



SUSTAINABLE FISHERIES MANAGEMENT PROJECT (SFMP)

Summary of the 2016-2018 directed
study course for Graduate Students
studying integrated fisheries
management.



JUNE 2018



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Cover photo: The Fall 2017 Graduate Study Group (Credit: Coastal Resources Center)

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ACRONYMS

CCM	Centre for Coastal Management
CEWEFIA	Central and Western Region Fishmongers Improvement Association
CRC	Coastal Resource Center
CSLP	Coastal Sustainable Landscape Project
DAA	Development Action Association
DFAS	Department of Fisheries and Aquatic Science
DMFS	Department of Marine Fisheries Sciences
DQF	Daasgift Quality Foundation
FtF	Feed the Future
GIFA	Ghana Inshore Fishermen's Association
GIS	Geographic Information System
GNCFC	Ghana National Canoe Fishermen's Council
HM	Hen Mpoano
ICFG	Integrated Coastal and Fisheries Governance
MESTI	Ministry of Environment Science and Technology
MOFAD	Ministry of Fisheries and Aquaculture Development
NDPC	National Development Planning Commission
NGOs	Non-Governmental Organizations
SFMP	Sustainable Fisheries Management Project
SMEs	Small and Medium Enterprises
SNV	Netherlands Development Organization
SSG	SSG Advisors
STWG	Scientific and Technical Working Group
UCC	University of Cape Coast
URI	University of Rhode Island
USAID	United States Agency for International Development
WARFP	West Africa Regional Fisheries Development Program

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1. BACKGROUND

1.1 Origins of the graduate education program

The design of the USAID Ghana Sustainable Fisheries Management Project (SFMP) contained a substantial component of capacity development for project implementing partners and collaborating institutions. This included the proposal that “the University of Cape Coast (UCC) faculty and staff will take advanced degree training at URI on fisheries stock assessment, GIS systems and modeling, climate adaptation, coastal and fisheries law and management.” UCC began to identify and select candidates for Ph.D. and Master’s Degree studies at the outset of its parallel Coastal Management Capacity Building Support Project in 2015.

High level visits by UCC to URI early in 2016 and by University of Rhode Island President David M. Dooley to Ghana in April 2016 were solidified by the University of Rhode Island and the University of Cape Coast signing a Memorandum of Understanding, which mentioned “facilitating opportunities in graduate degrees for UCC at URI (MA, MSc and Ph.D.), development of short term training for UCC graduate students at URI and development of joint research and development and extension projects.”

Following the signing of the MOU between URI and UCC to strengthen ties between the two institutions, a high-level delegation traveled from UCC to URI to explore a wide range of additional opportunities to collaborate in areas beyond fisheries and oceanography, including business and pharmacy. The new appointed chancellor at UCC visited URI April 26-28, 2017 along with a team of deans and faculty from various UCC departments. The visit focused on establishing guidelines for implementation of a graduate dual-degree program between URI’s College of Environment and Life Sciences (CELS) and UCC’s Department of Fisheries and Aquatic Sciences (DFAS) in areas of fisheries, ecology and environmental sciences. The deans of the UCC’s business pharmacy and engineering departments met with their counterparts at URI to explore opportunities for collaboration. URI curricula from the various URI departments were shared with the UCC team. The UCC delegation was composed of the following attendees:

- Prof. Joseph Ghartey Ampiah - Vice-Chancellor
- Prof. Isaac Galyuon - Chairman, Project Management Board and also Provost, College of Distance Education
- Dr. Denis Aheto - Project Manager and also Staff of the Department of Fisheries and Aquatic Sciences
- Dr. Noble Asare - M&E Coordinator and also Head, Department of Fisheries and Aquatic Sciences
- Prof. Johnson Nyarko Boampong - Dean, School of Biological Sciences
- Prof. Ernest Okorley - Dean, School of Graduate Studies
- Prof. Edward Marfo-Yiadom - Dean, Business School
- Prof. David Essumang - Dean, School of Physical Sciences

Implementation of the agreement began in SFMP Project Year 2 (FY 15) with acceptance of Evans Arizi to URI’s College of Environment and Life Science’s Ph.D. in Biological and Environmental Sciences. He began his studies in the Spring of 2016.

Two additional individuals from UCC were accepted for Master degree training at URI starting in the Fall of 2016. Ivy Akuoko studied in the Department of Marine Affairs (policy). Evelyn Takyi joined the Biological and Environmental Sciences program, concentrating on Fish Genetics. In addition, two master’s degree candidates from the Ghana Fisheries

Commission, Rosina Cobbina and Vida Osei, were accepted into the Marine Affairs Department and Biological and Environmental Sciences program, respectively. They returned to positions at the FC after their studies. All four master's students and the Ph.D. candidate are funded through the USAID Ghana SFMP.

