members hired, who have already brought in over $2 million in external funding this cycle, are on non-state funding. The match would provide the funding to ensure them the job security they have earned.

The UMCP and UMES land grant partnership is a model to be emulated. In support of UMES' efforts to acquire the state match for its formula funding, the former dean of UMCP's College of Agriculture and Natural Resources wrote, "The uniqueness of the UMCP/UMES extension and research programming that reaches across Maryland has allowed us to meet the needs of diverse audiences. Not only do we work together in a seamless fashion to deliver extension programming across the state without reference to the nature of our campuses' unique stature as 1862 or 1890 Land Grant Universities, we share research facilities and collaborative initiatives that transfer technologies across Maryland." Matching funding for UMES would allow Maryland to continue to be the leading proponent of cooperative programming between its two land-grant universities. This partnership works to deliver programming to all of Maryland's citizens, including low income families, family farms, minority farmers, youth, and those seeking to develop alternative enterprises.

Programs and Interactions

UMCP and UMES continually strive to enhance their collaborative research and extension efforts. Collaborative UMCP/UMES research programs are guided by a State Comprehensive Plan of Agricultural Research that is submitted annually to the U.S. Department of Agriculture's NIFA for approval. Joint Extension planning, programming and budgeting is guided by a 1983 comprehensive program document that identifies procedures for handling federal, state and county funds. As requested by the Board in 1993, separate accounting of 1890 Extension funding has been maintained. Dr. Henry Brooks, 1890 Extension Administrator, retains signatory authority for all 1890 extension funding.

IV. ACADEMIC PROGRAMS

- The average combined math and verbal Scholastic Aptitude Test (SAT) scores for entering freshman in the UMCP College of Agriculture and Natural Resources for Fall Semester 2010 increased to a mean of 1,273 and an average high school GPA of 3.977 (4.0 scale).
- At UMCP, the percentage of African-American undergraduate students in the college is 8.9%, while the national average for colleges of agriculture is 5.8% (FAEIS Reports, 2009). In Fall 2010, the percentage

of Hispanic students in the college was 6.3% and Asian-American students, 9.6%. Overall, the college has a 25% minority enrollment. Females comprised 58.5% of the undergraduate enrollment. Of the 359 graduate students currently enrolled, 51% are white, 2.5% African-American, 5.8% Asian-American, 3.6% Hispanic, and 26.5% foreign.

- The first year retention rate for all UMCP majors was 95.2% in 2009 and 96% for AGNR. The six-year graduation rate of the AGNR 2005 cohort of degree-seeking students was 77.1%, which is similar to the graduation rate for all UMCP campus students (81.5%). Although the sample size for AGNR is small, the data over time suggests that minority students (African-American, Asian, Hispanic and Native American) are successfully returning after their first year of study. In 2009, the first year retention rate was 100%.
- AGNR awarded 134 scholarships totaling more than $302,000 to newly admitted and returning students to the college. Currently AGNR supports four minority students on teaching assistantships. In May 2010, one M.S. and one Ph.D. student who had been receiving assistantship support completed their degrees.
- Undergraduate and graduate student participation in study abroad experiences continues to increase with study/travel experiences in Belize, Costa Rica, Czech Republic, England, Australia, Russia, Japan, Namibia, Peru, Ethiopia, Egypt, and Europe.
- UMCP faculty continue to serve on UMES graduate committees for Ph.D. and M.S. students, and UMES faculty continue to serve on the committees of Ph.D. and M.S. students at UMCP.
- UMES is still participating in the USM Louis Stokes Alliance for Minority Participation program (LSAMP). UMBC is the lead institution for the alliance, which continues to support activities that enhance the curriculum and programming at UMBC, UMES, and UMCP. Through the program, students are assisted as they continue their education in the scientific disciplines beyond the B.S. degree. UMES anticipates notice of the continuation of the award.
- Research and education programs conducted in the Center for Food Science and Technology focus on food safety and the quality of products important to our region, including poultry, seafood, and farm animals as well as fruits and vegetables. A partnership has developed among Maryland Sea Grant, joint UMCP and UMES extension specialists, and UMES food scientist faculty to support and spearhead seafood seminars and training programs at the Center not only for the regional industry, but for international reach. Train-the-trainer programs in Good Aquaculture Practice (GAqP) were offered for representatives from developing countries and GAqP training was provided on site overseas. Also located in the Center is the USDA/UMES Center of Excellence Program in Poultry Food Safety Research, which was established in 1995 to promote interest for advanced careers in agriculture among minority students by providing research opportunities. The research, which is funded by USDA ($430,000/yr), is aimed at improving the microbiological safety of poultry by the development of computer models that predict the risk of getting a foodborne illness from poultry produced by different farm-to-table scenarios.
- UMES dietetics program graduates continue to maintain a 100% passing rate on the national dietetic licensure exam.
- A two-week European Fashion Study Tour gave 20 participants the opportunity to explore the various facets of the fashion industry and allowed them to observe the differences and similarities between American and European fashion businesses. Participating were students and faculty from UMES; North Carolina A&T; and Southern University, Baton Rouge.
- A dual degree program is in place with the New York Fashion Institute of Technology (FIT) that allows eligible students to participate in a Visiting Student Program, which culminates at UMES. Students continue to earn two degrees – a B.S. from UMES and an A.A.S. from FIT. Four students attended last year and one student is currently attending.
- The UMES Child and Family Development Center has grown from 65 students in 2005 to 94 in 2009, representing a 37% increase in enrollment over a five year period. As of November 2010, enrollment was steady at 93 children, with 32 school-aged children in the afterschool program and 12 infants (with more on a waiting list). Plans are underway to work with the food service program at UMES to provide hot meals to the children.

- Scholarships established for UMES' agriculture majors between the years of 2008 and 2010 include the Robert's-Green Scholarship Fund, the Loretta and Daniel Savoy Fund for Human Ecology, the Mrs. Marguerite Daugherty Miles and Mr. Howard S. K. Miles Scholarship, the Shirley Hymon-Parker Endowed Fund and the Paul S. Sarbanes Endowment Fund. The Perdue Farms, Inc. scholarship fund, originally awarded at $2,000 annually, increased to $5,000 annually in 2007 and to $10,000 annually, with $5,000 going to two students each year, in 2008 and 2009.
- To engage students studying the human sciences in experiential opportunities that complement and enhance the effectiveness of classroom learning, the Department of Human Ecology continues to acquire USDA funding that provides $3,000 per year per student to help them pursue research and service learning opportunities. Ten students are involved. Students are required to present research results at local and national meetings and to submit research manuscripts for publication in reputable journals. One student's research was published in the *Journal for the Human Sciences* and another student presented research results at the inaugural UMES Research Symposium.
- UMES provided training in Geospatial Information Technologies, Global Positioning Systems (GPS), Geographic Information Systems (GIS), and Remote Sensing for personnel at various state and local agencies and for high school teachers in counties within close proximity to the UMES campus. Additionally, high school scholars and undergraduate students, especially minorities, are introduced to the science of Geospatial Information Technologies while participating in summer internships. These internships have provided training to approximately 100 high school students in grades 9-12 and 35 undergraduate students. Since 1999 the Geospatial Information Technologies Program at UMES has provided training, research, and assistance to many departments on campus, both academic and administrative. Each year, the program offers workshops and a semester long GIS course (AGNR 483 Principles of GIS). For 2008 and 2009, the UMES GIS program hosted a GIS Day Open House that was free to the public.
- A full-time position for an agricultural communication specialist has been established and is shared between the School of Agricultural and Natural Sciences and the Extension Office. In addition to other duties, the specialist is charged with creating exposure for the research and outreach efforts of the administration, faculty, staff and students associated with both offices.
- UMES has been approved to offer a new, four-year academic program in urban forestry.
- 2008-2009 USDA 1890 Scholars – Essence Hales, sponsored by the Foreign Agriculture Service; Meredith Esquerra, sponsored by Rural Development; and Simone Tomlinson, sponsored by the Animal and Plant Health Inspection Service – have completed their programs and are now pursuing degrees at The Ohio State University, the University of Maryland College Park, and the Tuskegee University School of Veterinary Medicine, respectively. Sebastian Cartwright, Kimble Brown, Jr., and Kelly Hall are members of the 2009-2010 class.

UMCP Department of Agricultural and Resource Economics (AREC)

Undergraduate Teaching

a. New courses introduced in 2008-2010

- AREC200, Economics of the Chesapeake Bay, a new Marquee and I-Series course.
- HONR228N, Evaluating Global Development Assistance. AREC plans to offer this course every year, which covers more than its share of the College's teaching commitments to the honors program.
- AREC425, Economics of the Food Sector, a new summer course to be taught be Dr. Carolyn Dimitri, a graduate from AREC's doctoral program and currently a Senior Economist with the Economic Research Service of the USDA. Carolyn is nationally recognized as a leader in research on marketing organic food products.

b. Activities to ensure that our undergraduate programs are rigorous

- Enforcement of a C-or-better rule for major requirements.

- Encouraging qualified students to pursue the "preparation for advanced degree" supporting field. After years of disuse, this supporting field now attracts one or two students a year.
- Continued monitoring of learning outcomes assessment results, with feedback to upper level course instructors.

c. Activities to recruit and enroll academically talented undergraduates

- Based on course GPAs, AREC awards the Arthur and Pauline Seidenspinner scholarship and the Ray Murray scholarship to the top 20 students in the major.
- AREC faculty have served on the campus National Scholarships committee and on the Banneker-Key committee to review and interview candidates for that scholarship.
- AREC reaches out to high school students through the Ag Day celebration and the Ag Discovery summer program for high school students. AREC extension faculty meet frequently with Maryland citizens on important issues.

d. Activities to increase undergraduate retention and graduation rates

- AREC applicants for graduation increased from 38 in academic year 2008-09 to 53 in academic year 2009-10, reflecting continued growth in the major.
- Since 2004, AREC has achieved 100% retained or graduated for new freshmen and the native Junior class. For new transfers, AREC has a 100% retained or graduated rate since 2004 with the exception of 2008 when the rate was 91%. (Data source: IRPA, Profiles, UG Retention and Graduation Rates). These are outstanding retention and graduation rates. Success can be attributed largely to exceptional management of our program by our undergraduate director, professor Howard Leathers, and to the following steps adopted:
  - Requirement for all AREC students to meet with an AREC faculty advisor at least once a semester to receive advice about how to make progress toward a degree and receive assistance in discovering whether or not AREC is a "good fit" as a major.
  - Implementation of a policy to limit support for student requests for exceptions for exceeding allowable repeats for prerequisite courses.
  - Enforcement of requirement for a student developed graduation plan for all major changes.
  - Implementation of an early warning system to identify and counsel students requesting a change of major who have needed more than one attempt to pass pre-calculus, calculus, statistics, and introductory economic theory classes. Struggling in any of these classes is a clear indicator of future difficulty completing a degree in AREC.

e. Additional noteworthy activities

- AREC student Wei Zheng was selected as outstanding graduating senior in AGNR in 2010 and is attending Yale University for graduate study in economics.
- Two AREC students were nominated to interview for Giant Foods finance internship (outcome pending).
- ENSP-AREC advisee Trevor Young and AREC major Nnenna Nwosu received numerous recognitions for Tseai Energy, a startup company founded by Trevor with Nnenna on its management team. Tseai works on bioprocessing plants to bring electricity to underdeveloped countries. Trevor was highlighted in the *Washington Post Magazine*. Tseai won $10,000 in the undergraduate division and the $15,000 Warren Citrin Social Impact Award in the University of Maryland $75K Business Plan Competition in 2009. Tseai was one of 60 companies selected as a semifinalist from more than 700 entries representing over 200 universities from countries around the world in the Dell Social Innovation Competition and was one of 37 semifinalists selected among 120 entrants for the Wake Forest Elevator Competition.

f. Graduate teaching

The number of applicants to the AREC graduate program has increased by nearly 70% in the last five years and has grown every year over that period, from 123 in 2006 to 207 in 2010. The quantitative

GRE scores of applicants increased from Fall 2005 [748 applied; 762 were admitted; 763 enrolled] to Fall 2010 [759 applied; 780 admitted; n/a(?) enrolled]. The 2009 incoming graduate class was the best in program history based on quantitative GRE's, while the 2010 applicant pool was the best in program history. Quality has steadily increased over the past five years with students being recognized by national associations with awards for outstanding doctoral dissertations, best student paper, and fellowships. Graduates have been successful in placements in academic tenure-track and post-doc positions and in research organizations, government agencies, non-governmental organizations, and private industry.

g. Major awards/fellowships received by of AREC Ph.D. students in 2008-2010

- Constant Tra, 2008 Outstanding Doctoral Dissertation Award, Agricultural and Applied Economics Association.
- Stephen Kasperski, 2008-2010 National Marine Fisheries Service Sea Grant Marine Resource Economics Graduate Fellowship, for his Ph.D. dissertation "Economics and Fisheries Policy for Multi-species Fisheries with Biological and Technological Interdependence."
- Lucija Muehlenbachs, 2009 Best Student Paper Award, International Association for Energy Economics.
- Claudia Reitmaier, 2010 US EPA STAR (Science To Achieve Results) Fellowship for Graduate Environmental Study. Nationally, across all environmental disciplines, 67 STAR fellowships were awarded in 2007, 32 in 2008 and only 19 in 2009. From 2007-2009, only three STAR Fellowships were awarded in Economics.
- Beat Hinterman, Honorable Mention, 2010 Outstanding Dissertation Award, Agricultural and Applied Economics Association.
- John Roberts, Chester O. McCorkle, Jr. Student Scholarship for 2011, Agricultural and Applied Economics Association.

h. Graduate student placement 2008-2010

- Seven academic tenure-track: Texas Tech University; Mount Holyoke College; Montana State University; University of Manitoba, Canada; University of Monash, Australia; Kasetsart University, Thailand; University of Dhaka, Bangladesh.
- Three academic post-doc: (3) ETH Zurich, Switzerland
- One independent research organization: Resources for the Future, Washington, D.C.
- Four U.S. government agencies: Congressional Budget Office, National Marine Fisheries Service, (2) USDA-Economic Research Service
- Two non-governmental organization: (2) World Bank.
- One private industry: FINTRAC.

Mrs. Mary Ann Gardner, widow of deceased Distinguished University Professor Bruce Gardner, established the Bruce L. Gardner Memorial Fellowship Fund to support fellowships for graduate education in the Department of Agricultural and Resource Economics.

UMCP Department of Animal and Avian Sciences (ANSC)

Teaching/Instruction

ANSC is the #1 department within the College of Agriculture and Natural Resources (AGNR) in terms of current undergraduate enrollment, offering degree options in 1) sciences/pre-professional, 2) equine studies, 3) animal biotechnology, 4) animal care and management, and 5) laboratory animal management. The number of ANSC undergraduate majors has increased 27% since 2003 to 253. Among ANSC majors, 84% are female and 32% are Black, Hispanic, or Native American. The ANSC department and its faculty are actively engaged in undergraduate recruiting.

The ANSC Campus Farm is an integral part of the ANSC undergraduate teaching program and is the most frequently cited reason for undergraduate students selecting the Animal Science program at the University of

Maryland, College Park. Substantial funds are being invested to upgrade the Campus Farm and the department's teaching laboratories, which will allow the number of ANSC majors to grow by an additional 50% in coming years. ANSC faculty members are engaged in teaching across campus, with number of student seats filled increasing from 1,136 in 2005 to 1,776 in 2010 – a greater than 56% increase in contribution to teaching on campus in the past five years. While the national acceptance rate for students applying to veterinary schools is less than 50%, the acceptance rate for our ANSC students applying to veterinary schools is greater than 80% and has been for the last four years. This highlights the quality of our students and our ANSC undergraduate program.

The ANSC Graduate Program was ranked 13th in the nation by the National Research Council based on 2005 data, and the ANSC department was ranked 9th in the nation in 2007 by Academic Analytics for faculty productivity. Of the 33 ANSC Ph.D. students graduating in the past seven years (2003-2010), all acquired professional positions, mostly as post-doctoral fellows at prestigious research institutions

UMCP Department of Environmental Science and Technology (ENST)

Teaching/Instruction

In 2006, a major reorganization within the College of Agriculture and Natural Resources spawned the new academic Department of Environmental Science and Technology (ENST). New undergraduate (B.S.) and graduate (M.S. and Ph.D.) programs in ENST were created, approved by UMCP, USM Board of Regents and MHEC, with Fall 2008 semester marking the first time the new major was available to students. Over the past year, the department has attracted new faculty and is currently searching for additional faculty to support the growing teaching, research and extension programs

The B.S. program contains four concentrations: 1) Ecological Technology Design; 2) Environmental Health; 3) Soil and Watershed Science; and 4) Natural Resources Management. Currently, there are 165 students with declared majors in ENST – an enrollment rate approximately three times larger than was projected during the program development process. Along with success comes the challenge of being able to continue to deliver a quality educational experience to an expanding student population with relatively static resources.

The graduate program, also first launched in 2008, has three specializations: 1) Soil and Watershed Science; 2) Ecological Technology Design; and 3) Wetland Science. Approximately 75 applications (both MS and PhD) were received for Fall 2010 admission compared to a typical average of 10 to 12 applicants to the preceding (now discontinued) graduate programs. Admission was granted to 24 applicants with outstanding background and credentials and five funded assistantships were awarded. While applications to the graduate program have increased tremendously, funding limitations have dictated only a modest increase in student numbers. However, the talent level of the admitted graduate students is increasing markedly.

UMCP Department of Nutrition and Food Science (NFSC)

Teaching/Instruction

The total NFSC undergraduate enrollment was 240 in Fall 2010. In response to campus request, NFSC has increased the number of seats in five of its courses so that they can be available to more students. Four new courses have been developed: Nutritional Genomics, Molecular Nutrition, Molecular Gerontology, and Food Polymer Science.

In 2010, several departmental changes and improvements were made: (a) The three undergraduate majors were merged into one BS degree and the two graduate programs were merged into one; (b) After submitting a 5-year program assessment report, the undergraduate dietetics program and the Dietetics Internship were granted continued accreditation from the American Dietetics Association; (c) The undergraduate food science program was granted continued accreditation from the Institute of Food Technologists; (d) NFSC purchased about $380K instruments for teaching laboratories, greatly improving the quality of NFSC lab courses; and (e) The Henry J. and Camille J. Shaffer Dorn Dietetics Teaching Laboratory opened in Fall 2010. The state of the art kitchen lab is used to teach foodservice management to Dietetics students.

Dr. Wen-Hsing Cheng, assistant professor, developed three new courses (Nutritional Genomics, Molecular Nutrition, and Molecular Gerontology) in 2008-2010, and Dr. Qin Wang, assistant professor hired in 2008, developed a new course, Food Polymer Science.

NFSC faculty have received numerous recognitions as recipients of awards for teaching, advising, and research and have been called upon as renowned experts in their field.

- Dr. Robert Buchanan received the 2010 IAFP Silliker Lectureship Award and the 2011 UGA Woodroof Lectureship Award.
- Nancy Brenowitz Katz, Director of the Undergraduate Dietetics Program, received the 2008 College of Agriculture and Natural Resources Alumni Association's Excellence in Instruction Award.
- Dr. Y. Martin Lo received the 2008 Select Paper Award from the Information & Electronic Technology Division of the American Society of Agricultural & Biological Engineers (ASABE), the 2008-2009 Distinguished Lecturer from the Institute of Food Technologists (IFT), the 2008 Outstanding Faculty Educator Award, and the 2009 Outstanding Academic Advisor Award from the UMCP Ag Council.
- Dr. David K. Y. Lei, Professor, has been appointed as External Examiner of Food and Nutritional Sciences, Chinese University of Hong Kong, 2004 to 2011.
- Dr. Nadine Sahyoun, associate professor, was selected as a Fulbright Scholar for the academic year 2009-2010 to teach and conduct research at the American University of Beirut, Lebanon (AUB).
- Dr. Robert Jackson, professor of nutrition, is currently on sabbatical leave as a Visiting Professor of Nutritional Sciences at Kuwait University teaching, mentoring students, and conducting research on nutritional problems of Kuwait.