In addition, the University of Cape Coast used funds from its own Coastal Management Capacity Building Support Project to train 10 Ph.D. candidates, including a semester abroad at URI. Four of these students attended URI during the Fall Semester of 2017. The SFMP complemented these resources by paying tuition for class work including ecological statistics, fisheries stock assessment, fisheries oceanography, and topics in aquaculture. A fifth student arrived as a Visiting Scholar for the Spring 2018 semester.

All of the students had to apply for USAID J-1 visas managed through the USAID Trainet system, which integrates with the US Department of Homeland Security Student and Exchange Visitor Program. This process was coordinated by Kim Kaine of the Coastal Resources Center, and Esinam Attipoe of the University of Cape Coast Center for Coastal Management. Students were given pre-arrival briefings in Ghana and orientations by Kim Kaine upon arrival at URI as part of the CRC Ambassador program provided to international visitors.

1.2 Course Objectives

A one-credit directed study class was carried out each semester for the Ghana degree candidates, the UCC Ph.D. candidates who were studying abroad for a semester, and two students from Malawi pursuing a Master of Environmental Science and Management (MESM) degree as part of the Malawi FISH project implemented in part by the Coastal Resources Center. This class was offered during the Fall of 2016, Spring 2017, Fall 2017 and Spring 2018. Two additional USAID funded students from Indonesia---Heva Yumi and Fitri Zuliani were incorporated into the group. An additional five Ph.D. students are anticipated as visiting scholars for the Fall 2018 semester, so a similar regular group meeting will be held.

The course listing was as follows:

Orientation for international students to coastal, marine and fisheries studies and issues in Rhode Island and Southeastern New England, with comparisons to contexts and approaches in home countries and regions, focusing on East and West Africa. Group discussions and exchange of ongoing learning in individual programs of studies, tutorials on information sources, current events and study skills based on interests of participants. (Independent Study) Pre: permission of instructor.

During the Fall of 2016, the course was listed in the Marine Affairs Department as an undergraduate course, MAF 499. In the subsequent three semesters, the Department of Natural Resources Science offered the course as NRS 591 in the Fall and NRS 592 in the Spring. CRC alternated the lead facilitation of the directed study between Dr. Donald Robadue Jr, co-principal investigator of the USAID/Ghana Sustainable Fisheries Management Project, and Dr. Elin Torell, leader of CRC's international program. Recent URI graduate and CRC staff member Dr. Cathy McNally also participated throughout, providing guidance on strategies for navigating through URI requirements and expectations for academic performance and thesis preparation.

The aim of the directed study was to help new and continuing international students pursuing graduate degrees associated with CRC projects including Ghana and Malawi become established in their study and living situations, augmenting the support provided by their respective departments. It sought to help them remain engaged with each other and as

members of the network of researchers and professionals involved in their respective sponsoring projects at home.

Hundreds Attend President Dooley’s Lecture in Ghana at the University of Cape Coast (April 18, 2016)

Hundreds of people attended Friday’s public lecture by URI President David M. Dooley at the University of Cape Coast (UCC) in Ghana and later witnessed the signing of a memorandum of understanding between CRC/URI and UCC’s Department of Fisheries and Aquatic Sciences and Centre for Coastal Management, during the president’s first trip to the West African nation.

During his talk, President Dooley said his vision upon assuming office as president of URI was to vastly increase internationalization and globalization of the school and its students because the world we live in is not just interconnected but interdependent and hyper-connected. Such hyper-connectedness includes a global economy and society in which citizens communicate in seconds and not in days or weeks. The complexity of the modern world includes great challenges, such as climate change, which is beyond one single nation’s ability to solve alone, he continued.

“With these global challenges also come global opportunities. We need to focus more on the opportunities,” he told the audience.

He continued: The less-developed world is not responsible for the lion’s share of atmospheric changes, but it and the entire world have to live with the consequence. That is not the only challenge with global consequences: War in one country affects the entire world; the outbreak of diseases, quality of the air we breathe, sustainability of the food supply, disputes and conflicts are all global issues, he said.

“We are no longer insulated by borders and oceans as we once were, but in all this, are global opportunities and demand for higher education,” President Dooley said. President Dooley continued his inaugural trip to Ghana Saturday when he met with four doctoral and two master’s students bound for URI on a USAID-funded scholarship program. The graduate students went through an intensive and competitive selection process to emerge as recipients of the scholarships. President Dooley congratulated and welcomed the students in advance to URI and hoped they make the most of the experience.

Two USAID projects, USAID/Ghana Sustainable Fisheries Management Project (SFMP) and USAID/UCC Capacity Strengthening Project are collaborating in this effort.. (Source: <http://www.crc.uri.edu/2016/04/hundreds-attend-president-dooleys-lecture-in-ghana/>)



Figure 1 President Dooley meets with incoming URI graduate students from Ghana in April 2016

(Photo credit: Patricia Mensah, CRC/SFMP)

The course oriented incoming students to the work of the Coastal Resources Center and its partners and collaborators at the University of Rhode Island, including approaches to integrated coastal and fisheries management efforts in Rhode Island, the US and internationally, and kept students abreast of ongoing developments. The course was also aimed at helping students build and integrate their study, research and professional skills. Throughout the four semesters, activities included weekly group meetings, presentations, field trips and interactions with local visiting scholars, experts and staff. Access was provided to extensive collections of documents and references on fisheries and coastal management compiled by CRC for Ghana and Malawi. The course provided numerous opportunities for students to build communication skills through preparing required periodic reports and class presentations during student led seminar sessions.

2. HIGHLIGHTS FROM THE FOUR SEMESTERS

2.1 Highlights Fall 2016, MAF 499

The course met for an hour at the Graduate Village community center on Thursday afternoons. The group was introduced to the history of the Coastal Resources Center, asked to review their plans for their studies and discuss concerns they had. The students also had the opportunity to interact with colleagues from UCC. Two different study tours for UCC faculty took place early in the semester. Prof John Blay, Thomas Robin Davis (BSc Biological Science; Lab. Tech. Diploma) Senior Technician, Prosper Dordunu (BSc Laboratory Technology) - Laboratory Technology), UCC, were at URI to learn about the Operation and Maintenance of AAS and Gas Chromatograph Instrumentation. Prof. Edward Obodai and Mr. Joseph Debrah, DFAS, UCC were obtaining training on Oyster Culture and Shellfish Management.

Evans Arizi, the Ph.D. student who arrived for the Spring Semester of 2016, was featured in the annual report of the University of Rhode Island Foundation. (see Figure 2 and the article at https://issuu.com/foundationpubs/docs/urif_annual_report_2016_1_f on page 12.)



Figure 2 Evans Arizi featured in the URI Foundation Annual Report

Evans' presented his plans for dissertation research to the class, partly as a demonstration of communication skills and presentation techniques for the group to critique. All the other class participants had multiple opportunities to give short presentations throughout the semester.

The group participated in a fun training event on traditional harvesting and cooking hardshell clams in Rhode Island, sponsored by the African Alliance of Rhode Island. (Figure 3).

During the semester, class sessions were devoted to critical reading of journal articles, including a class in preparation for meeting a visiting scholar from Cienfuegos, Cuba. (See Section 2.2). The Ghanaian students were invited to a dinner at the home of University President David Dooley. A special lecture was provided by Donald Berces, a Marine Affairs program graduate who was completing his Ph.D. research on the previously unstudied drift net fisheries in Ghana. Dr. Cathy McNally introduced students to the Integrative Graduate Education and Research Traineeship (IGERT) program approach that has been adopted by the College of Environment and Life Sciences, which advocates a balanced approach of education for research as well as practical professional skills.

All of the students did very well with their course work during the first semester.