UMCP Department of Plant Science and Landscape Architecture (PSLA)

Teaching/Instruction

During 2008-2010, PSLA expanded its faculty with the appointment of four assistant professors, recruitment of an associate professor from the reorganization of the College of Chemical and Life Sciences, and recruitment of two associate professors from the reorganization of Institute for Bioscience and Biotechnology Research (IBBR). The department's academic program was strengthened in Spring 2010 with the accreditation of its undergraduate Landscape Management Program by the Professional LandCare Network (PLANET). The Master of Landscape Architecture Program was implemented, with the first students entering in Fall 2007. The program achieved preliminary national accreditation with the Landscape Architecture Accreditation Board (LAAB) in Spring 2009. The Plant Sciences Graduate Program curriculum was revised and received approval in Fall 2010. Professors Marla McIntosh and Chris Walsh contributed two I-Courses to the pilot signature series of the new General Education requirements in Spring 2010.

PSLA faculty had many achievements:

- In 2009, Dr. Steven Cohan was elected as a 2009 PLANET Trailblazer – an elite group of dedicated professionals who are nominated by their peers for making significant and long-term contributions to the green industry in the areas of Design/Build/ Installation, Interior Plantscaping, Landscape Management, and Lawn Care. The PLANET Trailblazers is a program of the Professional Landcare Network (PLANET), an international professional association. Dr. Cohan was recognized as an educator who has developed a successful educational program, and as a PLANET Trailblazer, he will mentor educators in new programs in other colleges and universities.

  Dr. Steven Cohan also received the Paul R. Poffenberger Excellence in Teaching and Advising Award in 2009. Dr. Cohan teaches and advises the students in the Landscape Management Program in PSLA; is the Landscape Management Program Coordinator; coordinates the Department's internship program and serves as the PSLA Landscape Management Team coach.

Student accomplishments included:

- Landscape Architecture students from Spring Semester 2008 LARC 471, led by Assistant Director Mr. Dennis Nola, were recognized in Spring 2009 for Project of the Year presented by the non-profit Neighborhood Design Center for the class's community design project for the Central Kenilworth Avenue Revitalization Study.
- In Spring 2010, the PSLA Landscape Management Team, coached by Dr. Steven Cohan, professor of the practice, won 5th place of 70 teams competing in the national Student Career Days sponsored by PLANET.

UMCP Department of Veterinary Medicine (VTMD)

Teaching/Instruction

Virginia-Maryland Regional College of Veterinary Medicine (VMRCVM) students consistently score high (top 5 percent of all veterinary schools) on the GRE exams. In the past five years, VMRCVM has ranked 5th in GRE scores four times, and 6th one time. The graduate program in Veterinary Medical Sciences, a joint venture of the Virginia-Maryland Regional College of Veterinary Medicine (VMRCVM), increased its number of doctoral students from 10 in 2005 to 24 in 2010.

UMCP Environmental Science and Policy Program (ENSP)

The ENSP program has grown to 375 undergraduate majors since its inception in 1997, and the students are specializing in 12 concentrations supported by three colleges (BSOS, AGNR, and CMNS). The students are finding employment opportunities in the environmental field in Maryland, the DC area, the Mid-Atlantic, and around the United States and world. They are working for Maryland state agencies (e.g., DNR, MDA, and MDE), the federal government, non-governmental organizations, and many businesses and consulting firms. About 60% of the approximately 700 BS graduates have gone on to earn M.S., Ph.D., J.D., and other advanced degrees at the University of Maryland, College Park, Johns Hopkins, and Towson University in Maryland; and in other top universities in the US and other countries (e.g., Harvard, Yale, Columbia, University of Pennsylvania, Duke, Texas, University of Michigan, University of California (Berkeley, Davis, and Riverside), Blekinge in Sweden, and others in Norway and Argentina).

UMCP Institute of Applied Agriculture (IAA)

Enrollment at the Institute of Applied Agriculture increased by 40% from Spring 2008 to Spring 2010 due primarily to its revitalized landscape and horticulture programs. The IAA added three new concentrations: Sustainable Agriculture, Golf Course Construction Management, and Sports Turf Management. Courses have been evaluated for transfer credit into the University of Maryland, College Park and are now listed in the university's list of transfer courses, making it easier for IAA students to transfer into AGNR baccalaureate programs. IAA has improved the academic performance of its students. In Fall 2007, 7% of its students were academically dismissed and 7% made Dean's List. In Fall 2010, only 2% were academically dismissed and the number of students on the Dean's List *more than doubled. 15% of IAA students achieved this honor.*

IAA faculty are working closely with PLSC faculty to combine expertise and increase course offerings for both two- and four-year students. IAA students are highly competitive with their peers at other institutions as evidenced by their placement in national competitions and winning national scholarships. They placed fourth at the National Turf Bowl competition, third at the Sports Managers Student Challenge, and won such scholarships as the CHS Foundation Scholarship, Trans-Mississippi Golf Association Scholarship, Golf Course Builders Association Scholarship, and National Federation of Independent Business Young Entrepreneur Scholarship. Students graduating from the IAA in ag business and green industries have had an employability rate of 90% during the past three years even in a down economy.

The IAA implemented its own Open Houses for prospective students and their families and now hosts four-five events each year. IAA works closely with secondary agricultural science teachers throughout the state and with the Maryland State Department of Education to promote agricultural education. It serves as the college's liaison to Harford County's new Natural Resources and Agricultural Sciences

magnet program. The IAA hosts FFA students for an Open House during the state competition. Working with Maryland Agriculture Education Foundation, the IAA implemented and hosts Maryland's Teach Ag Day. In addition, the IAA has taken the lead role in hosting and managing a national CASE (Curriculum for Agricultural Science Education) Institute for secondary teachers. Throughout the year, IAA faculty visit high school classes, meet students, and discuss agriculture-related careers and college opportunities, reaching an average of 200 high school students per year. Online training and workshops were offered to 194 students from spring 2008 through fall 2010.

The IAA continues to have strong industry support and connections. In Fall 2010, the IAA became the first in the nation to create a student chapter of the Professional Grounds Management Society (PGMS), which unites, educates, and promotes the standards for professional grounds managers thus giving students the opportunity to develop leadership skills and network locally and nationally.
The Institute was named the *2009 Outstanding Postsecondary Program in Maryland* by the National Association of Agricultural Educators. Two IAA faculty members received the North American Colleges and Teachers of Agriculture (NACTA) Teaching Award of Merit. IAA received Pepsi Enhancement Funds to support an Arbor Day celebration during which students in the Arboriculture class will write and prepare literature on urban forestry and the importance of trees. This literature will be distributed along with saplings of Maryland's state tree, the white oak.

V. UNIVERSITY OF MARYLAND EXTENSION (UME)

The following represents accomplishments by University of Maryland Extension (UME), University of Maryland Eastern Shore (UMES) and University of Maryland, College Park (UMCP) partners in these programs. The first section lists specific examples of cooperation between these two institutions. The second section provides programmatic highlights.

Specific examples of cooperation include:

- Dr. E.N. Escobar (UMES) actively participates in the Entrepreneurship Coaching Project, sponsored by Sustainable Agriculture Research and Education (SARE) and managed by Ms. Ginger Myers (Western Maryland Research and Education Center-WMREC/UME), and assists small ruminant producers in identifying goals for their individual enterprises, developing business plans and introducing technical modifications to their operational plans.
- Dr. Escobar (UMES) teams with Ms. Susan Schoenian (WMREC) to: (a) implement the State Fair 4/H meat goat show and the 4H-Goat Skillathons; (b) offer small ruminant workshops, seminars, and newsletters and engage in applied research; (c) manage Extension needs across the state; and (d) jointly offer workshops and seminars.
- Dr. Escobar (UMES) actively collaborates with the Pasture Based Meat Buck Test at Keedysville, MD. The buck test is managed by Susan Schoenian who, with Dr. Escobar and other UME specialists, have co-authored an abstract to be presented at the 2011 Southern Association of Agricultural Scientists/Southern Section Animal Science meeting, detailing data collected in previous buck tests.
- Dr. Henry Brooks (UMES) cooperates with UMCP administration in financially supporting key field faculty positions, such as Dr. Andrew Ristvey (UME-Wye Research and Education Center, green industry alternative crops), Dr. Jerry Brust (UME-Central MD Research and Education Center, vegetable production and IPM) and Ginny Rosenkranz (UME-Wicomico County, commercial horticulture).
- Dr. Brooks (UMES) and Dr. Bob Tjaden (UMCP) leverage Renewable Resources Extension Act (RREA) funds to deliver forestry/wildlife related programs statewide.
- UMES Human Ecology Health Fair is an annual event open to the campus and the local community at which community and campus health related agencies and organizations (including UME) set up educational exhibits/displays to help participants become more knowledgeable about health related

issues. UMES and UMCP faculty, including UME campus specialists and UME county faculty, team up to provide the displays and exhibits for the fair.

- Dr. Virginie Zoumenou (UMES) and Mira Mehta (UME-EFNEP) collaborate on several EFNEP trainings across the state of Maryland as well as overall collaboration of the 1862 and 1890 EFNEP programs.
- Dr. Zoumenou (UMES), Berran Rogers. (UMES), and Jennifer Timmons, (UME Wicomico County) collaborated in programming for Avian Influenza Pandemic Preparedness in the Tri-County area.
- Dr. Zoumenou (UMES), Dr. Bonnie Braun (UMCP), and Dr. Elaine Anderson (UMCP) develop and implement a project on "Family Influence on Fruit and Vegetable Consumption among Rural, Low-Income, and Preschool Children: A Preliminary Investigation of Factors Associated with Obesity."
- Dr. Zoumenou (UMES), Tom Rippen (UMES), and Liat Mackey (UME-St. Mary's County) are researching "New Technologies to Improve the Competitiveness of the Maryland Blue Crab Industry."
- Berran Rogers (UMES) and Jeff Semler (UME) are working to promote and support statewide sustainable agriculture initiatives, as well as provide information on Sustainable Agriculture Research and Education (SARE) grant programs available to agriculture service providers and farmers in Maryland.
- Each year, UME researchers, specialists and county educators Dr. Escobar, Susan Schoenian, Jenny Rhodes (UME-Queen Anne's County), and Ginny Rosenkranz (UME-Wicomico County) team with UMES under the leadership of Dr. Henry Brooks to participate in their annual Small Farms Conference coordinated by Berran Rogers (UMES). The conference attracts over 150 participants from Maryland and neighboring states and provides a venue for aspiring farmers, producers, landowners, and supporters of agriculture to learn about new farming techniques, direct marketing opportunities, and other strategies to increase farm profitability and sustainability.
- To keep farmers up-to-date on current programs and services, Berran Rogers, with UME's Small Farm Outreach Initiative, coordinates quarterly Small Farm Update meetings within the project area. These meetings are usually held in the evenings to allow greater opportunity for participation since many small-scale producers work off the farm to support their families. At each meeting, agriculture professionals selected from UME, local, county, and state agricultural agencies and non-profit organizations are invited to share updates and timely information on a variety of ag-related subjects, many of which address small farm issues.
- In efforts to address the lack of participation among small-scale and underserved farmers and ranchers in forestry management and conservation programs, Berran Rogers initiated collaborations with state and government agencies (Maryland Department of Agriculture, Maryland Department of Natural Resources, USDA-Natural Resources Conservation Service, and University of Maryland Extension) to coordinate a series of Small Landowner Forestry and Conservation field tours on Maryland's Lower Eastern Shore. The main objectives of these demonstration tours was to 1) educate farmers about forest resource management strategies, 2) inform them of various cost-share/conservation programs available from state and government (USDA) agencies, and 3) equip them with the ability to manage their natural resources in a way that will provide environmental, societal, and financial benefits.
- Through the support of Virginia Cooperative Extension, Berran Rogers coordinated a two-day educational bus tour which provided 35 Maryland small-scale producers with the opportunity to learn from dynamic agriculture entrepreneurs and their successful farming ventures in the Southeast and Tidewater regions of Virginia. Select tour stops included a family vineyard, a cut-flower farm, a pasture poultry farm, a successful CSA farm operation, a thriving farmers market, and much more. During each stop, farmers were received valuable information on how to improve direct marketing, develop value-added products, start up agri-tourism ventures, find a 'niche' market, grow specialty 'niche' crops, and other innovative and sustainable farming practices.
- Berran Rogers, along with Small Farm Outreach Project staff, coordinated several on-farm demonstrations at the Delmarva Peninsula using High Tunnel Systems in crop production. The goal of the program is to educate farmers about the benefits of extending the growing season using this

low-cost efficient technology. At each event, experts in the field (UME Agriculture Educators, UDEL extension, and DSU) and participating farmers were on hand to discuss materials used in the construction process, the types of crops that can be grown inside a structure, and horticultural practices used to increase crop quality and yield. So far, this UMES sponsored project has attracted over 50 producers and farming enthusiasts.

- Dr. Henry Brooks, 1890 UME Administrator, is a member of the National 4-H Congress Board of Directors.
- Dr. Nick Place, Associate Dean and Associate Director of UME, is the past-president of the Association for *International Agriculture and Extension Education.* He is a board member of MARBICO, the Northeast US Center for Rural Development, and the Northeast US Aquaculture Center.

Programmatic highlights from University of Maryland Extension – a seamless system with shared involvement of both UMES and UMCP campuses:

Integrated Pest Management (IPM) – Nursery, greenhouse and landscape management is Maryland's second largest agricultural industry (valued at $1.96 billion in 2007). This industry requires cost-effective and environmentally safe materials and methods to control insects and diseases and to efficiently use water and nutrients. The IPM program was developed to help Maryland greenhouse and nursery managers stay on top of current insect, disease and fertility problems with greenhouse crops and to sustain and expand the use of IPM techniques. UME faculty conducted over 150 educational programs reaching over 9,000 people. Sixty-two percent of the commercial Maryland greenhouses are actively participating in TPM/IPM programs with hired professional scouts or using Extension trained in-house personnel to monitor their crops. Through educational efforts we have convinced seven greenhouse operations to install microscreening on newly constructed greenhouses, which greatly reduces the outdoor inward migration of insect pests. As a result of participation in TPM/IPM programs, pesticide applications have been reduced by 45-50% compared to years previous to participation in the program. A written survey of the 59 growers showed that 86% felt they improved their understanding of diseases, insects and nutrient management monitoring techniques. Seventy-nine percent felt they improved their ability to correctly select the least toxic fungicide or insecticide to control greenhouse insects and diseases. Ninety-five percent felt they could now correctly calibrate a fertilizer injector and understood how to use a pH and soluble salt meter to monitor nutrient and pH levels in their greenhouse soils.

Invasive species – Introduction of invasive species, such as the brown marmorated stink bug (BMSB) and emerald ash borer, has caused millions of dollars damage to agricultural and ornamental crops in Maryland. BMSB is a new pest in the US, imported from Asia in the 1990's. Until 2010, it appeared to be primarily a nuisance pest in homes in the cooler months, but by July 2010, it was doing severe damage to tree fruit, small fruit and vegetable crops with losses of up to 100%. Based on the 2010 level of damage to apples, peaches, raspberries, tomatoes, peppers, sweet corn, and an array of other crops in Central and Western Maryland, the potential spread of BMSB in just a few years may result in crop losses that will drive a large number of horticultural operations out of business. UME programming will focus on providing to producers control strategies that will allow them to minimize crop losses.

Little is known about the biology of the emerald ash borer, and control with current products and methods is not adequate. This destructive pest can cause a loss of millions of dollars in landscape trees in Maryland. Efforts are to keep this pest isolated to a county where observed, and monitor continuously to know if it spreads to other counties. First Detectors for Invasive Insect Species training programs were developed. A written exam was administered with 36 of the 46 participants taking a pre- and post-written exam. The average grade was 85.3 with a grade range of 64 - 98.7. As a result, 36 participants received national certification as First Detectors.

Animal health and biosecurity – Poultry and egg production is Maryland's largest agricultural industry worth nearly $1billion in 2007. A disease outbreak such as Avian Influenza (AI) or exotic Newcastle disease

in Maryland's poultry would economically impact poultry growers and processors, and in the case of H5 or H7, AI would present potential human health risks. These diseases can cause epidemics on poultry farms, loss of export markets, and long expensive quarantines resulting in large financial losses. This project provided small flock owners access to biosecurity training geared toward their needs and supplied them with the tools and resources to help them prevent, control, or respond rapidly to any avian disease outbreak. Biosecurity workshops and educational material such as fact sheets and web-based materials have led to better AI prevention and control measures. It is estimated these programs have saved the industry millions of dollars in losses. Approximately 41 publications were developed in disease identification, vaccine development. and biosecurity.

Rural Community Resource & Economic Development – Surveys of rural communities indicate an overwhelming need for educational programs in financial issues, business planning, sustainable agriculture, entrepreneurship, value-added, alternative enterprises/crops, land use planning, farm profitability and support for small and beginning farmers, rural-urban interface conflicts and AGNR marketing. The Maryland Rural Enterprise Development Center (MREDC) is a new on-line Extension initiative providing farmers, agricultural entrepreneurs, and new and beginning farmers a much needed resource.

Examples of programs initiated through the MREDC include: 1) Mastering Marketing: Provides educational training and support to improve economic prosperity to MCE educators and AGNR economic development professionals. A Quarterly 'Mastering Marketing' newsletter was developed and an Ag Marketing website and list-serve established. 2) Curbside Consulting: Provides one on one consultation for business development and market planning. Thirty-nine consultations have been performed. As a result of direct marketing programs, attendees had an increased understanding of the components of different direct markets outlets, the opportunities and threats involved in pursing any of these outlets, contact information for different outlets, and the profit potential for each.

Alternative agriculture crops - Both economic and environmental issues have caused many producers to reevaluate their operations. Growers are looking for crops that provide a good return and can be produced with less pesticide and fertility inputs and less labor. One possible way to increase profitability is the production of traditional crops in a way to capture early or late season markets. High tunnels are proving to be the tool that growers need to capture these markets, but there are many unanswered questions regarding cultivar selection and over all economics. Extension developed numerous educational programs to provide farmers with new production strategies to increase profits and sustainability. Approximately 2,360 producers attended educational workshops and twilight tours on alternative crops and 534 on organic crops. Surveys of organic crops events indicated 85% improved their knowledge on weed control options, 100% increased knowledge of tillage effects on weed species populations, 50% increased knowledge of using a commercial source of compost, 62% increased knowledge of using a flamer to control weeds, and 62% increased knowledge of using biological control for insect management. In addition, a Network of Farmers was established to provide locally grown sustainably produced food to the Delmarva region.

Urban food production - Grow It Eat It (GIEI) program – Interest in home and community food production has grown over the past two years in Maryland due to the 2008 recession and a growing public desire for locally grown foods. Fewer than 30% of adult Marylanders consume five servings of fruits and vegetables each day – the minimum amount generally recommended for good health (CDC). Many Marylanders desire fresh, locally grown vegetables, either to purchase or to grow themselves, but lack the space, time, or knowledge to create and maintain a garden of their own. GIEI program goals are to increase food production in the state; teach residents how to grow food sustainably; and create a network of food gardeners through web site, classes, blog, and surveys. Since its inception in 2009, the Grow it Eat it program, with assistance of the UME Home and Garden Information Center and Master Gardeners, has created GIEI teams in 15 counties and Baltimore City. Master Gardeners have taught 337 classes and trained over 7,200 people since 2009.