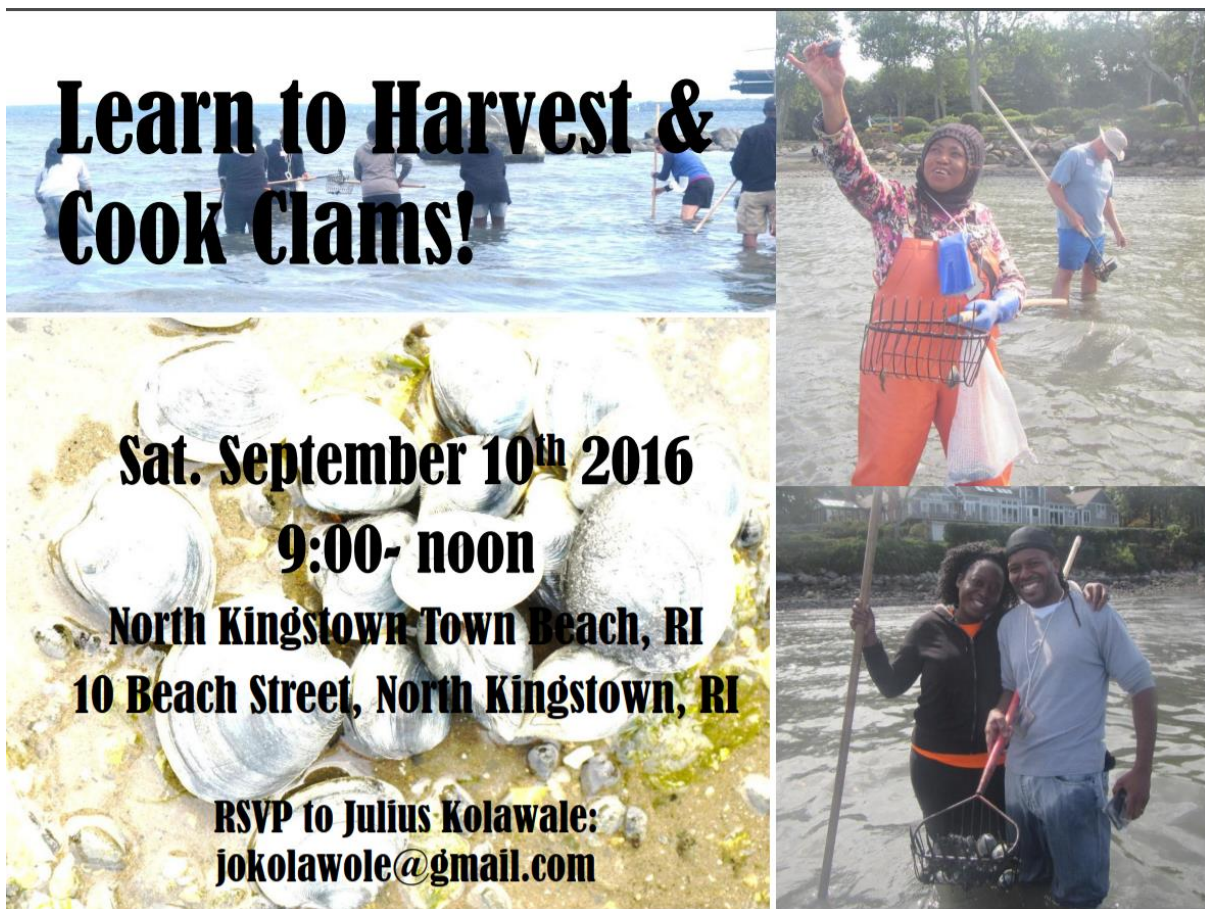


Figure 3 Digging clams with African Alliance of Rhode Island

2.2 Highlights Spring 2017, NRS 592

The Spring semester incorporated skill building, special guest speakers and help in preparing and presenting research proposals (see Table 1). Dr. Castellanos from Cuba, a visiting scholar to URI sponsored by CRC, presented a public lecture attended by the class (Figure 4).

All five master's degree students and Ph.D. candidate received approval for their final research projects from URI. Four of the group began conducting field research in Ghana in June 2017.

Table 1 Curriculum for Spring Semester 2017

Date	Topic	Class leader/presenters
January 23	Class 1: <ul style="list-style-type: none"> • Introduction to the class; planning for the semester and summer • Gender mainstreaming in Fisheries and Coastal Management. 	Lecture and discussion with Elin Torell
January 30	Class 2: <ul style="list-style-type: none"> • Discussion about gender in fisheries management • Preparing your masters research proposal presentations 	Discussion led by Cathy McNally of CRC.
February 6	Class 3: Conflict Resolution	Guest lecture and discussion led by Azure Cygler of CRC
February 13	Class 4: 2 Thesis proposal presentation	Presenters: Evelyn and Ivy (Ghana)
February 20	<i>President's day – No class</i>	
February 27	Class 5: Coastal Management in Cuba	Guest lecture by Cuban visiting scholar Dr. Castellano Gonzalez. Lecture will be held at the URI Bay Campus
March 6	Class 6: 2 Thesis proposal presentations	Presenters: Innocent (Malawi) and Rosina (Ghana)
March 13	<i>Spring Break – No class</i>	
March 20	Class 7: Skills building - Leadership	Guest lecture and discussion with Glenn Ricci
March 27	Class 8: Fish flow	Guest Lecture and discussion with Dawn Kotowicz
April 3	Class 9: <ul style="list-style-type: none"> • Discussion about Fish Flow paper • 1 Thesis presentation 	Class led by Elin Torell Presenter: Vida (Ghana)
April 10	Class 10: 2 Thesis proposal presentations	Presenters: Elliot (Malawi) and Heva (Indonesia)
April 17	Class 11: Semi structured interview skills and overview of Institutional Review Board (IRB) requirements	Guest lecture and discussion led by Cathy McNally and Kristine Beran of CRC
April 24	Class 12: Marine Spatial Planning	Guest lecture by Tiffany Smythe of CRC
May 1	Class 13: <ul style="list-style-type: none"> • Discussion about Marine Spatial Planning paper provided the previous week • 1 Thesis proposal presentation 	Class led by Don Robadue Presenter: Fitri (Indonesia)

Evelyn Takyi is concentrating on Fish Genetics and remained at URI for part of the summer of 2017 to study samples of sardinella taken from 10 West African countries to determine if there are localized stocks. However, due to challenges in transporting the fish samples of sardinella taken from the 10 West African countries for DNA analysis, Evelyn Takyi returned to Ghana in the later summer to process the samples for future transport. Evans Arizi attained approvals for his Ph.D. research and began gathering data in early June. He successfully defended his Ph.D. dissertation proposal, “Testing the Ecological Effects of Spatial and Seasonal Closures on the Sardinella Fishery in Ghana”, and conducted field research in Ghana in the summer and fall of 2017. Ivy Gyimah studying in the Marine Affairs Department traveled to Ghana for her research, which focused on water and sanitation issues in fishing communities. Two Fisheries Commission staff, Rosina Cobbina (studying in the Department of Marine Affairs) and Vida Osei (studying in the Department of Biological and Environmental Sciences), prepared their research proposals and carried out their field work in Ghana in the summer of 2017 as well.