The Grow It Eat It program was a winner of the 2009 Northeast Director's Award of Excellence with over 104,000 people visiting the GIEI website, and the 70 program gardening video clips have been downloaded 200,000 times since June 2009. In addition, the 4,719 residents who took vegetable gardening classes saved approximately $290,000 on food because of their gardens. The GIEI program has developed the University of Maryland Salad Tables™ and Salad Boxes™ to help homeowners with backyard food production. Training programs and participants estimated they have reached 14,000+ people with information on Salad Tables™ and Salad Boxes™; 679 Salad Tables™ and 956 Salad Boxes™ have been constructed and used as a result.

Nutrient Management – Maryland's Nutrient Management Program (MNP) was developed by UME in cooperation with the Maryland Department of Agriculture and as a result of Maryland's 1998 Water Quality Improvement Act. This act requires farmers to have an "N" and "P" based nutrient management plan on their farms. UME provides training for writing a nutrient management plan and updates on program and research components of a nutrient management plan to recently certified Nutrient Management Consultants. This is the only program of its kind in the State of Maryland. From 2008-2010, UME advisors have written 620 new traditional nutrient management plans and updated 4,190 plans along with 74 manure transport plans. Twenty-seven workshops were held and 545 nutrient management consultants were trained and were issued required continuing education credits. Eighty-three farmers were trained to write their own plans.

UME faculty developed an E-Learning Resource for Water and Nutrient Management & Conservation for the Nursery and Greenhouse Industries program. This web-based knowledge center provides research-based knowledge on soilless substrates, water management, nutrient management and crop health management. This center has been accessed by thousands of individuals from 33 countries and 48 states in the US. More than 10% of the people accessed the site repeatedly for an average of eight pages per visit. The center program concept has extended the support network through initiation of a USDA multistate working group which has attracted interest from an additional twenty-five land grant research and extension faculty.

Environmental Stewardship and the Chesapeake Bay – Urban and suburban sprawl has led to the conversion of thousands of acres of native landscape into home lawns and gardens. This growth and change in the Chesapeake Bay watershed is typically accomplished without an understanding of how these landscapes are a part of the greater ecosystem, and environmental and ecological concepts are essential to prevent continued degradation of soil and water quality. UME faculty have conducted hundreds of programs educating more than 100,000 people on a variety of environmental stewardship topics. The MD Bay-Wise Program is a homeowner education program conducted by UME Master Gardeners and focuses on teaching homeowners, Master Gardeners, and students the importance of individual watershed and landscape practices and the impact on water quality. Training programs, workshops, web sites and publications on well and septic system maintenance, composting, water conservation, rain garden, and wise landscaping practices have reached several thousand individual from 2008-2010. Programming on well and septic maintenance led to 50% of participants saving money ranging from $100 to $15,000 with an average of $4,700. Thousands of primary school students discovered the connections between water quality, agriculture and their environment during field days at Close Encounters with Agriculture.

Riverdale Initiative – The former Engaged University's programming success at the University-owned Riverdale Community Center continues through University of Maryland Extension's collaboration with the Center for Educational Partnerships. Extension Educators have facilitated continued partnerships with Americorp Volunteers and local community organizations to offer programming through the Community Garden with the help of Extension's Master Gardener Program and youth related programming through 4-H in the areas of entrepreneurship, nutrition education, and a recent addition – robotics.

State of Maryland Problem Solving Courts Partnership – Funding from the State of Maryland Problem Solving Courts has provided support for Maryland 4-H youth development and family consumer sciences

faculty and staff to develop partnerships with drug court staff to enable youth and adults in the Drug Court program to participate in UME programs that build life skills. A total of nine counties now participate in this program as a result of the grant.

4-H Military Partnership – The mission of the UME Military 4-H Club project is to make 4-H available to youth on active duty military installations. Youth are enrolled through local county/city programs with a goal of fully integrating youth and volunteers from military installations into the ongoing 4-H youth development program in their county/city, while providing access to high quality 4-H curriculum and training. We currently have 4-H programs on five Maryland installations – Fort Detrick, Aberdeen Proving Grounds, Fort Meade, Walter Reed and Andrews Air Force Base. Additionally, we provide support to one technology/youth development specialist in Korea and one youth development specialist in Europe to strengthen 4-H club programming in overseas Army 4-H clubs. All youth enrolled in 4-H in Korea and Europe are enrolled as Maryland Military 4-H Club members. Furthermore, military youth off post are part of 4-H through the Operation Military Kids program through partnerships with the National Guard and Reserves. Over 4,000 military children were involved in 4-H programs during 2010.

4-H Afterschool – Maryland 4-H youth development has expanded a statewide 4-H afterschool initiative as a part of a national 4-H effort to provide extraordinary learning opportunities to school age youth in urban, suburban, and rural communities. Additional grant funds secured during 2010 continued this program. This outreach to youth in afterschool and out of school time has resulted in increased participation by underserved and underrepresented youth in the Maryland 4-H program. 4-H educators provide staff development and training for afterschool providers; develop 4-H curriculum to enhance afterschool program offerings; and organize 4-H clubs for children and youth in afterschool programs, together with partners from Boys and Girls Club of America, YMCA, 21st Century Community Learning Centers, libraries, housing authorities, Police Action Leagues, and local parks and recreation entities.

No Child Left Inside: Reversing Our Children's Nature Deficit – Recent research shows that children are spending half as much time outside as they did 20 years ago. Today's kids spend 6.5 hours a day "plugged into" electronic media. What has been labeled as "nature deficit" has the potential for impacting the health of our children, our economy and the future of American conservation. One highlight of how the UME 4-H Youth Development Program has been reconnecting youth to nature through environmental education within the past year includes Partnering with Maryland National Capital Park and Planning Commission to provide a weeklong residential camping program for over 150 at-risk youth from urban communities. These youth have had little opportunity to spend time in the outdoors and do not have the funds available to attend traditional camping programs. Over 2,225 youth attended residential and day camp programs operated by 14 County 4-H Youth Development Programs. Over 50% of the youth that attend these camping programs are not enrolled in our traditional 4-H Youth Development Program. County 4-H Educators work with the local Department of Social Services to identify and support youth from foster homes so that they can attend the camping programs. A partnership was formed with Allegany County to offer outdoor school to over 1000 youth at the Western Maryland 4-H Center in Garrett County.

4-H Adventure In Science (AIS) Program – This partnership program between Adventure In Science Inc. (AIS) and University of Maryland Extension's 4-H program is targeted to inspire young students with an interest in science education and science related careers. AIS is primarily offered in Montgomery County and was expanded in 2010 to include a new group being formed in Bethesda. A similar program, which is a hands-on scientific program for youth ages 8-14, is being started in Prince George's County and targeted to the University of Maryland College Park campus. AIS participants are enrolled as 4-H members and are entitled to participate in all 4-H programs and activities. AIS operates at four sites: the National Institute of Standards and Technology (NIST), the National Institute of Health (NIH), Lockheed-Martin Corporation, and Comsat Corporation in Germantown, MD, with 25-50 youth participating at each site. The classes meet for 18 Saturdays from October to March for three hours of hands-on science and math experimentation in brain functions, dissection, rocketry, optics, robotics and many more. Classes are designed to be very informative, interactive and inspiring. At the conclusion of the program series, a parent's day is organized where the AIS

youth participants make presentations on formal topics with scientific research and findings to approximately 500 viewers.

Baltimore City 4-H Teen Corps Leadership Project – This program provides training to youth ages12-18, adult mentors, and partners from diverse communities during after school hours. A core element of the program is a monthly meeting that brings together in one location youth/adult volunteers representing several after school programs across the city. Teen Corps members receive facilitation training on various youth development topics and then demonstrate those skills learned by facilitating the topics at their local after school sites. Over the past four years, over 60 intensively trained teen facilitators have delivered programs to hundreds of youth in after school settings in Baltimore City.

4-H Science continues to expand as 19 Maryland counties have launched the newest cutting edge 4-H project clubs – Robotics. Through substantial grants facilitated through National 4-H Council and BAE systems, Robotics project clubs have brought in a significant number of children who most likely felt like 4-H did not have anything to offer them. Youth members begin with Lego Kits and through mastery of problem solving and skill enhancement, they advance to build their own robots. Maryland 4-H members from Garrett and Carroll counties have accomplished top 10 placement at the National Robotics Competition and similar contests over the past two years. Over $150,000 in outside funds were secured for the Maryland 4-H Program during 2010 to enhance this popular project area.

UME – Sea Grant Extension Program – This joint program between UME and Maryland Sea Grant College had several significant accomplishments during the 2008-2010 period. UME Sea Grant Extension played a major role in providing education and information that led to new state legislation related to oyster aquaculture, paving the way for the development of a new industry in Maryland that will create jobs for watermen and other citizens while contributing to the restoration of the Chesapeake Bay. Another major accomplishment was the development of a partnership with the Maryland Department of Natural Resources (DNR) to develop a Regional Watershed Restoration Program. DNR is providing $150,000 a year to support Sea Grant Extension faculty positions that help targeted communities in the Chesapeake Bay watershed implement on-the-ground actions that will lead to pollution reduction and the restoration of the Chesapeake Bay. Sea Grant Extension was awarded approximately $1 million in funds provided by the federal government in its declaration of a "fishery emergency" for the blue crab fishery. These funds are being invested, in collaboration with Maryland's seafood processing industry, in new technologies that will help maintain the industry's competitiveness in global seafood markets.

MoneySmart Impact Team – Low financial literacy, consumer indebtedness, low savings rate, low financial assets, expensive health care and long-term care, and insufficient retirement planning are all areas of concern for Maryland residents. Individuals and families need to be empowered with knowledge, attitudes, and skills to practice successful financial management to achieve financial security in later life. Participation in personal finance educations programs help individuals learn how to reduce debt and increase savings. During 2008 through 2010, more than 4,500 Maryland citizens participated in 146 MoneySmart programs across the state.

Personal Finance Seminar for Professionals – Since 1989, Maryland has offered an annual financial education seminar to meet the professional development needs of educators employed in the financial industry, land grant universities, and the military. Conferences in 2008-2010 were attended by 470 participants from across the world representing the U.S. military, credit unions, housing non-profits, housing management agencies, financial institutions, ten state cooperative extension/land grant universities, and credit counseling non-profits. Follow-up surveys with participants indicate the significant outreach of this effort, with these participants engaging more than 380,000 persons in financial education classes or workshops; 173,000 in financial counseling; and more than 2.4 million citizens through indirect education via newsletters, websites, news articles, podcasts, or other media.

Of the 148 attendees in 2010, 78 received AFCCS credits, 13 received continuing education CEU's, and seven received social work CEU's. Fifty-nine percent of attendees had previously attended a seminar,

while 23.6% of attendees attended more than three previous seminars. Sixty-six percent of participants learned new ways to support the financial health and economic success of their clientele and 86% learned new information concerning financial strategies related to savings, investments, and retirement that would benefit their clientele.

Walter Reed Project: Basic Financial Education for First-Term Soldiers – From 2008 through 2010, 380 soldiers participated in basic financial education through the Walter Reed project. This project provides instruction on financial management for service members assigned to Walter Reed Army Medical Center (WRAMC) to support the operational and mission readiness of the Department of Defense (DOD). Classes were provided for first term soldiers who are required to receive eight hours of training at their first duty station. This class is designed to improve financial readiness of military members and their families. Quotes from Financial Readiness Program Participants: "This is the very best training the Army has provided." "I can't believe I did not know this about money before today." "My money life will be better after this training — this knowledge is powerful." "Today has changed my way of thinking about money, forever."

Money Wise in Tough Times. **Maryland Supplemental Retirement Plan (MSRP)** – In 2010, eight one- to two-hour classes were presented to 216 participants on various ways to save money, prioritize and control debt and spending, utilize resources, and live on less. Classes were taught to Maryland State employees through MSRP retirement information events at the invitation of the MSRP Programs Director and also to representatives from Maryland's Comptroller's Office at their Employee Communications meeting at the invitation of Comptroller's Office representative, Emma Wimbush.

Investment Company Institute Education Foundation Grant – In 2010, University of Maryland Extension received a grant from ICIEF to provide investment and retirement education programs to University of Maryland College Park faculty and staff. A series of four classes (financial checkup, investing principles, investing IQ, and retirement) will be provided during 2011 to targeted staff (typically with lower salary and education) in departments such as departments of dining services and facilities management. Additionally, the classes will be provided to the entire faculty and staff through the Health Center and training departments. The year 2010 was used to develop the necessary partnerships and prepare resources and curricula for the 2011 kickoff of the program.

Reading Makes Cents (RMC) Pilot – The MoneySmart Impact Team presented a statewide in-service on September 15, 2010 based on the National 4-H Curriculum, ***Reading Makes Cents (RMC)***, a financial literacy and reading curriculum for children in grades 3-5, and the pilot project conducted by MoneySmart Core Impact team members. This program is in development as a UME Signature Program focusing on youth as the target audience. The initial training was attended by 17 Extension educators and collaborators who received a teaching toolkit for use in implementing the curriculum. This project was funded through MoneySmart Impact team funds and additional support from Sandy Spring Bank and MD 4-H Foundation.

Dollars and Sense is an example of a program taught as a part of the MoneySmart program area. Since 2009, ten ***Dollars and Sense*** classes for 230 participants were conducted. This three-hour basic financial education course, taught to participants in the Workforce Opportunities Program at the local Department of Social Services, requires mandatory participation as part of the Workforce program. Pre/post test evaluations revealed that 78% of participants intend to improve their money management (n=72), 69% of participants intend to develop a spending plan (budget) (n=123), 65% of participants intend to set financial goals (n=72), 68% of participants intend to track family income and spending (expenses) (n=71), and 86% of participants intend to request/review their credit report(s) annually (n=95). In 2009, two- to four-month follow-up phone contacts indicated that 76% (n=19) of those surveyed were actively using a spending plan, 92% (n=23) could identify at least one positive financial behavior change that they made since attending the class, and 56% (n=14) had written down at least one SMART goal for their money.

Healthy Living Environments Impact Team – The work of the HealthSmart Impact Team focuses in two priority areas: Health Literacy and Healthy Homes.

- **Health Literacy –** Health literate people understand health information and have the skills to use that information in making health decisions and accessing health services. The ability to access and process information and services is affected by the demands of health education and process information, and services are affected by the demands of health education and service environments. With the Center for Health Literacy as a partner, Extension can both improve health education in Maryland and lead the national Extension system in health literacy science and practice. Current and emerging research from the Center, the School of Public Health, and other colleges on campus, combined with research from across the nation, will serve as the basis for health literacy programming through HealthSmart.
- **Healthy Homes** – A Healthy Homes website was created on the University server to provide space to communicate the availability of educational resources, curricula, and important public information related to Healthy Homes. Publications (such as the *Help Yourself to a Healthy Home* book) and other tools were purchased with funds to provide educational toolkits to consumers/participants of healthy homes programs. Partnerships were created with Boys and Girls clubs, Department of Aging, WIC programs, child care providers, and Head Start to deliver outreach education on healthy homes. Within Extension, Healthy Homes partnered with EFNEP and urban IPM programs. A publication "*Keeping a Healthy Home: Seven Tips Made Easy*" was developed and distributed in the state healthy homes project. This project trained 440 educators or professionals with healthy homes information.

  Healthy Homes Toolkits were designed, developed, and provided to training participants in 2010. 94% of the participants plan to use the toolkit received at the in-service in future educational programs. One educator was awarded a radio spot to discuss Healthy Homes. She has produced newsletters and fact sheets with *Healthy Homes* content and has also adapted two factsheets:
  1. Safer Cleaning: An A to Z Resource Guide of Safe Alternatives to Household Cleaning and Maintenance Supplies (http://www.epa.gov/region07/citizens/safercleaning.pdf)
  2. Seven tips for keeping a healthy home

Four FCS educators are now trainers with the National Center for Healthy Housing. This team taught their first course on March 10, 2010 at the Wheeler Tenant Association in Washington DC. Extension FCS educators, in partnership with The National Center for Healthy Housing, conducted the "*Essentials for Healthy Homes Practitioners Course"* at the Johns Hopkins Bloomberg School of Public Health. The audience included public health nurses, environmental health specialists, pest control operators, home inspectors and indoor air quality professionals and technicians, and three UME Extension educators.

Health Literacy

1. ***Rural Health Grant*** – UME HealthSmart Team's first federally funded project is a USDA Rural Health and Safety grant to convert research findings from the Rural Families Speak study into health messages based on principles of health literacy. UME is partnering with the School of Public Health and the Center for Health Literacy, along with UMass-Amherst and 13 other states, in conducting the grant project. Other program partners include the Maryland Rural Health Association and the Rural Maryland Council. Findings will be shared across the Extension system through eXtension and will inform future decisions and programmatic efforts concerning health care reform in rural areas. This grant will contribute to the goal of infusing Extension with health literacy. It is both a research and application grant that will strengthen educational programming and add to the body of knowledge regarding low-income families and their health. The total amount of funds is $349,958, while Maryland's portion of the grant is $134,443.

2. ***Health Care Reform, Rural Communities and You –*** As one foundational component of the Rural Health Grant (above) this five-hour forum focusing on health care reform was made available to the

public and broadcast live as a web-based interactive forum. Five sites across Maryland participated with live audiences, with more than 150 participants. The purpose of the forum, hosted by the Rural Maryland Council and originating out of the University of Maryland College Park, was to explain the impact of the Affordable Care Act (Health Care Reform) on rural communities and, in small group discussion at each location, collect feedback, questions and concerns from rural community members.

3. **FoodSmart Impact Team** – FoodSmart encompasses several target audiences and focus areas including nutrition, food safety, food systems, and growing food for health that are targeted to limited income individuals, families and youth, childcare providers, professional development, worksite wellness, high risk youth, and general community nutrition education. A multitude of topics are addressed, most of which support the formation of healthy eating habits, normal growth and development throughout the lifecycle, and prevention of chronic disease. Examples of subject matter include the Dietary Guidelines for Americans, MyPyramid, overweight and obesity, heart healthy eating, infant and child nutrition, picky eaters, and menu and meal planning.

   The **FoodSmart Impact Team** was initiated to lead, develop, implement, and evaluate interdisciplinary food-related education programs for UME. Classes and workshops were conducted on integrating relevant food safety information into nutrition and health educational opportunities. Faculty updates and training are provided and consumer alerts to faculty and public are provided as appropriate. The team developed a collaborative effort with Home & Garden Information Center and Master Gardeners, resulting in the Farm-To-School Initiative with emphasis on local, healthy veggies for schools. A series of educational videos have resulted, as well as engagement in social media, to promote the program and available resources.