2.3 Highlights Fall 2017, NRS 591



All of the Master’s degree students returned from Ghana and Malawi in the fall with successful research trips. In addition, four visiting Ph.D. students at URI arrived to pursue a wide range of research topics with potential benefit to managing Ghana’s fisheries. The topic areas included better understanding fisheries stocks such as “Determination of Population Genetic Structure of Sardinella in the South CECAF Region in West Africa for the Management of the Ghanaian Sardinella Stocks”, “Influence of Climate on Abundance of Demersal Fish in Ghana”, “Population Dynamics of Seabream fish population in Ghana”, and “Assessment of the fishery and nutrient value of Atlantic Chub Mackerel in Ghana”.

Other research efforts by the students focused on fisheries policy, including “Effort Control in the Artisanal Canoe Fishery of Ghana: Implications and Likelihood of Success” and “Testing the Ecological Effects of Spatial and Seasonal Closures on The Sardinella Fishery in Ghana.”

A third group of studies examined coastal issues including “Poor Coastal Sanitation, a Menace to the Coastal Environment; Case Study of a Coastal Community in Elmina”, and “Ecological Assessment of Some Coastal Wetlands in Ghana: a Bio-indicator Approach.”

One researcher was looking beyond fisheries toward improving aquaculture by “Cross Breeding of Some Selected Populations of Black-chinned Tilapia in Ghana.”

PARTNERING TO SAVE CIENFUEGOS BAY

WEDNESDAY, MARCH 1, 2017
6 P.M. LECTURE
Reception to follow

Richard E. Beaupre Center for Chemical and Forensic Sciences
 Room 100
 URI Kingston Campus

This event is free and open to the public.

For more information contact Karen Sechio at karensechio@uri.edu or 401.874.4359.

If you have a disability and need an accommodation, please call 401.874.4359 at least five days in advance. For TTY assistance, please call the R.I. Relay Service at 711.

Maria Elena Castellanos González
 Professor, University of Cienfuegos
 and Researcher, Center for
 Environmental Studies of Cienfuegos,
 Cuba

Figure 4 Effective watershed management through integration of research, extension and education in Cienfuegos Bay, Cuba



Figure 5 The Fall 2017 International Students Directed Study NRS 591

Pictured above are: 1) Asta Habtemichael, Eritrea; 2) Innocent Gumulira, Malawi; 3) Michelle Naa Kordei Clottey, Ghana; 4) Jemimah Etornam Kassah, Ghana; 5) Lawrence Armah Ahiah, Ghana; 6) Ivy Serwaa Gyimah Akuoko, Ghana; 7) Elliot Watson Lungu, Malawi; 8) Margaret Fafa Awushie Dzakpasu, Ghana; 9) Evelyn Takyi, Ghana; 10) Fitri Zuliana, Indonesia; 11) Heva Yumi, Indonesia; 12) Vida Samantha Osei, Ghana; and 13) Rosina Cobbina, Ghana.

The seminar class was aimed at continuing to support the Master’s degree candidates as well as introducing the newly arrived Ph.D. students to URI and CRC projects, concepts and practices, including fisheries management with Najih Lazar, coastal governance with Emeritus Director of CRC Stephen Olsen, and systems thinking and project management by Dr. Don Robadue.

Another scholar visiting URI, Mohammad Mozumder of the University of Helsinki, presented his Ph.D. research plan and initial findings to the group. CRC had previously provided some technical assistance to Bangladesh on the Hilsa fishery, a highly popular anadromous fish. Mr. Mozumder’s presentation offered an example of the work of an advanced student to the class. (Figure 6)

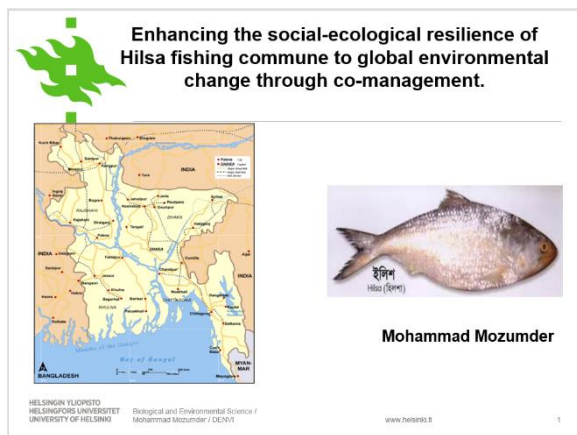


Figure 6 Presentation on Hilsa fishery in Bangladesh

Once again, the students were asked to present their study pathways, this time toward completing their course work and research to reach graduation. (See Figure 7) The four additional Ph.D. students were enrolled in an average of 3 courses, which they were able to take for credit with support from the USAID/Ghana Sustainable Fisheries Management Project, while the University of Cape Coast covered living and travel expenses from its USAID funds.

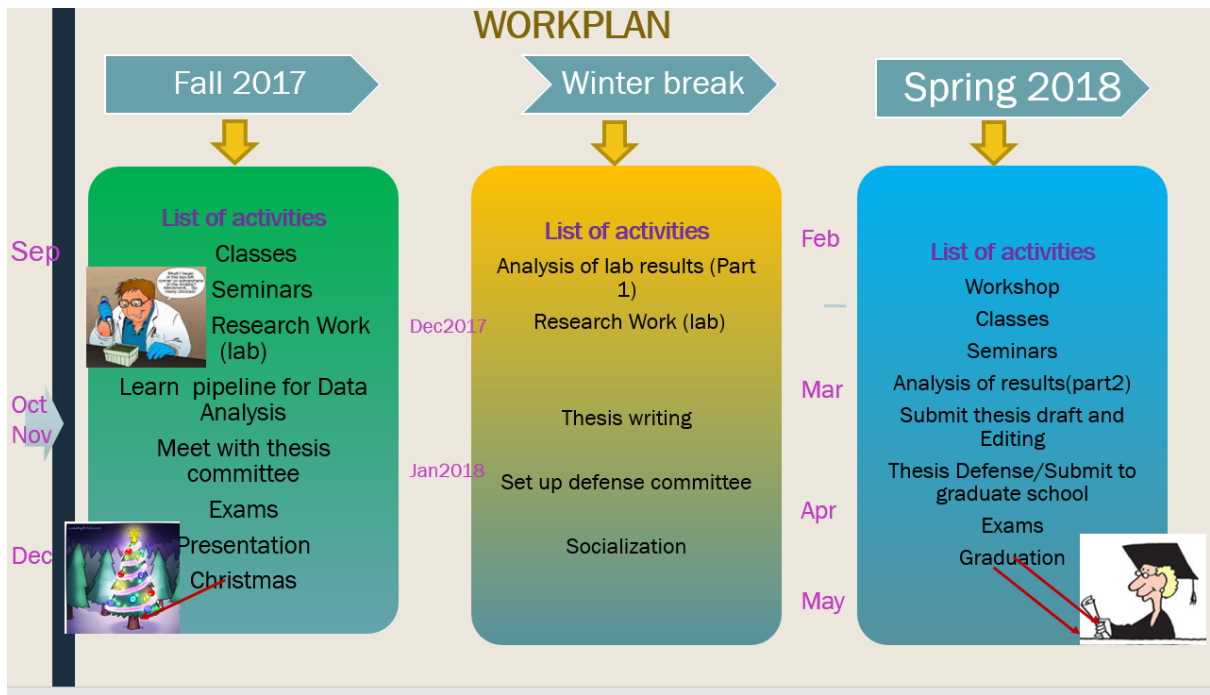


Figure 7 Evelyn's Pathway to Graduation

The Fall Semester 2017 coincided with a high level visit of senior fisheries officials from Ghana's Ministry of Fisheries and Aquaculture Development (Figure 8). Three members of the tour group met with the class for a lively discussion of research and fisheries policy in Ghana (Figure 9).



Figure 8 High Level Visit of Senior Fisheries Officials from the Ministry of Fisheries and Aquaculture Development

Course participants with member of the High Level Visit of Senior Fisheries Officials from the Ministry of Fisheries and Aquaculture Development and representatives of the Fishing Industry in Ghana, October 16, 2017.



Figure 9 Students debate options for fisheries management in Ghana

Students debate options for fisheries management in Ghana with Thomas Insaidoo, Deputy Director, Fisheries Commission, Francis Kingsley Ato Codjoe, The Honorable Deputy Minister for Fisheries and Aquaculture Development (MOFAD), and Papa Yaw Atobra, Chief Director, MOFAD. (fourth, third, and second from right)

2.4 Highlights Spring 2018, NRS 592

The final semester for the Master’s Degree students focused on supporting their completion of data analysis and writing chapters of thesis and papers. UCC Ph.D. candidate, Rebecca Essamuah, arrived as a visiting scholar, working with Dr. Richard Burroughs of the Department of Marine Affairs on her study of pollution issues in Fosu Lagoon, the research site located near the UCC campus in Cape Coast, Ghana. Emeritus Director of CRC Stephen Olsen led a two-part examination of project impacts and outcomes drawing upon CRC experience and student examples in February. Vida, Evelyn and Rebecca to the initiative to participate in the Rhode Island Chapter of the Society for Women in Marine Science (SWMS) held at the Graduate School of Oceanography, with Rebecca also contributing a poster to the event.