FoodSmart Nutrition-Focused Programs

Expanded Food and Nutrition Education Program (EFNEP) reaches many underserved populations who are at high risk for food insecurity, hunger, obesity and chronic disease. The overall program goal is to provide nutrition education to low-income families for the prevention of chronic disease through healthy eating and increased physical activity. This joint collaboration of the University of Maryland Extension, College Park and University of Maryland, Eastern Shore is funded by the USDA through federal appropriations. Major Goals of EFNEP are:

- Deliver behaviorally-focused, learner-centered, evidence-based nutrition education to *food insecure Maryland families with young children* and *youth.*
- Facilitate *behavior change* for the prevention of chronic disease risk in youth and families with children through healthy lifestyle programming: *obesity prevention.*
- Develop effective *research-based strategies* for *culturally competent programming* in communities at *high risk for food insecurity and chronic disease.*

Target Audience includes food stamp and food stamp eligible families with young children, pregnant women and teens, minority (Latino/Hispanic and African American) families and youth at high risk for the development of obesity and type 2 diabetes, and school age youth in school based, after school, and summer programs. EFNEP Cost Benefit Analyses: Savings on health care costs as high as **$**10.64 per $1 spent on EFNEP programming. For every $1 spent to implement EFNEP, $2.48 is saved on food expenditures, reducing the need for emergency food assistance. Collaboration with other agencies reinforces the common nutrition message of the importance of overall diet improvement in all food groups, improved food safety practices, and preventing food-borne illness.

Number of Families with Children and Youth Reached through EFNEP in 2009 – Number of program families = 2,352; number of contacts with adults = 19,000; total number of youth = 9,618; total number of contact hours with youth = 38,472 with average number of contact hours with each participant/family = 8.1 hours and average number of contact hours with youth = 6 hours.

Food Supplement Nutrition Education (FSNE) – a program of University of Maryland Extension providing nutrition education to current or eligible Supplemental Nutrition Assistance Program (SNAP) recipients. In FY10, this program received funding in the amount of $4,409,692 from USDA/FNS through a contract with Maryland Department of Human Resources, one-half of which was provided through a third party match.
During 2008 through 2010, twelve FSNE projects were implemented annually in eleven Maryland counties and Baltimore city with a total 109,405 individuals and youth participating and resulting in total program contacts of 411,214. FY10 evaluation data indicated that 27 post/pre questions were statistically significant ($p<.0001$) demonstrating a difference between behavior prior to FSNE participation and intent to change behavior following program participation.

Growing Healthy Habits (GHH) – Growing Healthy Habits (GHH) is a gardening and nutrition education curriculum providing easy-to-adopt lessons. The curriculum was developed by FSNE to (1) deliver nutrition messages in alignment with FSNE key outcome to increase fruit and vegetable consumption, (2) creatively meet Maryland State Education curriculum objectives, and (3) correspond with Maryland growing season. GHH uses growing food as the teaching vehicle to link nutrition and gardening concepts in both in-school and out-of-school youth educational settings.

FSNE partnered with Maryland State Department of Education for review and support of curriculum and teacher trainings. The curriculum was approved by the *Alliance for a Healthier Generation* and featured as the resource of the month on the *SNAP-Ed Connections National Resource Finder* website. GHH was also featured at a number of national meetings and was the central program component of a multi-state project application for a People's Garden grant. GHH was also featured in April/May 2010 "*Flavor*" magazine article. By the end of 2010, 849 persons were trained in Growing Healthy Habits, while a total of 3,425 contacts were made through this program.

Up For the Challenge – *Up For the Challenge* is a youth fitness and nutrition curriculum that was written and developed by a team of four UME FCS and 4-H educators. This five-chapter, 290-page *Up for the Challenge, Lifetime Fitness, Healthy Decisions Curriculum* was developed for use by all domestic and international U.S Army after-school, youth-service facilities. It has been distributed to 100 Army installations worldwide.

During the 2008-2010 timeframe, 208 adults were trained to implement *Up For the Challenge,* while 4,299 participated in the program.

A two-day *Up for the Challenge* train-the-trainer session was conducted for 50 youth development and nutrition educators representing several state extension programs and organizations from various outside youth-serving agencies. Feedback from this training indicates that the curriculum has been adopted by youth educators in Florida, Maine, and Pennsylvania, as well as Army child youth services professionals, among others.

Project Re-Fresh – UME partnered with Maryland State Department of Education (MSDE) to write a 2010 Team Nutrition Grant, which was funded for $291,768. UME is facilitating the creation of ReFresh teams in 10 Local Education Agencies (LEA's) to implement Re-Fresh. Up to $15,000 will be awarded per LEA to conduct school food and nutrition services staff training and enhancements to "nudge" students toward healthier cafeteria choices, particularly fruits, vegetables and whole grains. Students in 4^{th} and 5^{th} grades will also receive nutrition education to lay a foundation for making healthier choices. Classroom nutrition education and teacher training will be integral components of this holistic approach to improving nutrition outcomes. Forming a network of EBT markets in Maryland to better expand opportunities for federal nutrition benefit clients in the state, $50,724 was granted by USDA for a Farmers Market Promotion Program.

Farmers Market Promotion Program (FMPP) – Implementation of a multi-organization project with goal to "create a network of efficiently organized, well-attended, well-resourced and economically vibrant

EBT markets in Maryland, where people of all income levels are able to access fresh, nutritious, locally grown fruits and vegetables directly from producers." The FoodSmart Impact Team committed UME to collaborating with current and potential partners, providing guidance and expertise in the development of educational and marketing materials, and supporting network efforts to disseminate educational messages and materials and promote utilization of supplemental nutrition assistance benefits at farmers' markets. This project will begin implementation in 2011.

Other FoodSmart Nutrition Programs – In 2010 in partnership with the Montgomery County Health Department School Health Services, a new program was developed to train school health nurses to run after-school health/cooking clubs where pre-registered students receive nutrition education lessons on a weekly basis. The health clubs focus on encouraging children to try new foods, particularly fruits and vegetables, and developing cooking skills. Another new program for 2010 is the addition of Centro Nia, a bi-lingual childcare center servicing 81 pre-school aged children. Teachers at Centro Nia received training and are incorporating *Color Me Healthy* and *Healthy Steps* lessons into daily activities. The Montgomery County FSNE program also includes collaboration with Health Department nurses and dental hygienists who deliver *Color Me Healthy* and *Healthy Steps* lessons at multiple HeadStart locations.

Steps to a HealthierYou – A three-week, six-hour online continuing education course for child care providers was developed as a guided exploration of MyPyramid.gov. Students utilize the information and tools on the website to design personalized eating plans and evaluate dietary intake. Original course materials include a five minute introductory video, three assignments, supplemental educational materials, and a web-based course evaluation. Fifteen students successfully completed the course and received credit for six clock hours of training approved by the Maryland State Department of Education.

Foodsmart: Food Safety–Focused Programs – In an effort to reduce further instances of foodborne illnesses, UME Educators partnered with local churches, child care providers, agency food service staff, the Office on Aging, Southern Maryland Food Bank, assisted living personnel, and Boards of Education to provide up-to-date food safety training during 2008-2010. The need for a comprehensive food safety curriculum resulted in the development of *Food Safety is for Everyone* curriculum. As a result of these programs during 2010, 243 participants received food safety certificates or three CEU's enabling them to meet job requirements and to remain in compliance with their funding sources.

Food Safety is for Everyone consists of an introduction, four PowerPoint modules, classroom activities, after class evaluation (FCS Evaluation System), follow-up evaluation, and two handouts: *When to Consult a Doctor* and *Fact Sheet Links.* Numerous online resources are downloaded from Federal government websites. The four modules focus on (1) foodborne illness, (2) personal hygiene, (3) cross-contamination, and (4) temperature matters. In 2010, a fifth module focusing on Food Safety Updates was added.

This three-week, six-hour online continuing education course for child care providers was designed and implemented. A classroom version of the curriculum was requested by Extension educators in 13 states and is presently in use in Alabama, Tennessee, Maryland, and Illinois. Six additional states have included "Food Safety is for Everyone" in their 2011 Educational plan and the curriculum has been made available to the public nationwide via eXtension.org and the Extension EDEN websites.

Food Preservation: Grow It, Preserve It, Eat It – In recent years there has been a resurgence in consumer questions and interest related to food preservation. UME educators have received an increased number of requests for classes related to food preservation techniques. In addition, the National Institute of Food and Agriculture's (NIFA) Division of Family and Consumer Sciences has identified food preservation education as one of the six priority areas necessary to assist families and consumers in making informed decisions that enhance quality of life and well-being.

Grow It, Preserve It, Eat It is the UME food preservation program developed by the FoodSmart Food Preservation Action Team. During 2010, training for action team members was initiated and followed by the

development of a food preservation action plan for 2010-11. As a result, a five-member UME action team attended a food preservation train-the-trainer workshop; three UME Master Gardener trainings were conducted during 2010; and 51 volunteers attended a six-hour food preservation workshop, with 84% of the participants feeling more confident in their ability to safely operate a pressure canner and 76% understanding food safety concerns for preserving foods at home. Plans are in place to conduct statewide food preservation training in 2011 for UME faculty as well as the general public.

UMCP Department of Agricultural and Resource Economics (AREC) Extension Efforts

In addition to its dual interests in traditional and high-value agriculture, AREC extension programs have also evolved to encompass environmental issues related to agriculture, land use including suburban sprawl, and resource management in the Chesapeake Bay. The accomplishments of the department's extension programs can be organized into three main themes:

1. **Economic Prosperity for Maryland Families and for Productive and Sustainable Food and Fiber Systems**
   - Computer Record Keeping and Financial Management using Quicken & QuickBooks: Farmers learn six steps to farm financial analysis including constructing a balance sheet, projecting cash flow, monthly record keeping, cash flow monitoring, constructing an income statement, and enterprise analysis. They are then trained to use the Quicken and QuickBooks record keeping program to complete these steps.
   - Maryland Dairy Farm Business Analysis: Since 1994, income, expense, and profit data have been collected from over 70 participating farmers. These data are then summarized to show averages of specific income and expenses line items on a per cwt, per cow, and total farm basis. The most profitable 20% and least profitable 20% (profit per cwt.) are also averaged to help farmers understand successful and unsuccessful management practices.
   - Provided substantive input to Governor O'Malley from the Maryland Dairy Industry Oversight and Advisory Council that included analysis on options for administering a state emergency dairy fund, consumer price impacts of a proposed "sell below cost" law for milk, and future trends in the Maryland dairy industry.
   - Financial Management for FSA Borrowers: Farmers who borrow money or obtain loan guarantees from the U.S. Department of Agriculture Farm Service Agency (FSA) are required to take 30 hours of Financial Management training, which is conducted by Extension faculty.
   - Business Planning Workshops: AREC developed a business planning workbook that steps farmers through the process of developing business plans including the core components of production plans, marketing plans, and financial plans.
   - Transitioning the Farm to the Next Generation: This extension program educates farmers in the basics of transitioning the farm business structure and assets to the next generation so that they can develop effective plans to accomplish their goals and be better prepared to meet with their paid planning professional.
   - Served on the Board of Directors for Maryland Agriculture and Rural Based Industries Development Corporation (MARBIDCO), a local organization helping traditional rural businesses succeed in the 21st century.
   - Developed Farm Bill workshops at multiple locations in 2008.
   - Provided grain marketing education that includes teaching farmers various marketing alternatives and supplying necessary basis data and supply and demand information upon which farmers' marketing decisions are implemented.
   - Developed educational programs on crop insurance supported by annual USDA grants.
   - Organized and developed numerous presentations on estate planning, risk management, dairy gross margin insurance, and other related topics.
   - Directed Maryland's Northeast Sustainable Agriculture Research Education (NESARE) program.

2. **Sea Grant Extension for the Chesapeake Bay:**
    - Recreational boating economics: An extremely important industry and activity in the Chesapeake Bay which is very sensitive to the current and future health of the Bay. Extension programs have focused on educating State policymakers on the importance of the industry and the potential economic losses from degraded water quality.
    - Crabmeat industry: Industry viability has been challenged by a lack of domestic labor, and the solution has been the use of H2-B Visa workers. Extension work has focused on documenting the labor usage and analyzing the economic impact of foreign workers on domestic employment.
    - Non-Native Oyster Introduction: Developing the economic analysis of an environmental impact statement that is currently undergoing public comment analyzes the economic consequences of various strategies to restore the Chesapeake Bay oyster resource.
    - Blue Crab Emergency: Based on analysis by AREC extension, the Chesapeake blue crab fishery was declared a disaster by the federal government, making the industry eligible for approximately $15 million in relief.

3. **Enhancing Environmental Stewardship and Maintaining a Balance between Agriculture and the Environment:**
    - Analyzed the economic value of poultry litter in alternative uses. Showed land application as fertilizer to be the highest value use of poultry litter and estimated that there is sufficient land on the Eastern Shore to absorb almost all the poultry litter generated annually.
    - Studied systematic differences in fertilizer recommendations in nutrient management plans and pesticide use in pest control to determine whether retail representatives were more likely than independent scouts and extension personnel to recommend higher use rates of fertilizer and pesticides.
    - Sustained program on farmland preservation that includes land quality issues; profitability; program instruments and novel techniques; family heritage; spill-over impacts; and estate, capital gains, and property tax issues.
    - Provided the analysis for the preservation/land use component of the Future of Maryland Agriculture report for the Maryland Department of Agriculture.
    - Determined the critical mass of agricultural land that would be needed to ensure a viable agricultural sector in Maryland.
    - Provided extension programs and analysis on conservation practices for riparian buffers and improving environmental indicators in the Chesapeake Bay. Adjusted parameters of the CREP program to attain the 100,000 acres desired.
    - Provided substantial input to set the new riparian buffer goal for the Chesapeake Watershed and the forest goal for the state of Maryland.
    - Directed the Mid-Atlantic Water Program that coordinates extension and research efforts of over 30 faculty at nine institutions.
    - Researched and provided extension programs on ecosystem markets that include water quality credit trading extension programs with particular emphasis on nutrient trading between point and non-point sources of pollution.
    - Examined nutrient management, nutrient balances, and nutrient budgets in different watersheds and worked with different citizen groups who live and work in those watersheds to help them adapt their behavior.
    - Worked with regional educational and governmental institutions on the effect of increased biofuel production on water quality.
    - Participated on the Scientific Advisory Committee to the Governor's BayStat Program, a new program to assess, coordinate, and target Maryland's Bay restoration efforts. The committee developed evaluation parameters and goals to improve the effectiveness of restoration efforts and achieve higher water quality and other environmental attributes for each dollar spent.

UMCP Department of Animal and Avian Sciences (ANSC) Extension Efforts

- The ANSC Extension and Outreach program is focused on the dairy, poultry, equine and beef industries in the State.
- Numbers of faculty and staff FTE supporting the ANSC Extension program have declined by 40% since 2003. Despite this decline, our ANSC Extension program continues to serve the animal agriculture industries in the State and receives laudatory feedback.
- ANSC Extension efforts are often integrated with applied research and have attracted substantial extramural funding.
- ANSC dairy extension faculty are recognized as national and international experts in the areas of animal nutrition and management. They are leading contributors to the national eXtension program, which provides science-based information to dairy producers nationwide via the Internet.
- ANSC faculty members are leading national efforts to establish standards for air quality and ground water nutrients resulting from animal agriculture operations.

UMCP Department of Environmental Science and Technology (ENST) Extension Efforts

- The Department of Environmental Science and Technology is the home of the Maryland Agricultural Nutrient Management Program, which has since 1988 provided Extension education programs including nutrient management plan development, certified consultant continuing education programs, and farmer certification and training.
- In 2010, the Agricultural Nutrient Management Program launched its first continuing education webinar series as a more time and resource efficient method of providing certified nutrient management consultants with technical training and program updates.
- ENST faculty are working very closely with State and Federal agency partners in collaborative Chesapeake Bay restoration efforts. The extension of cutting edge research on agricultural best management practices and drainage water nutrient load mitigation are informing public policy and management requirements throughout the Chesapeake Bay region.

UMCP Department of Nutrition and Food Science (NFSC) Extension Efforts

- Dr. David K.Y. Lei has been actively engaged in knowledge transfer to King Saud University, Saudi Arabia, since 2008. He was PI or director of equipment acquisition to initiate the establishment of a new biotechnology lab. He was appointed to the Board of Consultants for the Center of Excellence in Biotechnology Research in 2008 and is actively involved as a consultant in knowledge transfer for this new biotechnology lab.
- Dr. Y. Martin Lo:
  - Established extension research programs related to alternative uses for tobacco, recovery of protein from poultry processing wastewater, microencapsulation of probiotic cells, algal biomeal, algal toxins, bioluminescence sensors for food safety and adulteration detections, cell immobilization, and value-added applications of soybean for agricultural sustainability;
  - Developed a training manual on Commercially Sterile Packaged Foods (CSPF) and conducted two international trainings, one in Casablanca, Morocco (Dec. 2008) and another in Qingdao, China (Sept. 2010), for food safety inspection officers in these countries;
  - Established an FDA-approved Acidified Foods training program for regional and local small and on-farm processors – two training programs conducted in 2009-2010 in College Park and Loveville, respectively, and another one scheduled for April 2011 in Annapolis;
  - Continues to serve as the USDA Food Safety Inspection Service (FSIS) Hazard Analysis Critical Control Points (HACCP) Maryland Coordinator and each year offers several trainings for food processing industries in MD.
- Dr. Mira Mehta
  - Directs all Expanded Food and Nutrition Education Program (EFNEP) activities in the state of Maryland to develop effective intervention programs for childhood obesity, food insecurity, malnutrition, and diabetes among minority populations. In 2010, EFNEP delivered its evidence based, behaviorally focused series of nutrition education workshops to 2,300 adults with children and

9,600 children/youth in school and after school programs. EFNEP's intervention emphasizes behavior change linked to physical activity; fruit and vegetable consumption; making healthy choices at home, grocery store and while eating out; healthy beverage consumption; food safety; and food resource management. In 2010, EFNEP piloted a nutrition, cooking, gardening and physical activity program for Latino/Hispanic middle school youth in partnership with numerous community collaborators. EFNEP also collaborated with the WIC Program, Head Start Program, Primary Care Coalition, Share our Strength, and more than 230 faith based and community based organizations to deliver nutrition education workshops to low income families, particularly high risk Latino and African American youth and their parents in Maryland;

- Participates in the eXtension "Obesity, Health and Wellness" Community of Practice and serves on several advisory groups including the Clemson University/NIFA grant to develop an online (web-based) evaluation/reporting system for EFNEP, the AFRI Parental Feeding Practices, Core Nutrition Messages, the Prevention of Obesity among Preschool Children Conference Grant Planning 2011, and the EFNEP National Conference Planning Committee 2010-11.