Ivy Akuoka presented initial findings from her thesis “Solid Waste Management In Coastal Ghana” at Social Coast 2018 in Charleston, South Carolina (Figure 11) as well as filled in for Dr. Elin Torell by presenting the paper “The Imperative For Mainstreaming Gender In Fisheries Management: Project Designs And Partner Interventions For Transformation And Lasting



Figure 10 Ivy Akuoka and other classmates at graduation

Impact”. Ivy was the only Ghanaian Master’s student to have been able to defend and submit all of her graduation paperwork on time so was able to “walk” and receive her diploma.

All of the Master’s degree students were able to defend and complete their research projects by the end of June, 2018, with the exception of Evelyn Takyi, who returned to Ghana to present initial results of the DNA analysis of the *Sardinella* stock with her advisor, Dr. Marta Gomez-Chiari, and will complete her work in the summer of 2018. Their work is featured in the Spring 2018 edition of URI’s publication on research. (Figure 12). Ph.D. candidate Evans Arizi passed his comprehensive exams and is completing his final stage of research in Ghana during mid-2018.



Figure 11 Ivy Akouka after her second successful presentation at the Social Coast 2018 conference in Charleston, South Carolina, with Dr. Brian Crawford and Dr. Donald Robadue.



Rebecca Stevick, NSF Fellow, Ph.D. candidate, oceanography; Melissa Hoffman, graduate student, Biological and Environmental Sciences (BES), Sustainable Agriculture and Food Systems (SAFS) program; Evelyn Takyi, graduate student, BES, Cell and Molecular Biology (CMB); Professor Gomez-Chiari; Erin Roberts, Ph.D. candidate, BES SAFS; Sam Hughes, graduate student, BES CMB; URI Visiting Scholar Murni Karim, Senior Lecturer at the University of Putra Malaysia.

Figure 12 Evelyn Takyi featured as a member of Dr. Marta Gomez-Chiari’s lab

Source: URI Momentum: Research and Innovation, Spring 2018.

(http://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1012&context=researchcondev_pubs)

Progress was made to establish a dual degree program between URI and UCC. Academic leaders from UCC met at URI in April 2017, led by Prof. Joseph Ghartey Ampiah - Vice-Chancellor, and deans from the schools of Biological Sciences, Physical Science, Graduate

Studies and the Business School. Among the innovative ideas explored was the innovative dual-degree option with UCC and URI in the College of Environment and Life Sciences. A delegation from the University of Rhode Island then visited the University of Cape Coast Department of Fisheries and Aquatic Sciences. The purpose of the visit was to continue working on common objectives outlined and signed in the MOU between URI and UCC. The dual degree program will provide a unique opportunity for an enhanced graduate degree program in fisheries and aquatic sciences at UCC. In the meantime, five more Ph.D. students from the Department of Fisheries and Aquatic Sciences are expected to spend the Fall 2018 semester at URI, auditing classes, utilizing URI's research facilities and libraries, and connecting with faculty experts in the areas of their research.

3. CONCLUSIONS AND RECOMMENDATIONS

The SFMP Master's degree class of 2018, along with the five Ph.D. students involved in the semester abroad at URI managed to take advantage of their opportunities at URI, working hard to pass courses with high grades, as well as propose, carryout and defend their research within a very tight time frame, more than 8,000 km from home. CRC's international visitor Ambassador Program provided a continuing flow of support to insure a high quality of experience of both campus life and living in New England.

The Ph.D. students who arrived as visiting scholars for just one semester found that the courses required a great deal of work, and while worthwhile made it impossible to complete as much writing on their dissertations as they expected. An earlier arrival or longer stay would compensate for this imbalance. As with the Master's students, adjusting to the climate, the shorter length of the day during the autumn compared to Ghana and a degree of homesickness presented challenges. The perception of a time crunch was perhaps more intense due to the interest in seeing more of Rhode Island, New England and the US, participating in ongoing research activities such as fish trawls, and visiting other researchers.

Lawrence Armah took a pre-planned break from classes in order to attend a meeting and get to know faculty at the University of Arizona working in aquaculture. Some of the other students managed to participate in local events and conferences and found the experiences very worthwhile. In thinking about how to further improve the overall experience, the students suggested a more in-depth orientation to Rhode Island before the semester starts to help them become more familiar with the history, culture, environment and other offerings of southern New England.

The group found the statistics and quantitative methods and skills they learned key for being successful in their research. Many took advanced statistics courses, but also sought out tutoring from CRC staff and other URI faculty. In general, the intense programs of study including required courses, extensive home-work and rigorous research standards were facets of the experience at URI that could be beneficially transferred and applied to Ghanaian graduate education.

APPENDIX 1 GRADUATE STUDENT PROFILES

IVY AKUOKO (Ghana)

Research proposal for Master of Arts in Marine Affairs, major professor Dr. Richard Burroughs

Poor Coastal sanitation, a menace to the Coastal Environment; Case study of a coastal community in Elmina.