- Dr. Jianghong Meng received three awards in 2010: Outstanding Service Award to the National Advisory Committee on Microbiological Criteria for Food, US Department of Agriculture; FDA/CFSAN Director's Special Citation Award on Aquacultural Foods; and FDA/CFSAN Exceptional Achievement Award on Food Safety Practices at Retail.
- Ms. Phyllis McShane, NFSC Dietetic Internship Director, was appointed by the American Dietetic Association (ADA) Board of Directors in 2010 to serve on ADA's seven-member Nutrition Informatics Committee charged with developing electronic health record training for both students and registered dietitians. NFSC Dietetic Internship (director + 10 interns):
  - Participates in the Maryland Food Supplement Nutrition Education Program's client-centered education and accrues data evaluating the effectiveness of the teaching provided.
  - Implemented social media marketing strategies as: Internship Facebook (2009), Twitter Site (2010), Blog Site (2010), and contributing Blogger to Society of Nutrition Education's Communication Blog (2010).
  - Along with USDA's National Agricultural Library (NAL)'s Food and Nutrition Information Center (FNIC), offered a "Nutrition, Communications and Information Conference" for dietetic interns at Johns Hopkins, NIH, Sodexo, Army, Aramark: Philadelphia, UMES, UMMC, Virginia Tech, Howard University and UMCP.
  - In 2010 developed a technology training partnership with USDA's Center for Nutrition Policy and Promotion (www.usda.cnpp.gov) that allows interns to participate in new Dietary Guidelines activities leading up to public release and on MyPyramid computer and phone applications as part of their training.
- Dr. Nadine Sahyoun
  - Was a task force participant on the "Food Aid Quality Enhancement Project" sponsored by the non-governmental organization SUSTAIN in October 2008. This project was conducted to enhance the quality and nutrient profile of food aid sent overseas through the U.S. government's Food for Peace program (P.L. 480).
  - Has since 2008 been a member of the Meals-On-Wheels Association of America hunger coalition.
  - Along with her collaborators received a grant on Food Safety from the USDA National Integrated Food Safety Initiatives (NIFSI) and in conjunction with select communities across the United States, is writing a train-the-trainer manual targeting individuals involved in the food preparation, packaging and delivery of the home delivered meal program. A section also targets the clients themselves.
  - Received numerous media contacts: 2008, was quoted in the *Washington Post*, Healthday and several other media channels regarding research findings on glycemic index; 2009, was featured prominently in the *Seniorcare Connections* nutrition campaign newsletter which led to distribution of news release to about 600 media channels; 2008, was the narrator in a DVD on Community Connections, a study on increasing collaboration between the healthcare system and community-based services; and in 2010, she and a former student were quoted by a large number of media channels including CNN, the

Washington Post and *Arthritis Today* on their study that was published in December in the *Journal of the American Dietetic Association*.

- In 2008, Dr. Lucy Yu published a monograph entitled **Wheat Antioxidants**.

UMCP Department of Plant Science and landscape Architecture (PSLA) Extension Efforts

- Dr. John Lea-Cox
  - Was recognized in Spring 2008, by Epsilon Sigma Phi, an Extension professional organization, for his outstanding international Extension service in 2008. He received recognition for the Northeast Region of the United States, which includes Maryland, Delaware, New Jersey, Pennsylvania, New York, and West Virginia.
  - Was selected to receive the 2009 Outstanding Extension Educator Award presented by the American Society for Horticultural Science, and in Spring 2010, received the AGNR Alumni Chapter's Award for Excellence in Extension.
- In September 2009, Dr. Robert Kratochvil and Dr. Jose Costa propagated and supplied 225 portable boxes of wheat that served as the centerpiece for the "Urban Wheat Field" exhibit staged by the Wheat Foods Council on the National Mall in Washington, D.C. The effort included planting on five dates starting in mid-June and ending in early September which allowed five different wheat growth stages to be highlighted. Thousands of visitors attended the event.

UMCP Department of Veterinary Medicine (VTMD) Extension Efforts

Dr. Nathaniel Tablante continues to work on the development of innovative methods for carcass disposal and to conduct training sessions and seminars on that topic throughout the Eastern Shore and across the nation. He also assists with the Composting School at UMES for the Maryland poultry growers. Dr. Tablante has published 21 frequently asked questions to the public web site: http://www.extension.org/pages/Avian_Influenza_Homepage. The department faculty members work closely with the Delmarva Poultry Industry on poultry health-related issues.

VI. RESEARCH – MARYLAND AGRICULTURAL EXPERIMENT STATION (MAES)

MAES research faculty have been highly successful in obtaining research grants and contracts from federal agencies. They secured $22.8 M in 2008, $24.8 M in 2009, and $34.3 M in 2010 in competitive contract and grant expenditures, and their research publications have increased in both quality and quantity during that time. They have received numerous national and international awards in recognition of their research accomplishments.

The Office of Technology Commercialization (OTC) calculated that inventions disclosed from patents listed in AGNR had a net total income of $334,962 in FY2008; $274,890 in FY2009; and $185,281 in FY2010. AGNR continues to be one of the leaders in intellectual property disclosures on the UMCP campus.

UMCP IR-4 Project – Ms. Marylee Ross, Field Research Director of Maryland IR-4 Field Research Center at the Lower Eastern Shore Research and Education Center, conducts 20-25 field and greenhouse food use Magnitude of Residue trials each year on high value fresh market and processing crops that are important to Maryland economy. The IR-4 Project has been the major resource for supplying pest management tools for specialty crops for more than 40 years. It is a highly effective, collaborative effort among the state agricultural experiment stations, NIFA (formerly CSREES), the USDA Agricultural Research Service (ARS), the U.S. Environmental Protection Agency (EPA), commodity growers, and the crop protection industry. Its mission is to facilitate the availability of EPA-registered, safe and effective pest management products for specialty crop growers who produce high-value, small-acreage crops such as fruits, vegetables, nuts, and herbs and nonfood crops such as turf and ornamental landscape plants throughout the United States. The specialty crops have a value totaling approximately $43 billion, or about 46% of the total farm crop value in the United States.

Ms. Ross also conducts efficacy trials to provide the needed data for pesticide approval for use when a pest presents a serious economic or health-related problem. She has worked on such special crops as honey and beeswax, Maryland watercress, and Pennsylvania mushrooms. She has hosted tours of Maryland and Delaware facilities for USDA, EPA, and IR-4 personnel. She is a member of the IR-4 Education and Training Committee and assists with planning and implementation of regional and national education conferences. A National Training Conference was held in 2009 and another is being planned for February 2012. At the 2009 conference, Ms. Ross was presented with the first National Recognition of Excellence Award. IR-4 continues to expand participation in global organizations with respect to pesticide issues causing commodity trade barriers. In North America, IR-4's strong partnership with the Canadian Agriculture and Agri-Food Canada's minor use program, the Pest Management Center (PMC), has been a model of what IR-4 hopes will develop with other countries. In 2010 (marking our 16th year of cooperation), IR-4 and PMC initiated 18 new cooperative projects, consisting of numerous field trials that will result in harmonized MRLs for new products and new reduced risk tools for growers. Ms. Ross is a cooperator on two of these trials for 2010 and two for 2011.

IR-4 is assisting U.S. growers to compete in international trade by aiding the harmonization of pesticide use and country specific Maximum Residue Levels (MRLs) that often differ between the U.S. and its global trading partners. IR-4 received funding from USDA-Foreign Agricultural Service to conduct a global residue study to examine the influence of geographic location on pesticide residues. Ms. Ross was one of two Field Research Directors in the U.S. to participate in this Global trial that was performed in 27 countries. As well, she hosted visits from one of the African partners, Lucy Namu of the Kenya Plant Health Inspectorate Service, and Ben Rau and Luis Suguiyama from EPA. The IR-4 Project, with support from the International Crop Grouping Consulting Committee, leads an effort to update the EPA crop group regulation to incorporate "orphan" crops and develop new crop groups. The ultimate goal is to pursue a harmonized international crop grouping system such as Codex to facilitate international MRLs and trade. Ms. Ross has been one of three cooperators in the U.S. on this project since its inception has worked with Mi-Gyung Lee, Andong National University, Republic of Korea during its first year in 2008. On several occasions, Mi-Gyung visited the facility and participated in the trial.

Wye Research and Education Center (WREC) – The five Agricultural Experiment Station faculty at the WREC generated approximately $2.3 million in grants and contracts, completed more than 25 technical reports, presented at more than 21 seminars and lectures, and published over 10 peer reviewed technical papers. The Center hosted numerous regional, statewide, national and international tours and meetings. The Wye Angus Program continues to collaborate with the VA-MD Regional College of Veterinary Medicine and conducts ongoing research with UMES faculty.

Center for Agricultural and Natural Resource Policy – The Policy Center continues its legacy of applied economic policy research and outreach advising and educating Maryland's legislature and state agencies on critical agriculture and natural resources policy decisions. Center affiliated faculty also work with federal and international agencies and non-governmental organizations to provide scientifically and economically relevant policy analyses to inform decision-making. Recent efforts have included improved risk management for the agricultural sector; advancing the frontier of land use research and policy analyses; examining approaches to combating world hunger; and examining mechanisms to regulate biotechnology to improve societal welfare.

The Harry Hughes Center for Agro-Ecology, Inc. is an affiliated foundation of UMCP College of Agriculture and Natural Resources located at the Wye Research and Education Center. Its mission is to promote economically viable and environmentally sustainable farms and forests as Maryland's preferred land use. Through multiple funding sources ($1,465,046 from the USDA, $511,250 from the Maryland Higher Education Commission, $300,000 from the NFWF, and $350,000 collectively from The Abell Foundation, the Keith Campbell Foundation, the Grayce B. Kerr Fund and the Town Creek Foundation) from 2008 through 2010, the Center funds research of importance to the State, the Bay, to agriculture and forestry.

Notable reports are as follows: **(a)** "Least Cost Supply of Nitrogen Reduction from Two Important Agricultural Non-point Source Best Management Practices in Maryland" by Robert Wieland and Dr. Doug Parker which clearly demonstrates a practical way to target non-point source pollution mitigation so that a greater amount of pollution reduction is obtained per dollar spent. The report is being used by the Maryland Departments of Agriculture and Environment to better target dollars towards attaining the most from pollution reduction practices; **(b)** "Processing for Profits: Assessment and Comparison of Regional On-Farm Processing Regulations to Develop a State Food Policy that Accommodates Small-Scale Processing" by Ginger Myers, Luke Howard, Jane Storrs and Jody Menikheim which has already been used by the Maryland Legislature to make changes to some of the regulations that have thwarted the ability of Maryland's small farms to grow and process product on their property; **(c)** "Use of Nitrogen Stabilizers with N for Corn to Maintain Profitability While Reducing Environmental Impact" by Drs. Bob Kratochvil, Josh McGrath and Ron Mulford is showing important differences among commercially available stabilizer products. In two to three years, one of the products tested has shown that its inclusion with UAN and a 25% reduction in total N applied, produced a corn yield comparable to the currently accepted standard application method and N rate; **(d)** "Ensuring Environmental Safeguards Exist for Wood Based Bio-Energy Harvests" by The Pinchot Institute resulted in an assessment of wood-based bio-energy that yielded two reports – one being the results of the assessment where wood-based resources are most prevalent in Maryland and the second being a report of Guidelines to follow when putting a wood-based bio-energy harvest program in place so that the resource does not become depleted and multiple environmental benefits continue; **(e)** "Assessing Progress Toward Meeting Nutrient Reduction Goals for Maryland Coastal Plain Cropland" by Dr. Ken Staver although not completed has some implications/results that indicate that the GPS-based soil sampling approach being tested and the systematic stream baseflow nitrate sampling will provide a definitive assessment of how soil P levels have changed in the Green Run watershed (pre and post WQIA 1998) and will be definitive and relatively inexpensive to use.

With respect to the Choptank River, results indicate little change in subsurface nitrogen loads since the mid 1990's which is counter to nitrogen loads projected by the Chesapeake Bay Program watershed model. It is anticipated that the final results will be used to inform the Bay Model as the WIP Phase II plans are being developed.

In addition to funded research, the Center has implemented a strong and significant outreach and education effort over these three years. Of note were the five regional workshops held in 2009 to provide the public input for the Department of Natural Resources Strategic Plan for Forestry required under the Farm Bill. Compiling the input from the five workshops into a Forest Summit to which over 120 people came, decisions were made that were incorporated into the Strategic Plan being used for the first time to garner Federal dollars to help the Department implement key Bay-related management measures. The Center is in the midst of conducting five regional workshops to help all 23 counties and the hundreds of municipalities develop their Phase II Watershed Implementation Plans being required by EPA. Receiving over $40,000 to hold these workshops, the Center has been the catalyst to enhance cooperation and coordination among the State agencies that are responsible for providing the local governments with data, information and guidance in this part of the TMDL plan development. The result from these "kick off" workshops will be the completion of 23 county and the City of Baltimore Phase II plans that will be folded into a cogent State response back to EPA by 2012.

Center for Food Safety and Security Systems (CFS^3) – Established in 2007 on the UMCP campus, the Center and its Joint Institute for Food Safety and Applied Nutrition (JIFSAN) serve as a comprehensive, multidisciplinary resource for research, education and outreach services directed toward issues in food safety, food protection, and food security with special emphasis on the development of systems approaches for producing, processing, and marketing safe, nutritious food products. The Center focuses on complex, high priority regional, national and international food protection concerns that require multi-disciplinary and trans-disciplinary programs teams, particularly those that require effective collaboration between academic, government, and industry. The Center has established various relationships with surrounding research

institutions, federal agencies, professional societies, relevant trade organizations, and individual companies to become the preeminent center of knowledge and service in this academic area. Because of the anticipated emphasis on research and teaching related to food systems policy and regulations, it is reasonable to anticipate ongoing efforts in cultivating strong relationships with other agencies and with the food manufacturing industry. Working with multiple colleges within the UM System, other universities, federal agencies, and industry, the Center is striving to become the national leader in solving the food safety and security challenges that are emerging as the food and agricultural industries embrace a highly complex and rapidly evolving global marketplace.

Joint Institute for Food Safety and Applied Nutrition (JIFSAN) – JIFSAN is a multidisciplinary research, education and outreach program in food safety and applied nutrition, established by UMCP and the US Food & Drug Administration (FDA) in 1996. JIFSAN has established strong partnerships with units at UMCP and other universities, foreign and US government agencies, NGOs and industry, which leverage JIFSAN's resources and magnify its impact. During 2008-2010, JIFSAN obtained over $9M extramural funding to support its programs and provided $1.5M to support eight collaborative research projects between UMCP faculty and FDA scientists. JIFSAN's internship program supported over 50 UMCP undergraduate students to conduct research projects at FDA laboratories. Working with partner organizations, JIFSAN's education/outreach efforts include international food safety training programs to address the contamination problem at the source; a comprehensive online food safety risk analysis database (FoodRisk.org) and sponsorship of workshops and symposia. JIFSAN conducted 14 food safety trainings including Good Agricultural Practices, Good Aquacultutral Practices, and Commercially Sterile Packaged Food in 10 countries (China, Bangladesh, Costa Rica, Dominican Republic, El Salvador, Guatemala, Malaysia, Mexico, Morocco and Peru). The FoodRisk.org online database has reached food safety professionals in over 130 countries. JIFSAN sponsored/cosponsored 10 conferences. In 2010, JIFSAN signed an agreement with Bangladesh to establish a regional center in fish and shrimp research and education, and is working with Waters Cooperation to build an International Food Safety Training Laboratory at JIFSAN that delivers hands-on, laboratory-based training to food safety professionals in the application of state of the art, "fit-for-purpose" analytical techniques suitable for monitoring compliance with the broadest range of food safety standards. Through activities in these program areas, JIFSAN is able to reach out statewide, nationally and globally, and to continue playing a central role in creating knowledge for flexible solutions to ensure the safety of food supply in a changing world.

Northeastern Regional Aquaculture Center (NRAC) – NRAC is a jointly funded USDA-AGNR Center housed within the University of Maryland, College Park, College of Agriculture and Natural Resources' Department of Environmental Science and Technology. The NRAC is one of five jointly funded national centers with a mission to be a principal public forum for the discovery and dissemination of science and technology in aquaculture sciences. Specifically this Center focuses on the 12 northeastern states from Maryland to Maine and includes the District of Columbia. The priorities of the Center are industry driven seeking long-term public benefits through development and dissemination of profitable and environmentally responsible technologies. The quality of the science and outreach components is evaluated by scientists and extension faculty throughout the Northeast. As a part of AGNR since 2005, NRAC is funded through grants from USDA/CSREES with an averaging funding of about $735,000 per year. These funds support the competitive grants for aquaculture research and extension within the region. Key impacts of recent funding include the development and adoption of Best Management Practices for the shellfish industry, improving competiveness of fish farming by technological improvements and parasite control, evaluating the potential danger associated with transporting diseased fish across state boundaries and differing watersheds, and evaluating the potential of using the aquatic plant ornamental industry as a means of bioremediation to remove excess nutrients from residential developments before they enter major tributaries. All these projects, while regional and national in scope, impact the natural resources of the Chesapeake Bay.

UMCP and UMES faculty members are research-extension specialists who transfer their research findings directly to county-based extension faculty located in each county throughout Maryland. Many extension

faculty and some of the research-extension specialists are jointly funded by UMES and UMCP. The following examples are highlights of such efforts:

UMCP Department of Agricultural and Resource Economics (AREC)

a. Faculty scholarship and research activities and recognition

- Professor Richard Just: President, American Applied Economics Association
- Editorial Boards: Professor Erik Lichtenberg, editor, *American Journal of Agricultural Economics* (the leading field journal in Agricultural Economics); Associate Professor Roberton Williams, co-editor of *Journal of Public Economics*, co-editor and editorial council of *Journal of Environmental Economics and Management;* Assistant Professor Andreas Lange, editorial council of *Journal of Environmental Economics and Management;* Associate Professor Anna Alberini, editorial board of the *Review of Environmental Economics and Policy*, member of the Scientific Advisory Board of *Environmental and Resource Economics;* Professor Ted McConnell, member of the Scientific Advisory Board of *Environmental and Resource Economics;* Professor Ramon Lopez, editorial board of *Resource and Energy Economics*, editorial board of *Journal of Policy Reform*, chair of Publication Review Board of the International Food Policy Research Institute; Professor Robert Chambers, associate editor of *Journal of Productivity Analysis;* Professor Lori Lynch, associate editor *Journal of Soil and Water Conservation;* Associate Professor John Horowitz and Assistant Professor Andreas Lange, associate editors *Environmental and Resource Economics;* Associate Professor Ken Leonard, editorial board *Agricultural and Resource Economics Review; and* Associate Professor Jim Hanson, *Agronomy Journal* editorial board.
- Professor Robert Chambers lectured on Uncertainty and Decision-Making, University of Verona, Italy; was participant in European Union TEAMPEST project via University of Crete.
- Associate Professor Doug Parker**:** member of the Water Quality Steering Committee for the Mid-Atlantic Water Quality Program, the Bay Bank Advisory Committee, the eXtension Community of Practice Drinking Water Workgroup, the Eastern Shore Agricultural Cooperative, the USDA/CSREES National Committee for Shared Leadership, the Maryland Climate Change Commission, the Maryland Carbon Trading Advisory Committee, a Healthy Water Initiative advisor to EPA, and the Governor's Science Advisory Panel for the Chesapeake and Atlantic Coastal Bays.
- Professor Lori Lynch: member Governor's BayStat Science Advisory Panel for the Chesapeake Bay and Maryland/Delaware Farm Land Market Advisory Committee – USDA Farm Service Agency.
- Associate Professor Jim Hanson: member National Research Council Committee on Twenty-first Century Systems Agriculture, National Academy of Sciences.
- Professor Ted McConnell: review panel for the National Oceanic and Atmospheric Administration's estuarine restoration program.
- Assistant Professor Vivian Hoffmann: "Distributing Goods for Child Health through the Public Health System" presentation to Prime Minister Raila Odinga of Kenya at the Center for International Development, Harvard University.
- Assistant Professor Andreas Lange: Faculty Research Fellow, National Bureau of Economic Research.
- 2009 AGNR Faculty and Staff Excellence Awards: Assistant Professor Andreas Lange, Junior Faculty Award.
- 2009 AGNR Alumni Awards: Richard Just (Distinguished University Professor), Excellence in Instruction; Dale Johnson (Farm Management Specialist), Excellence in Extension.
- 2010 AGNR Alumni Awards: Professor Robert Chambers, Excellence in Instruction.
- Dale Johnson (Farm Management Specialist), University of Maryland International Programs' Landmark Award (for "exceptional long-term achievements in support of international life at the University").

- Associate Professor Anna Alberini, one of four UMCP campus faculty to receive the inaugural Graduate Faculty Mentor of the Year Award (2010).
- Associate Professor James Hanson, 2008 Distinguished Service Award, National Association of County Agricultural Agents. (Honorees are the top 2% of the membership of NACAA as chosen by their peers and Directors of Extension of the various states.)
- Assistant Professors Vivian Hoffmann (Ph.D., Cornell University) and Charles Towe (Ph.D., University of Maryland) joined the department in Fall 2008.
- Associate Professor Roberton Williams, who joined the department in Fall 2009, is a Faculty Research Fellow of the National Bureau of Economic Research, a Senior Fellow at Resources for the Future and former Andrew W. Mellon Fellow of the Brookings Institution. He is a co-editor of both the *Journal of Environmental Economics and Management* and the *Journal of Public Economics*. Dr. Williams was previously associate professor in the Department of Economics at the University of Texas.

b. Agricultural and Applied Economics Association Awards (awards from the leading professional association in the discipline)

- Distinguished University Professor Richard Just – 2008 Quality of Research Discovery Award.
- Associate Professor Doug Parker – 2008 Outstanding *Choices* Article Award.
- Professor Marc Nerlove – 2010 invited Centennial Address to the 100th Annual Meetings of the AAEA
- Professor Erik Lichtenberg – 2010 AAEA Fellow and 2010 Publication of Enduring Quality Award
- Professor Lori Lynch – 2010 Director of AAEA
- Distinguished University Professor Richard Just – 2010 AAEA Applied Risk Analysis Section Award for the Outstanding Publication on Risk Analysis and the 2010 WAEA Distinguished Scholar Award
- Associate Professor Jim Hanson – 2010 Director of NE Extension Section, AAEA

c. Fundraising/Grantsmanship

- AREC achieved a 60% increase in grant funding from sponsored projects over the period 2008 to 2010.
- In 2009, associate professor Doug Parker assumed leadership of the 2008-2012 USDA Mid-Atlantic Regional Water Quality Coordination Project, a multi-state project with UMCP as lead institution and total funding of $2.4 million. Doug is the lead economist on the 2009-2015 USDA Specialty Crops Research Initiative, a multi-institution project with total funding of $12 million. Doug was recently awarded a $446,641 grant by USDA-CSREES for work on precision irrigation and nutrient management.
- Assistant professor Charles Towe, co-P.I. on a $5 million grant from the National Science Foundation.
- Associate professors Doug Lipton and Doug Parker, Chesapeake Bay Policy and Economics Technical support, MDA, $247,000.
- Associate professor Ken Leonard received a $188,849 grant from the National Science Foundation and a $65,534 grant from NASA**.**
- Professors Erik Lichtenberg and Lars Olson received one of six grants awarded nationally by the USDA-Economic Research Service-Program of Research on the Economics of Invasive Species Management for their project “Risk Factors for Invasive Pest Introductions in Commodity Imports,” $172,000. They also received a grant of $347,240 from the USDA, Beltsville Agricultural Research Center for their project "The Economic Value of the Beltsville Agricultural Research Center's Systematics Program."

UMCP Department of Animal and Avian Sciences (ANSC)

- Research in the ANSC Department is focused on four areas: nutrient utilization & metabolism, genetics and cell biology, reproduction and development, and pathobiology & infectious diseases. ANSC faculty members have secured more than $20 million in research funding from 2004-2010.
- The academic environment in the department is stimulating. ANSC is home to three annual lecture series. ANSC faculty members are productive and are publishing the research findings in top-rated journals, including *Nature*, *Science*, *Proceedings of the National Academy of Science (PNAS)*, *Stem Cells*, *Development*, *Journal of Immunology*, *Journal of Biological Chemistry*, and *Endocrinology*. Five ANSC faculty members have greater than 1,000 citations with their research publications.
- ANSC is the #2 department within AGNR in terms of current active grant funding, second only to Plant Science and Landscape Architecture (PSLA). ANSC extramural grant support from 2007-2010 increased nearly two-fold (95% increase) relative to 2003-2005. ANSC grant submissions are increasing exponentially, reaching $18,252,567 already for 2011 start dates compared to $479,177 for 2003 (a 34-fold increase). Most of ANSC extramural grant support comes from NIH, NSF and NIFA.
- The State budget for ANSC now accounts for less than half of total expenditures by the ANSC department. ANSC total expenditures from external funding have increased by 66% in the past five years and averaged $2.5M/year for FY 2008-2010.

UMCP Department of Environmental Science and Technology (ENST)

- Ecological treatment systems, also known as living machines, are a form of biological wastewater treatment designed to mimic the cleansing functions of wetlands that produce beneficial by-products such as edible and ornamental plants, aquaculture products and/or energy, while treating agricultural, industrial and domestic wastewater to high standards. Anaerobic digesters use animal, human or plant waste materials to create renewable energy (methane 'biogas') while reducing water pollution, greenhouse gas emissions, and odor. ENST research focuses on the development of low-cost digestion systems that can be used by farmers both in the United States and the developing world. Additionally, algal turf scrubbers are another example of constructed ecosystems used for wastewater treatment. ENST research has focused on economic assessment of the technology and scale-up potential for utilization in the Chesapeake Bay watershed.
- Understanding changing environments is vital for alleviating undesirable ecological and human health effects and to exploit potential positive effects. Environmental change provides a great opportunity to study nonequilibrium systems and thus test hypotheses of how physical and biotic interactions affect all ecological units, from individual species through to ecosystem processes. Several ENST research efforts are centered on the ecology of native and invasive mosquitoes in wetlands and drainage systems. Because human health and ecosystem health are intrinsically linked, species such as mosquitoes that are affected both by human disruptions (e.g., climate change, land use change, and globalization) and that present social, economic, and health risks, are key subjects for study.
- The ENST agricultural nutrient management team's research activities focus on agricultural productivity and environmental quality as they relate to soil fertility, nutrient management, and water quality. ENST faculty are currently conducting research on a range of questions including in-situ treatment of agricultural drainage; sensor based variable rate fertilizer application; manure management in no-tillage production systems; animal manure storage to reduce nutrient losses to the environment; and persistence of pathogens, steroids and pharmaceuticals in the environment resulting from land-applied animal manures and sewage sludge.
- While it is generally accepted that coastal wetlands worldwide are threatened by increases in sea level, most research to date has focused on salt and brackish marshes. Little is known about the current status of tidal freshwater marshes or how these diverse and productive wetlands may respond to increases in water level and salinity due to rising sea level. The overall goal of ENST research is to understand responses of tidal freshwater marshes to sea level rise.
- ENST has on-going projects designed to quantify and better understand rates of carbon sequestration in restored tidal marshes such as the Blackwater National Wildlife Refuge and similar march ecosystems along the Chesapeake Bay. An estimated 8,000 acres of tidal marsh have been lost since the 1930's at

Blackwater NWR due to sea-level rise, subsidence, erosion, salt water intrusion, and herbivory by invasive species. Current tidal marsh loss rates are estimated at 150-400 acres per year.

UMCP Department of Nutrition and Food Science (NFSC)

Faculty members within NFSC continue a tradition of strong research activities related to health and wellness and food safety and protection. In 2010, total funding of $5.7M was received.

Dr. Robert Buchanan is conducting research projects on use of risk assessment techniques to enhance Hazard Analysis and Critical Control Point (HACCP) system and studies on the microbiological safety of fresh produce. Dr. Thomas Castonguay researches mechanisms that control food intake and explain dietary obesity in part as a failure of glucoregulation. Dr. Wen-Hsing Cheng studies novel roles of selenium in genome maintenance in the context of cancer and aging. Dr. Robert Jackson is concentrating on research related to international nutrition, developing standards for defining the metabolic syndrome in various ethnic groups, and researching the nutritional problems and habits of Arabs of the Middle East, including Kuwait, Egypt, and Lebanon. Dr. David Lei's research concentrates on nutrient control of gene expression by using molecular and cellular approaches. He has also initiated research in the area of food safety and obesity. Dr. Martin Lo is conducting research on biotechnology and process engineering for the advancement of food safety and value-added food products. Dr. Jianghong Meng conducts important, internationally-recognized food safety research related to comparative genomics and antibiotic resistance of common food borne pathogenic bacteria. Dr. Nadine Sahyoun investigates the relationship between dietary intake, nutritional status, and chronic disease outcomes using epidemiological techniques, particularly among an older adult population. Dr. Sahyoun also works internationally on nutritional status and food security issues, particularly in Lebanon. Dr. Qin Wang is designing and constructing micro- and nano-scale structures from food polymers (proteins and polysaccharides) for encapsulation and antimicrobial composites development using nanotechnology as a tool. Dr. Liangli Yu is continuing research on chemistry and biological activities of selected food factors related to the safety, quality and health properties of foods.

NFSC faculty received four research awards in 2008-2010:

- Dr. Wen-Hsing Cheng – University of Maryland Graduate Research Board (GRB) research award in 2009 and Gamma Sigma Delta Excellent in Research Award in 2010;
- Dr. Qin Wang – GRB research award in 2010; and
- Dr. Liangli Yu – the 2008 Young Scientist Research Award from the American Oil Chemist Society and the 2008 Excellence in Research Award from the College of Agriculture and Natural Resources Alumni Association, University of Maryland, College Park.

UMCP Department of Plant Science and Landscape Architecture (PSLA)

- Current faculty members conduct education, extension and outreach, and research in the areas of plant ecology, biodiversity and conservation; plant genomics and physiology; plant production and protection; and landscape architecture and management.
- Dr. Peter H. Dernoeden, professor: In November 2007, received the "Fred V. Grau Turfgrass Science Award" from the Crop Science Society of America in recognition of his significant contributions in turfgrass science and the "Outstanding Researcher Award" from the Northeastern Weed Science Society (January 2008).
- Dr. John Lea-Cox, associate professor: In November 2009, received a $5.16 million grant from the USDA National Institute of Food and Agriculture to investigate "Precision Irrigation and Nutrient Management for Nursery, Greenhouse and Green Roof Systems Using Wireless Sensor Networks." This research will focus on the development of the next generation of tools to precisely monitor plant water use, allow for better control of irrigation water applications, and increase the efficiency of water and nutrient use by commercial growers.
- Dr. Gary Coleman, associate professor: In August 2009, received a $3.2 million grant from the National Science Foundation (NSF) for a project titled "An Integrated Study of Nitrogen Cycling and Storage in

Poplar." Nitrogen storage and cycling is an important trait that has been identified to have the potential to enhance sustainable yield and quality of biomass from trees – a potential source of biofuels. Through grant collaboration with Bowie State University as part the NSF grant award, the Biotechnology Summer Institute was developed for training in biotechnology laboratory techniques for minority high school and undergraduate students and high school teachers. The first two sessions of the Institute were held in summer 2010. The program is expected to run for the four years of the grant.

- Dr. Sonja Duempelmann, assistant professor in the PSLA Landscape Architecture program: In Spring 2010, received the one-year Dumbarton Oaks Fellowship – the most prestigious national and international award in the field of garden and landscape studies and is the premier international award for landscape architecture historians.
- In 2010, the Department recruited three new research faculty through transfers: Professor James Culver and Associate Professor Shunyuan Xiao, both from the reorganization of the Institute for Bioscience and Biotechnology Research (IBBR); and Associate Professor Irwin Forseth, from the reorganization of the College of Chemical and Life Sciences.
- PSLA, in collaboration with the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA APHIS), developed the concept for the Center for Plant Health and Biosecurity. The proposal for the Center was submitted in Fall 2010 for administration approval. This development was in support of the Department's goal of developing strategic alliances with area federal and state research and regulatory organizations to provide opportunities for mutually beneficial research and teaching programs, and in support of the College's efforts to develop programs in plant diagnostics and plant protection.
- Dr. Jose Costa: In Spring 2009, was presented the AGNR Faculty Research Award. He has developed a leading plant breeding research program which contributes to the advancement of science and provides direct benefits to our Maryland grain producers. He is also nationally and internationally recognized as a leader in the identification of molecular markers and their use in selection programs. His research is primarily focused on wheat and barley improvement.
- Dr. John Lea-Cox: In Spring 2009, was presented the AGNR Integrated Research and Extension Excellence Award. He has developed a dynamic research program to generate the research-based information needed to answer the nursery and greenhouse industries' questions on sustainable production issues. He developed several web-based information systems for use by both students and green industry professionals.
- Dr. Peter Dernoeden: In Spring 2010, received the Dean Gordon Cairns Award from the College of Agriculture and Natural Resources (AGNR). The Cairns Award is the premier award to recognize AGNR faculty who make outstanding and creative contributions. Dr. Dernoeden is recognized as a leading world authority in the field of integrated pest management of turfgrasses and has been at the forefront of research in turfgrass science.

UMCP Department of Veterinary Medicine (VTMD)

The Department of Veterinary Medicine has made great strides in the areas of research and grant funding during the past three years. The total department research expenditure from grants and contracts for the last three years was $16,618,349. The research conducted by the faculty is published in most respected scientific journals. The department faculty and students published 56 peer reviewed research papers in 2010. This department continues to lead efforts in the study of avian influenza that occurs periodically on Maryland's Eastern Shore. Dr. Daniel Perez leads the USDA-funded national consortium on avian influenza, which received a renewal of its $5M grant in 2007. He is also conducting research into the mechanisms of avian influenza virus transmission to humans and development of live attenuated vaccines for avian influenza. Dr. Siba Samal continues his work on vectored vaccines for avian influenza and other avian and human viruses, under a $4.1M contract with NIH. The department operates a USDA/CDC-approved state-of-the-art Biosafety Level-3 facility to enhance their research into avian influenza, Newcastle disease, and other animal diseases. The department has also added other new state-of-the-art equipment to improve its quality of research. In addition, the department has hired two new research faculty in the last three years and is currently conducting a search for another research faculty.

Departments Supported by Research in Other Colleges – The MAES program supports three departments housed outside AGNR in an effort to better serve Maryland's citizens.

Department of Entomology (ENTM)

MAES/UME research in entomology is organized into several areas of emphasis. First, it is a leader in the study of organisms genetically modified (GMO) for insect pest management. In 2009, for example, MAES/UME faculty in this area received three of the nine grants awarded by USDA for GMO risk assessment, for a total of $1.2M (Dively, Lamp – Effect of Bt corn on aquatic insect communities; St. Leger – Genetic containment of transgenic fungi). In addition, Dr. St. Leger received major grants from the National Institutes of Health and the National Science Foundation for his work on genetic engineering of fungi that attach pest insects.

A second broad area of emphasis is basic and applied research in agro-ecology, sustainable agriculture and pest management, and the relationship of these to environmental stewardship. In 2008-2010, our MAES/UME faculty in this area received major grants from the National Institute of Food and Agriculture (Hooks- Organic agriculture); National Science Foundation (Gruner – Community ecology); Environmental Protection Agency (Dively – Insecticide use and honey bees); and USDA Animal and Plant Health Inspection Service (Raupp – Introduced emerald ash borer beetle). Drs. Dively, Hawthorne and Gruner also received substantial funding from USDA for their research on threats to honey bees, and several faculty (Hooks, Raupp, Mitter) were part of a team that has advanced to the final stage of the NSF competition to host a $30M National Center for Environmental Synthesis.

A third Entomology MAES/UME faculty area of emphasis is insect genetics and evolution. In 2008-2010, this group published papers in the top-ranked journals *Nature* (Shultz – Evolution of all arthropods) and *Proceedings of the National Academy of Sciences* (four papers: Mitter – Climate change and leafminer evolution; Shultz – Insect development and evolution; Thorne - Termite evolution; Via - Pea aphid genetics/evolution), and received three major grants (Mitter – Evolution of fungus-growing ants; Shultz- Insect development and evolution; Via – Pea aphid genetics and evolution) from the National Science Foundation.

Total numbers of refereed journal articles: 2008 = 41; 2009 = 33; (2010 not yet available)
Total external grant funding (from ORAA): FY08 = $717,574; FY09 =$1,116,908; and FY10 = $3,343,880
Major student awards: NSF Pre-doctoral Fellowships - Alex Forde (Gruner), Mercedes Burns (Shultz)
Student placement in faculty positions: Ian Kaplan (Denno), Purdue; Akito Kawahara (Mitter), University of Florida
Major Faculty Awards: National Distinguished Achievement in Extension, Entomological Society - Michael Raupp; UMCP Distinguished Scholar-Teacher – Raymond St. Leger; and Founder's Lecturer Award, The Society of Invertebrate Pathology – Raymond St. Leger

Department of Cellular Biology and Molecular Genetics (CBMG)

Faculty members (Caren Chang, Todd Cooke, Charles Delwiche, Steven Hutcheson, Zhongchi Liu, David Straney, Heven Sze and Stephen Wolniak) in Cell Biology and Molecular Genetics (CBMG) in the College of Computer, Mathematical and Natural Sciences are conducting basic plant research on a wide range of questions critical to the advancement of agricultural biotechnology. Their research encompasses aspects of plant growth, development, stress response, host-pathogen interactions and evolution using the latest methods in molecular genetics, cell biology, bioinformatics, and biochemistry. Findings from these studies can impact strategies for the improvement of human nutrition, the enhancement of stress tolerance in crops, and the production of biofuels.

Featured highlights:

- Dr. Sze was elected as a Fellow of the American Association for the Advancement of Science (AAAS), in recognition of her distinguished and long-term contributions to biology. Dr. Sze's

studies reveal how ion dynamics and transport are integrated with the plant life cycle with respect to growth, development, reproduction and adaptation. Her model system is the tiny weed *Arabidopsis thaliana*.

- Dr. Hutcheson attracted prominent media attention for his discovery of an unusual bacterium that has the potential to produce 75 billion gallons a year of carbon-neutral ethanol. The bacterium *Saccharophagus degradans*, found in the Chesapeake Bay, is capable of breaking down biomass into sugars, which are then converted into ethanol and other biofuels. These findings were widely reported in feature stories in the popular press, including headline stories in more than 600 newspapers across the U.S. In March 2008, Dr. Hutcheson hosted Maryland Governor Martin O'Malley for a tour and press conference in which the Governor declared: "We must continue to invest in Marylanders like Steve Hutcheson and in their revolutionary ideas to protect our environment, create jobs, and improve lives."
- Dr. Liu received a $1.56M plant genome grant from the National Science Foundation (NSF) for studying flower and fruit development in strawberry, *Fragaria vesca*, with the ultimate goal of improving plant reproduction. Dr. Liu is known for her studies on the molecular mechanisms that control floral organ identity and morphology. With support from this genome grant, her lab made a major switch from *Arabidopsis thaliana* as a model system to *Fragaria vesca*, which is an ideal model for many important fruit and nut crops. Dr. Liu is using the state-of-the-art genomic and genetic techniques such as laser capture microdissection and next generation sequencing to generate genomic and genetic resources for *Fragaria vesca*.

Other accomplishments:

- In 2008-2010, the research in Dr. Delwiche's lab resulted in 10 refereed research publications. The Delwiche lab investigates the early evolution of land plants, employing high-throughput DNA sequencing and computational analysis. Understanding evolutionary history can help predict how changes in biodiversity impact the productivity of ecosystems.
- Dr. Wolniak's laboratory, which studies the mechanisms of gamete development in the fern *Marsilea*, discovered that a molecule called spermidine specifies the developmental fate of the male gametophyte in *Marsilea*. This work was published in and highlighted on the cover of *The Plant Cell*, the premier journal for plant research.
- Dr. Straney, who studies the regulation of gene expression and development in response to a fungal plant pathogen called *Nectria haematococca*, co-authored a high-profile paper reporting on the genome of this pathogen.
- Dr. Cooke made major contributions to undergraduate education projects funded by a grant from the NSF Division of Undergraduate Education ($315,515).
- Mandy Kendrick, a graduate student in Dr. Chang's lab, was awarded an AAAS Mass Media Science and Engineering Fellowship, providing Mandy with an internship writing science articles for *Scientific American* in New York City. The Chang lab studies the molecular and cellular mechanisms of signaling in response to a stress hormone called ethylene.

Publications:

Collectively, the faculty published 17 refereed publications in 2008; six in 2009; and 12 in 2010. Many of these papers were published in high impact journals, including *Current Biology*, *PLoS Genetics*, *The Plant Cell*, *Plant Physiology*, *Plant Journal* and *Journal of Biological Chemistry*.

Research Grants:

Faculty members were funded by numerous research grants, the majority of which were from the NSF. Other federal grants were from the National Institutes of Health (NIH), Department of Energy (DOE), and U.S. Department of Agriculture (USDA). There were 10 new federal grants awarded to the faculty in 2008-2010: one in 2008 ($198,000), five (totaling $2.77 M) in 2009, and four (totaling $2.19 M) in 2010. The total dollar amount (to UMCP) of all active research grants for 2008-2010 was $10.49 M.

Other Selected Activities:
Many of the faculty served on editorial boards (e.g., for *Molecular Plant*, *The Arabidopsis Book* and *Faculty of 1000*), gave invited seminars at universities, gave invited talks at national/international meetings, and were involved in the organization of local, national and international symposia. Dr. Liu served as a Program Director and Cluster Leader for the Developmental Mechanisms Cluster at NSF in 2007-2009. Dr. Wolniak served as a Program Director and the Cluster Leader for the Cell Biology Program at NSF in 2008-2009. Dr. Chang served on the North American *Arabidopsis* Steering Committee (an eight-member committee elected by the North American *Arabidopsis* research community) for a four-year term that ended in 2010.

Department of Family Science (FMSC)
The College of Agriculture and Natural Resources (AGNR) currently supports four faculty in the Department of Family Science, located in the School of Public Health (SPH). Dr. Bonnie Braun's appointment is split 80% as the Herschel S. Horowitz Endowed Chair and Director of the Center for Health Literacy in SPH, and 20% as professor in the University of Maryland Extension. Her research focuses on family health literacy and policy; health and food insecurity; and rural, low-income family health and well-being. She published three book chapters, 11 journal articles, two research reports, and six Extension publications/proceedings and General Assembly testimonies, and presented 42 Extension/health literacy research talks. She was PI on five USDA, MAES, Maryland Department of Health & Mental Hygiene grants totaling $600,000. Dr. Braun was promoted to full professor and received the American Association of Family & Consumer Sciences Award for Services and the UMCP SPH George Kramer Practitioner Award.

Dr. Jinhee Kim is an associate professor focusing on personal and family finance, outcomes of financial stress, and the impacts of workplace financial education. She is developing collaborative extension financial initiatives with numerous government entities in South Korea. She published one book chapter, two journal articles, presented eight research talks, and developed and delivered five different financial counseling, resource management, savings, and financial education programs. She was PI on seven grants funded by the USDA, Department of Defense, UMES, and the Investment Company Institute Education Foundation totaling almost $240,000. Dr. Kim received the Mid-Career Award from the American Council on Consumer Interests. The Association for Financial Counseling and Planning Education recognized The Personal Finance Seminar for Professionals, of which Dr. Kim is the team leader, as the Outstanding Educational Program nationally.

Dr. Elizabeth Fost Maring, faculty research associate, leads the AGNR/SPH "Healthy Homes" statewide initiative involving research, education, and public policy aimed at reducing health hazards in the home/community environment. She was selected by UMCP to co-lead the Health-Smart Impact Team and develop the Healthy Homes program for the State of Maryland. She has published, or has under review, six professional publications including a seminal report to the Centers for Disease Control and Prevention on healthy homes initiatives. She provided over 10 research talks, and received three grants totaling approximately $360,000, with another $140,000 under review. She received the George F. Kramer "Practitioner of the Year" award from the UMCP School of Public Health.

Dr. Stephanie Grutzmacher, faculty research associate, focuses on health and nutrition literacy, social welfare policy, food security and nutrition education for low-income populations, health program planning and evaluation. She had five professional publications either published or under review and 22 research talks. She had six grants totaling over $571,000 and has conducted nine Maryland Extension workshops. She was selected as one of the University Gemstone Program mentors.

MAES Activities: Competitive Grants, etc., FY 2008-2010 – The MAES provided to the faculty competitive grant support totaling $367,928 for 2008/2009 and $438,780 for FY2010. These funds were used to support research in animal health, vaccine development, sensory and nano-bio-tech development research for nutrition and food safety, genomics, environmental and renewable energy and ecosystem sustainability,

and conservation biology in Chesapeake Bay region. MAES also spent about $670,000 towards purchasing badly needed research equipment to help support the faculty research in all four of its research centers encompassing eight research facilities. In addition, MAES helped spearhead organizing of faculty research teams to apply for multi-million dollar grants. In this effort, MAES was successful in linking our faculty with the scientists at the USDA-BARC for initiating additional joint team projects. All these efforts helped increase the AGNR's Research funding from about $24 M in 2009 to $34 M in 2010, which is a significant boost. Finally, MAES in collaboration with AGNR's Extension component (UME) sponsored Northeast Research and Extension Directors of the Land Grant Universities' Summit in Baltimore in 2010. They selected the "Climate Change and Water Resources" as the theme for the Summit. This has lead to the organizing of the Northeast Climate Change Committee that will have a Forum in March 2011 and Maryland is playing a leadership role for this effort. The objective of the Forum is to bring together the faculty from Northeast Land Grant Universities and form transdisciplinary and multi-institutional research teams. This effort is meant to help build successful teams and apply for multi-million dollar integrated regional research and extension related to Adaptation and Mitigation of Climate Change.

UMES Research Accomplishments

- **External Funding** – UMES-AES faculty members have been highly successful in acquiring external funding. From 2008-2010, funds continued to be awarded primarily from USDA and NOAA. The most recent funding by year has totaled approximately $4.1M in 2008, $3.5M in 2009, and $4M in 2010. These amounts do not include those mentioned earlier that were acquired by UMES-UME faculty. SANS operates almost totally on external support since state monies for land grant funding is minimal for the 1890 campus. Thus, a request for assistance from the Board of Regents for these purposes will be made in the final section of this report.
- **Capacity Building Grants** – UMES was highly successful in competing with other 1890 land grant institutions for USDA Capacity Building Grants. With the deferment of 08-09 funding and combining both years in 2009-2010, UMES received the greatest amount of funding for all schools.
- **Research and outreach programs for UMES' Agriculture Experiment Station and UME office** were showcased at the UMES Ag Field Day, which was sponsored by the USDA Natural Resources Conservation Service. Personnel from various USDA agencies were in attendance, and USDA Natural Resources Conservation Service's Maryland State Conservationist Jon Hall served as the keynote speaker.

  Dr. Joe Leonard, Jr., assistant secretary for civil rights toured the UMES campus, held talks with university officials, and met with agriculture honors students. Other high profile USDA visitors to the campus include Dr. Elisabeth Hagen, under secretary for food safety; Mr. Jon Hall, Natural Resources Conservation Service Maryland State Conservationist; Mr. Anderson Neal, Jr., interim director of the office of advocacy and outreach; and Ms. Mona Adkins-Easley, higher education institutions program lead.
- **The USDA 1890 National Scholars' four-day orientation program** was held on the UMES campus. Twenty-five new scholars and approximately 60 USDA personnel, many of them officials of various USDA agencies, were in attendance. Two of the 25 scholars will attend UMES.
  - Agriculture Secretary Tom Vilsack announced the winning proposals for the 2010 Conservation Innovation Grants (CIG). Included was Dr. Arthur Allen's $1 million award. UMES was the only 1890 institution awarded.
  - Dr. Jeanine Harter-Dennis is the 2010 recipient of the coveted Delmarva Poultry Industry's Medal of Achievement for her nearly 30 years of teaching and research at UMES.
- **Food Science and Technology Center** – Industry support is being sought to help support research in the Food Science and Technology Center. The Perdue Foundation is funding two $5,000 Perdue Food Science and Technology Scholarships at UMES. Activities to support entrepreneurs and small processors with product and process development for locally produced foods are leading to efforts to establish a center to better provide this kind of support to the regional agricultural and food processing industry.

- **The Living Marine Resources Cooperative Science Center (LMRCSC)** has, for nearly 10 years, been preparing students from primary school through the doctoral level to be the next generation of marine and fisheries scientists through intensive, hands-on research experiences. Delaware State University, Hampton University, Savannah State University, the University of Miami, Rosenstiel School of Marine and Atmospheric Sciences, and the University of Maryland Center of Environmental Science Institute for Marine and Environmental Technology (formerly University of Maryland Biotechnology Institute Center of Marine Biotechnology, (UMBI-COMB) are UMES' partners in the Center. Annually, the Center provides funding for 10-12 research projects, which are faculty-driven but student focused, providing data for the completion of M.S. or Ph.D. degrees as well as internship experiences for undergraduates. Center research has resulted in 143 publications and more than 500 presentations by students and faculty at national conferences. Sixty nine (69) such projects have been completed since the Center's inception, several of which have led to multi-faceted lines of research. To date, nearly 600 K-12, undergraduate, and graduate students have been supported by this program in pursuit of their educational goals. All three of LMRCSC's most recent doctoral graduates have been hired by NOAA.
- **NSF CREST Center for the Integrated Study of Coastal Ecosystem Processes and Dynamics in the Mid-Atlantic Region** is comprised of four institutions: UMES (the lead institution), the Virginia Institute of Marine Science, the Institute for Marine and Environmental Technology, and Morgan State University. The project will be funded for five years (2010-2015) for a total of $5M. The CREST Center's research focuses on: 1) land use and climate change on water quality; 2) water quality changes on microscopic algae and seaweed, including harmful species; 3) environmental factors on zooplankton populations, which serve as food for commercially and ecologically important fish species; 4) low dissolved oxygen and pollution on fish populations such as Atlantic croaker; and 5) water quality changes on the infection of blue crab by the parasite *Hematodinium* and on blue crab distributions in Maryland's coastal bays.
- **Subsurface application technology for dry poultry litter research** is being conducted by the UMES faculty team of Drs. Arthur Allen, Fawzy Hashem, Joe Pitula, and Eric May in collaboration with USDA-ARS scientists, Drs. Peter Kleinman, Clinton Church and Ray Bryant. A $600,000 Capacity Building Grant will support research, education, and extension activities geared toward protecting the air and water quality in the Chesapeake Bay Region.
- **Watershed Level Examination of Urea –** Drs. Bryant, Kleinman and Buda assisted the UMES faculty team of Drs. Eric May, Arthur Allen, and Fawzy Hashem in developing a Capacity Building Grant proposal for $500,000 to research the development of a watershed level examination of the use of urea as fertilizer and the production of the biotoxin domoic acid.
- **Water Quality Research** – ARS scientists and UMES faculty teamed on another grant proposal that brought an additional $2 million to UMES for water quality research associated with minimizing phosphorus and arsenic movement to the Manokin River Watershed. During the reporting period, approximately 10 refereed publications have been generated and approximately 15 posters and orally-presented papers have been jointly presented at mainstream conferences by graduate students and scientists.
- **Food safety research at UMES is the primary focus in the Food Science and Technology Ph.D. program.** *Salmonella spp.* are recognized as major food-borne pathogens in the U.S. causing an estimated 1.4 million cases of salmonellosis and over 500 deaths annually. Antibiotic resistance increases the mortality rates and has been linked to overuse or misuse of antibiotics not only in human medicine, but also in veterinary medicine and agriculture. Thus, UMES students and faculty are establishing an antibiotic resistance surveillance system to determine antibiotic resistance-associated genes. Research done with *Vibrio* sp.in oysters resulted in temperature dependent growth, survival and death data which were requested to be submitted to WHO for inclusion in their risk assessment work.
- **UMES Trial Garden** is operated yearly and provides information and services to enhance the profitability of the green industry in the lower shore region and to improve the quality of life for local residents.
- **Sea vegetables, often called seaweeds**, have been traditionally used as food in Asia, but not in the U.S. Emphasizing the importance of seaweed harvesting as a business, results from the seaweed studies at UMES have reached aquafarmers in the Delmarva region.

- **Childhood Obesity** – UMES researchers are conducting a study that explores the dietary patterns and activity levels of children, age two to five, who are enrolled in select child care centers on Maryland's Eastern Shore. The overall goal of the project is to create best practices for promoting healthy eating and physical activity among young children.
- **The Soybean** is an important crop on the Delmarva Peninsula and studies continue in cultivar breeding for improved seed yield, insect resistance, and response to bradyrhizobia inoculants.
- **Bioenergy** research has been initiated at UMES to examine several annual and perennial grass species as potential bio-feedstock for production in the Delmarva region.
- **A recent study in poultry science,** performed by a UMES faculty, revealed that using non-traditional litter amendment, such as superabsorbent polymers may be a labor-saving alternative to traditional litter amendments to control ammonia emissions in poultry houses.
- **Molecular Characterization and Predictive Modeling of Salmonella ssp. Recovered from Processed Poultry.** A total of 181 *Salmonella spp.* recovered from different parts of processed Cornish game hens were serotyped and tested for antibiotic resistance and the pulsed-field gel electrophoresis profile.
- **Integrating Specialty Crops in Organic Culture on Delmarva** has been the focus of one study wherein one researcher explored various organic practices to facilitate the safe production of selected specialty crops on the Delmarva Peninsula.
- **Microbial Models of the Effect of Storage Temperature on the Growth and Survival of Vibrio Species in Oysters** have been developed at UMES, where researchers have worked to develop predictive models for the behavior of *Vibrio vulnificus* and *Vibrio parahaemolyticus* in oysters.
- **UMES-APHIS Agreement –** A memorandum of understanding between the UMES School of Agricultural and Natural Sciences and the USDA's Animal and Plant Health Inspection Service Plant Protection and Quarantine division will facilitate the research, development, and marketing of agricultural products; leverage resources between the UMES community and USDA APHIS; and actively address workforce trends and needs.

VII. DISTANCE EDUCATION AND INTERNATIONAL PROGRAMS

AGNR Web Conferencing Initiatives – AGNR faculty, staff, students, and clientele are enjoying the benefits of web conferencing including effective and meaningful collaborations, just-in-time learning, increased schedule flexibility, virtual open houses, statewide forums, and reduced travel expenses and time. The College has seen institutional advantages with this strategic technology such as faster decision making, more effective partnering with international institutions, an extended reach of programs, and a meaningful virtual work environment. This technology is enabling AGNR faculty and staff to work with new external collaborators in ways that were not previously possible.

AGNR Distance Learning Unit – For the past three consecutive years, the Distance Learning unit of AGNR's Office of Communication and Information Technologies has developed and delivered a month-long videoconference-based professional development series for the College's faculty and staff located throughout the state of Maryland. This series has helped educate them in furthering their communication, education, and information technology skills. To reduce costs and increase effectiveness, the professional development series is delivered to various sites throughout the state using videoconferencing and Internet streaming technologies enabling over 300 participants each year.

Symons Hall Distance Learning Room – Two offices and a closet in the basement of Symons Hall were converted to a distance learning room. This facility builds on AGNR's successful web conferencing technologies and provides an effective and engaging space for faculty and staff to comfortably communicate and collaborate with remote participants. Many statewide internal meetings and trainings have benefited from this initiative.

Dissertation Defense Conferencing – AGNR graduate students and UMCP students from other colleges use AGNR's web conferencing technologies and the distance learning room to enable their committee members away on travel or from other institutions to participate in dissertation defenses.

eXtension – eXtension is a national project funded by USDA and designed to have only the "best of the best" available on-line. Objective, research-based and credible informational materials from 74 land grant universities across the US are included. AGNR through University of Maryland Extension (UME) played not only a key role in the establishment of eXtension, but has now made significant contributions to the publications distributed world-wide through the Internet. More than 300 of AGNR's professionals participate in eXtension. eXtension started with just 10 key topics in 2006 and now has more than 50 topics containing more than 20,000 Internet searchable, peer-reviewed contributions. Due to the high respect of UME professionals within the UDSA extension community, UME has made a contribution (authorship or reviewing) in 30 of those topic areas. eXtension has aided in formation of multi-state extension teams who have partnered with research teams for USDA integrated research and extension proposals that were funded for national efforts. UME has also been a pioneer in implementing key eXtension social-media tools into their own websites.

Food Defense Risk Analysis E-learning Program – AGNR was awarded a $540,000 USDA grant to design, develop, pilot, and evaluate e-learning courses and online resources focusing on Food Defense. The goal of this project is to provide an integrated multifunctional research, education and extension approach to better secure the safety and defense of the nation's food supply, utilizing the food safety risk analysis paradigm to empower food safety professionals to better defend the food chain. The grant team identified and met with an expert panel from industry to determine the emerging and most pressing food defense issues as well as prevention approaches. The grant team meets regularly over AGNR's webconferencing technology and uses AGNR's Confluence wiki as its primary communication and collaboration technology.

General Forestry Course – This course is delivered by either traditional correspondence course paper or web based format and designed for individuals wishing to increase their understanding of forests and forest management. The course specifically targets Maryland forest landowners and other citizens with an interest in the principles and practices of forestry. However, others such as USDA professionals, high school teachers, environmental educators, and other natural resource professionals have taken the course nationwide, with 285 completing the paper version and 85 completing the web based version. A certificate is awarded upon successful completion of the course, with certificate signed by the Dean, instructor and course coordinator. More information can be found at:
http://www.agnr.umd.edu/extension/elearning/generalForestry/

Institute of Applied Agriculture (IAA) web conferencing initiatives – IAA faculty are using AGNR's web conferencing technologies to enable non-traditional and remote students to access IAA courses. Students can access the classes live (at the time the lecture is being delivered) or they can access the archived recording. The use of web conferencing has increased retention, student performance, and student satisfaction.

International Distance Education – AGNR had extensive activities in International Distance Education during 2004-2008, with the impact exceeding expectations. The team of AGNR faculty in the International Program in Agricultural and Natural Resources (IPAN) collaborated with Stavropol State Agrarian University (SSAU) in Russia on a three year USAID-funded Higher Education Development grant that concluded at the end of 2008. SSAU developed an on-line certificate program for small agribusinesses as a part of the grant, and in 2010 they launched an on-line Institute of Continuing Professional Education with 29 specialties for certification of professionals in fields including veterinary science, agronomy, food technology and commerce. In 2010, the IPAN team also wrapped up a USDA-Foreign Agricultural Service (FAS) grant that established an on-line scientific journal with a focus on distance education (http://eng.agromagazine.msau.ru/). Fourteen issues of the journal have been published, and it received a prestigious award in Russia. Approval was received by the Russian Ministry of Education such that articles published in the journal would meet the Ministry's requirement for a Ph.D. candidate to publish their research work prior to receiving their degree.

Streamed Media - Seminar Series on Protection of Agriculture and Natural Resources – A seminar series consisting of presentations from visiting lecturers from the private sector and government were recorded and made available via streaming media technologies. While these lectures were focused to help the undergraduate students meet their course requirements, they were also re-purposed for anyone interested in the field of Plant Protection. This successful seminar series was last held in Fall 2010 and is planned to be repeated in the coming years. More information about the seminar and access to the video streams can be found at http://psla.umd.edu/AboutUs/seminarsPlantHealth.cfm

Wiki Technology Initiatives – AGNR's use of wiki applications continues to grow. This technology provides the opportunity for AGNR faculty and staff to communicate and collaborate with internal and external audiences in novel ways. Over 65 wiki spaces have been created for various purposes and projects including collaborative educational resource development, search committee management, workshops, grant funded projects, various IT support requirements, and general organization resources.

Multi-State Distance Education Program – UMES continues to be a participating member with the 1890 institutions who offer a multi-state distance education program. It is designed as a minor program or a program that awards successful candidates a certificate in financial planning. Curricula are developed by inter-institutional faculty teams.

International Programs in the Department of Veterinary Medicine – The VMRCVM has a Memorandum of Understanding with TamilNadu Veterinary and Animal Sciences University (TANUVAS), Chennai, India, to conduct reciprocal faculty and student visits for the purpose of enhancing the research and education programs of each institution, and received a National Competitive Grant in the amount of $60,000 from USDA under the US-India Agricultural Knowledge Initiative Program for this purpose. Under the program, active students and faculty exchange is ongoing on a regular basis, which has been mutually beneficial. Additional collaborations are ongoing with educational and research institutions in China and Chile. Two veterinary students traveled to the Panda Breeding Research Base in Chengdu, China in 2010 and more student participation is being planned for 2011. In 2010, the Center for Public and Corporate Veterinary Medicine (CPCVM) on the College Park campus signed a Memorandum of Understanding with the United States Department of Agriculture's Foreign Agriculture Service to provide technical assistance to USDA's Caucasus Animal Health Program, and CPCVM faculty traveled to the Republic of Georgia and Armenia as the initial steps of the MOU, which includes funding for future student travel. The initial step of the MOU includes a grant for $28,600, with expectations of expansion of the grant after an initial assessment phase. The CPCVM is also chairing the first Veterinary Medical Session at the 17th World Congress for Disaster and Emergency Medicine being held in Beijing, China in 2011, highlighting the critical role of veterinarians in global health, disaster response, and One Medicine. Dr. Daniel Perez is conducting avian influenza surveillance in Argentina and Guatemala through funding from NIH and the government of Argentina. Three students, funded by the government of the People's Republic of China, are currently pursuing doctoral degrees – two under the guidance of Dr. Yanjin Zhang, and one under Dr. Xiaoping Zhu.

JIFSAN – The 2008 through 2010 period was an extremely active time for JIFSAN international training programs. The Good Agricultural Practices (GAP), which is designed to help foreign countries ensure the safety of fresh produce shipped to the U.S., was offered 11 times in the following locations: Costa Rica (2), Honduras (2), Dominican Republic, Guatemala, Mexico (3), El Salvador, and Peru. The Good Aquacultural Practices (GAqP), directed to seafood safety, was offered five times in Thailand, Indonesia, Malaysia, and Bangladesh (2). In addition, a group of elite trainers from Bangladesh traveled to the U.S. to receive advanced training in Maryland. The Commercially Sterile Packaged Foods (CSPF) has been offered twice in Morocco and China. In 2010 JIFSAN assisted with a series of programs for Codex Capacity Building that were conducted six times, reaching students from Australia, Senegal, Zambia, Mozambique, Serbia, Vietnam, Laos and Cambodia. JIFSAN has matured to assume a significant leadership role for food safety and quality training throughout the world.

ARGENTINA

For several years AGNR has had joint programs with Argentina – an avian influenza project and a winter nursery that allows wheat breeding for two crops a year (rather than one if it had to rely on our climate). In 2010 Dean Wei led a delegation to Argentina to explore expanding our joint programs. As a result, we are now initiating joint programs on two important plant diseases, one with soybeans and the other with wheat. The diseases are a problem in both countries and by cooperating we expand the gene pools that may identify varieties with resistance increasing the possibility of developing new lines with disease resistance that then can be incorporated into our commercial varieties. The programs have received initial funding from both Argentina and UMCP.

CHINA

2+2 Student Transfer Programs – AGNR is in its third year of enrolling top transfer undergraduate students from China Agricultural University (CAU), who enroll at UMCP after two years of study at CAU. Twenty-two CAU students transferred to UMCP, with six graduating to date.

AGNR also entered into 2+2 programs with Northwest Agricultural & Forestry University (NWAFU), Jiangnan University, and South China Agricultural University.

Graduate education and faculty training – Selected Chinese students who graduated from some of the famous universities in China, such as CAU and NWAFU, have been admitted to various AGNR graduate programs. Junior faculty from CAU and NWAFU also spent several months up to one year working with AGNR faculty in their laboratories on collaborative projects.

Student Internships at Panda Breeding Research Base – Two Virginia-MD Regional College of Veterinary Medicine students interned at the Panda Breeding Research Base in Chengdu, China in the summer of 2010 as part of a partnership program among the Panda Base, UMCP, and the College of Agriculture and Natural Resources. VMRCVM is a joint venture between UMCP and Virginia Tech.

REPUBLIC OF GEORGIA

USDA Cochran Fellows – In 2010, IPAN trained several Republic of Georgia farm managers in Agribusiness Management through technical instruction, practical field observations, and "hands-on" experience. The Cochran Fellows Program is administered by USDA.

Evaluation of Animal Health Program – The USDA-Foreign Agricultural Service (FAS) has a program in the Republic of Georgia to help improve the health of livestock and increase farm income from livestock. They have provided funding for two faculty members in AGNR to assist in developing and analyzing the data from an evaluation program to determine the success and acceptability of the program, which continues until the end of the 2011 fiscal year.

Curricula Modernization – From 2006 through 2009, AGNR led a program funded by USDA/FAS to assist the only agricultural university in the Republic of Georgia (Georgia State Agrarian University-GSAU) to begin modernizing its curricula. Much of the course material was 40 years old and lacking in current concepts and methods. GSAU has made major revisions in its programs, including plant production, soil science, veterinary medicine, and water resource management. In total, 16 curricula were revised including new syllabi and 32 power point presentations were developed. With UMCP's assistance, 15 AGNR extension bulletins were translated into Georgian and printed for use in university classes and with agriculture producers.

IPAN faculty edited a GSAU textbook for soil scientists in Republic of Georgia, "Morphological Characteristics of Soils."

RUSSIA

Distance Education – The team of AGNR faculty in the International Programs in Agriculture and Natural Resources (IPAN) completed a Higher Education for Development grant (from USAID) on a

distance education project in Russia in 2009. Over three years, IPAN and Stavropol State Agrarian University (SSAU) established a distance learning center and conducted a series of workshops for Russian faculty members concerning use of advanced course management software and teaching tools, a series of seven continuing education seminars offered by Internet-based videoconferencing for practicing veterinarians, and helped develop a certificate program for small agribusinesses.

Agro-Journal – The IPAN team received a grant from USDA/FAS to establish an on-line scientific journal with a focus on distance education (http://eng.agromagazine.msau.ru/). The journal has been established, an editorial board developed, and 14 issues have been published.

IPAN faculty members continue to teach a video-conference course on environmental issues and culture in USA and Russia. In its 8th year, the course is co-taught by faculty at UMCP and Moscow State University of Environmental Engineering (MSUEE).

STUDY ABROAD

In 2009, IPAN was awarded one of two $6,000 grants as the result of a campus-wide competition to develop a study abroad course. The Office of International Programs funding allowed IPAN, in collaboration with UMCP undergraduate student Hokuma Karimova, to develop "Azerbaijan Environmental Research/ Summer Internship." Six students and one faculty participated in the first summer. Khazar University in Baku, AZ provided local support.

During 2010, IPAN developed two additional study abroad programs to be offered during Summer 2011. These programs are in collaboration with National Taiwan University (NTU) in Taipei, Taiwan, and Northwest Agricultural and Forestry University (NWAFU) at Yangling, China.

TAIWAN

In 2010, AGNR initiated a program with the government of Taiwan for which they provided support for several programs at UMCP. UMCP's AGNR and College of Education conducted the two programs with National Taiwan University and Tam Kang University. The courses were jointly developed and taught to UMCP and Taiwanese students simultaneously by video-conference. The students not only learned the subject matter, but also learned about different teaching styles, expectations and culture. The classes were highly successful. One was an advanced graduated course on nutritional genomics and the other was on teaching English as a second language.

AWARDS

AGNR's Dr. Mark Varner, Dr. Robert Hill, Brad Paleg and University of Maryland Extension's Dale Johnson , received the University's 2009 Landmark Award in honor of their exceptional long-term achievements in support of international life at the university. International team member, Dr. Pavel Sorokin, a professor of agribusiness management at Moscow State Agro-Engineering University, was also named in the award. Most notable was their contribution to the Russia Distance Education project.

Richard Weismiller, Patricia Steinhilber, Robert Hill and Raymond Miller received a plaque in appreciation for cooperation and outstanding support of International Programs at Moscow State University of Environmental Engineering, October 2008.

Ray Miller, Bob Hill, and Mark Varner received honorary degrees in 2008 from Stavropol State Agrarian University (SSAU), Russia, for their contributions to the Distance Education program at SSAU. Dale Johnson received a certificate recognizing his contribution in establishing the Agri-business management program at SSAU.

UMES INTERNATIONAL PROGRAMMING

UMES President, Dr. Thelma Thompson, has been intricately involved in the development of numerous international programming initiatives. Reporting of these initiatives would be done through the Office of

International Programs, which is administered by Dr. Emmanuel Acquah, the Executive Director for International Programs.

International Standards Organization – Over the years, UMES professor Anugrah Shaw has developed an extensive national and international network to support her research on protective clothing for agricultural workers. Her research includes work related to standardization of test methods, development of performance specifications, and studies related to the development and evaluation of personal protective equipment for hot climates. Dr. Shaw was responsible for the creation of an extensive database that includes data for more than 130 fabrics that were evaluated at UMES. This database has been used to develop an online system for work and protective clothing. Dr. Shaw serves as the technical contact for ASTM and ISO standards and performance specifications for protective clothing for pesticide applicators. In 2010 ASTM International F23 Committee on Protective Clothing recognized Dr. Shaw's contributions related to development of standards for protective clothing for pesticide users. Dr. Shaw currently serves on the Institute of Medicine (IOM) Committee on Personal Protective Equipment for the Workforce (COPPE). She also served on the IOM Committee on the Certification of Personal Protective Technologies in 2010. Dr. Shaw was the NC Regional Nominee for the National Multi-State Research Award.

International Conferences – During the reporting period, UMES professor Anugrah Shaw was invited speaker and/or presenter at conferences in Kuala Lumpur, Malaysia, Arnhem, Netherlands and West Raffia, Bahrain.

International Professional Exchanges – International professorial exchanges have occurred on numerous occasions between UMES and other campuses. Research conducted with Dr. Knut Straetkvern from Hedmark University in Norway working in the Food Science and Technology Program resulted in a publication in a peer-reviewed journal.

Requests for Assistance from the USM Board of Regents
UMES

Since UMES receives no state match for its land grant programs, it is in danger of losing much of the primary financial support it receives for all of its land grant initiatives. (Please refer to pages 2-3 for the explanation of the urgent request for state match for 1890 research and extension programs.) Effective 2006, the required non-federal match is ~$1 million for the research programs and ~$1 million for extension. Presently, because of the seamlessness of MCE, 1890 Extension is able to meet its required match with assistance from UMCP, but cannot do so indefinitely. UMES certifies that its AES is in compliance by using the state line salary and benefits of every faculty member and staff in the Departments of Agriculture, Food and Resource Sciences, and Human Ecology, as well as any donation to these departments, and all farm income. This is certainly legal, but not the intent of the legislation. The intent of Congress in imposing the required non-federal match for agricultural research and extension activities at 1890 land grant institutions is to support, expand, and promote programs in research, extension, and education related to food and agricultural sciences while providing maximum flexibility to the institution. According to the legislature, the actual authority to determine the use of these matching funds is the appropriate university official responsible for the administration of food and agricultural science research, education and extension programs.

In consideration of the tremendous impacts received for the Eastern Shore because of the federal government's entitlement funds to UMES and the dedicated and consistent hard work of faculty to acquire external funding, it seems only fair that the state would recognize these contributions and provide the state match. Otherwise, eventually, when the federal funds can not be matched, incrementally they will be diminished. The federal funds primarily provide for faculty who teach our classes, and these individuals also staff the graduate programs, garner the external funding to provide infrastructure and operating costs, equipment, financial funding for graduate and undergraduate students, provide indirect costs from the grants for general use by the university and serve the research and outreach needs of the Delmarva communities. Just image how much more UMES-AES and Extension could do with state support.

One critical concern is the Food Science and Technology program, which has great potential to be an outstanding asset for the agricultural and food-based economies of the Eastern Shore. The faculty are employed on soft money, yet we have invested state and USDA funds to build an excellent facility and initiated a popular and productive Ph.D. program that could all be diminished or lost if the outstanding faculty we have been fortunate enough to employ would leave for jobs with more security. The state land grant match provided would certainly be utilized to provide state lines for this new and vital graduate program.

The Eastern Shore of Maryland and UMES have a centralized geographic location in the seafood industry, with both Chesapeake Bay and Atlantic coastal fisheries activity nearby. Consequently, there is a viable regional seafood industry in place, including landing sites, processing plants, distributors and end users, such as seafood restaurants. But the seafood industry on the Eastern Shore is constantly being challenged by resource availability, consumer trends, negative media coverage, seafood safety concerns, competing imports, trained labor shortages, and access to industry-related education and support. The seafood industry of this area is important to local employment and small community economies, dictating a cultural way of life. The region is synonymous with seafood products and heritage, which results in seafood buyers, consumers and heritage tourism.

Currently there are no organized educational programs or training available to regional seafood entrepreneurs that would offer business oriented assistance. Though the seafood industry remains resilient, processors, buyers, packers, distributors, retailers, restaurants and area tourism would all benefit from organized research and educational programming and outreach services. As mentioned earlier, there is no state funding for food science faculty in a newly built facility that would be vital to research and educational programs and training at the center. At some stage UMES hopes to realize considerable financial support

from industry, but it is difficult to attract industry investment when the state of Maryland will not even invest by way of a state match.

Both UMES and UMCP could use state funding for the flexibility required to address the critical needs that are frequently arising that impact the state's poultry industry. The industry is governed by continuously increasing regulations. Research, particularly as it relates to the industry's impact on the environment and public health, is critical; yet, for example, UMES has a line for only one poultry scientist to work with other biologists, environmentalists, microbiologists, agriculturalists, etc., to address the needs of the poultry industry on Delmarva.

Finally, 1890 Cooperative Extension formula funds support (a) salaries and benefits of field staff, county advisors, campus specialists, and Extension administration; (b) travel; (c) operation and maintenance costs; and (d) program development and delivery expenses. If support for much of this could be provided from the state match, more assistance could be provided to citizens with the federal funding used to quickly respond to rapidly evolving critical and emerging issues of the state. There has never been a time when safety and security, resource/environment, and nutritional information promoting healthy lifestyles are more critical to citizens. The state match would allow 1890 extension a substantially improved chance to provide high impact programs to meet critical public needs and to meet the needs for additional staffing for the Rural Development Center.

The 3 x 5 UMES-UMCP Colleges of Agriculture Cooperative Solution
A Request for Regents' Support

The respective colleges of agriculture at UMES and UMCP share a proven history of collaboration in the best tradition of land grant institutions. We are guided by a common mission, serving the citizens of our state in areas of economic and social relevance. Both institutions offer degree programs in the broad areas of food science and environmental studies because these areas are very important to the citizens of Maryland as they impact our overall quality of life and general health and well-being. In the former, it is easy to recognize how the need for educational and technical expertise in food science, safety, and technology is tied to our overall economy and national security. Nothing short of water and air purity could impact our personal and corporate national security more than our food resources. Likewise with the latter, the value our state and region places on our treasured natural resources, the Chesapeake Bay and Maryland's coastal bays, is without question. Therefore, it is appropriate for Maryland's two land grant institutions to invest in such areas. With our shared goal to provide the best scientific, educational, and technical assistance to citizens locally and nationally, each institution would like to enhance the strengths of existing programs in research, education, and Extension in both of these important areas. Yet, we must avoid duplication that invariably occurs were each institution to pursue these goals independently. The responsible and accountable action of both institutions is to maximize our shareholder's (all Maryland citizens) wealth by minimizing inputs while optimizing their return on their investment.

We propose, for our two state land grant institutions, an approach that builds synergy, maximizes efficient and effective use of existing infrastructure, and provides a unique opportunity to capitalize on our respective strengths. Central to our goal is a 3 x 5 plan wherein three joint UMES-UMCP tenure-track faculty appointments are made each year over a five year period. Cost will be $1 million per year for salary and start-up costs. After the five year plan, base funding for salary, benefits, and student support will be $300,000 per year plus state approved increases associated with normal COLA and merit.

These 15 faculty will create state and national impacts by improving industry and consumer food safety, security and profitability; providing intellectual property rights and patents; procuring grants and contracts; and educating a new generation of Maryland citizens in the areas of food safety, security, and technology and the environmental and economic stability of our Chesapeake and coastal bays. All of these efforts will maximize the state's return on investment.

A precedent has been set through our existing inter-institutional Extension faculty joint appointments. This model provides for a seamless success that the two institutions have enjoyed for over two decades regarding human, physical, and fiscal capital leverage. Building this approach to the level of research and teaching is the next step. These proposed joint appointments will create a necessary critical mass of faculty that could offer a full complement of shared undergraduate and graduate level courses, provide graduate training, expand research capacity, supply technological training to industries and governmental agencies, and provide an educated workforce in the two critical target areas.

This kind of approach is much more cost effective to the state than if both institutions were to pursue these objectives independently. For example, in the area of food safety and technology, UMES has a strong investment to serve the seafood industry through its extension and research activities that concentrate on resource availability, competing imports, trained labor shortages, and access to industry-related education and support. In addition, both UMCP and UMES have strong investments in understanding the biology and identity of food-borne pathogens in processed and unprocessed foods. Joint appointments could bridge the knowledge gap between these two very important sectors of our food system and in so doing would compliment and strengthen both UMES and UMCP programs. With this interdisciplinary and inter-institutional approach, we would be much more competitive for large national center or institutional grants from such funding sources as NIH, NSF, and, in this case, Homeland Security because of the national security implications. A similar case could be made for the Chesapeake and coastal bays environmental research and coastal community development.

In terms of educational programming, these appointments would allow us to leverage existing resources through the use of current and future distance education technologies. Faculty would be able to develop and deliver real-time, live courses to students on both campuses utilizing course management tools such as WebCt, Centra, and Polycom in a cost-effective and efficient manner. UMES recently dedicated a 37,250 square foot state-of-the-art Food Science and Technology Center featuring laboratories, classrooms, and processing facilities, and initiated the Ph.D. program in Food Science and Technology. The Center also houses the USDA/ARS Poultry Food Safety Research Lab, which is a component of the Microbial Food Safety Unit of the Eastern Regional Center in Wynmoor, Pennsylvania. UMCP College of Agriculture and Natural Resources has taken the lead in a campus-wide Center for Food Safety and Security Systems and management of the federally funded JIFSAN. Together these assets provide a foundation for expanding a synergy between the two land grant institutions within our state that potentially would strengthen both programs.

Funding this program would provide the following benefits:

- Enhance and increase collaboration between institutions.
- Strengthen and compliment both programs.
- Minimize duplication of state funded programs.
- Better serve citizens of Maryland.
- Derive important economic and quality of life impacts on local and national agendas.
- Strengthen regional economic development through applied research and fundamental research.
- Improved graduate education – shared advising and faculty collaborations.
- Competitive advantage for collaborative and interdisciplinary projects.