Ivy is from Ghana and a former student of the University of Cape Coast. She gained admission to the University of Cape Coast (UCC) to pursue a Bachelor's degree in Biological Sciences and majored in Environmental Science. She holds certificates in Introduction to Environmental Law and Policy as well as Global Health from the University of North Carolina, USA and University of Copenhagen, Denmark respectively (online courses). Aside academic work, she loves to do voluntary work either to help improve the state of the environment or to help those in need. Ivy was a Teaching Assistant at the Department of Environmental Science of the University of Cape Coast. Ivy has the ambition to become a university lecturer and an environmental advocate back home after her studies in the States. Acting has always been her passion and she loves

reading as well.

EVANS ARIZI (Ghana)

Research proposal for Ph.D. in Biological and Environmental Sciences, major professor Dr. Austin Humphries:

Testing The Ecological Effects Of Spatial And Seasonal Closures On The Sardinella Fishery In Ghana

“As a young boy growing up in a coastal village in Ghana, University of Rhode Island (URI) graduate student Evans Arizi could see the economic importance of fish. He saw local fishermen at Metika and Anlomatuope, fishing villages near the border of Ghana and Cote d’Ivoire in West Africa, paddle their canoes into the waves and watched international boats cast nets into the water to reel in Ghana’s main source of protein.

He also saw how frequently fishing resources were exploited. “The challenges are many,” Arizi, 29, says. “Some fishermen are using inadvisable methods of fishing, and the territorial waters are not protected due to insufficient logistics, so anyone can come in there and fish.”

In Ghana, lack of government investment in sustainable fishing policies has created a plethora of problems with illegal fishing. Because fishing laws are not properly enforced, vessels frequently use incorrect gear, like nets that are too small to free bycatches and immature fish, therefore increasing their catch and profits but depleting the stock of young fish before they can reproduce. Though fishermen are supposed to report juvenile catches, many do not out of fear of punishment. Arizi says local fishermen sometimes adhere to practices that pollute waters and lead to species degradation.



“Local authorities back these illegal practices out of greed,” he says. “(They think,) ‘Let me think of my stomach, let me not think of others.’ ” Arizi aims to help change that culture at home, and the path to that goal has taken him to URI. He was introduced to the university through the Graduate School of Oceanography’s Coastal Resources Center (CRC). As an undergraduate, he participated in a fish stock assessment training program that was part of a CRC sustainable fisheries project in Ghana, which “provided many useful relevant materials” to local fishing communities, he says.

CRC currently leads a group of partners in the five-year Sustainable Fisheries Management Project in Ghana funded by the United States Agency for International Development (USAID/Ghana SFMP). The project aims to improve conditions for sustainable local fishing practices, help fishing communities become

stewards of their resources, strengthen information systems for managing fisheries and increase awareness for protecting fisheries ecosystems and the people who rely on them for their livelihoods, among other goals.

To help create the next generation of fisheries scientists and leaders in Ghana, the project is facilitating student exchanges and scholarship opportunities at URI in collaboration with the

University of Cape Coast in Ghana, Arizi's alma mater. Through CRC, Arizi applied for a scholarship to earn a Ph.D. in Biological and Environmental Sciences at URI. He was accepted and moved to URI to begin the three-and-a-half-year program in January. It was his first time outside of Ghana.

"When the opportunity came for me to come here I was so excited," Arizi says. "I felt that by coming here I would get the necessary materials and resources to be equipped to handle the opposition (to implementing and enforcing sustainable fishing laws in Ghana)."

Before coming to URI, Arizi worked as a principal research assistant for the Department of Fisheries & Aquatic Sciences at the University of Cape Coast in Ghana. That experience, his fieldwork with CRC and his course work as an undergrad and graduate student at the university in Ghana brought the fisheries challenges into sharp focus. Much of it comes down to competition, Arizi says.

"When an individual spots a friend doing such an unwarranted act (like illegal fishing practices), he will decide to do the same," Arizi says. While he believes the government needs to implement and enforce fishing laws recommended to them by many — including SFMP, which helped the country draft the recently adopted National Fisheries Management Plan — the most important change needed is in the behavior of fishermen.

"The fishermen have to change their behavior and also put their trust in others, he says.

Arizi hopes that his wife, whom he married a month before moving to Rhode Island, eventually can join him. Currently, however, his main focus is his studies. "I don't want to get any Cs, not at all, so I have to work hard," Arizi says. "My wife keeps on encouraging me to do well." He is the first member of his family to go to college; however, he hopes his six siblings can follow his lead.

Though Arizi says that working to excel in his five classes often means waking up early in the morning and staying up late at night, he likes graduate school.

"God has done a lot for me, because of all my friends who started out in school at the same time, I'm the only one who made it to this level," Arizi says. "I like education; knowledge is power."

-- *Allison Farrelly*

Published online at <http://www.crc.uri.edu/2016/04/crc-gives-grad-student-from-ghana-opportunity-to-make-a-difference/> and in University of Rhode Island Foundation Annual Report

LAWRENCE ARMAH AHIAH (Ghana)

Visiting Ph.D. Student, Aquaculture

Ph.D. research topic: Cross breeding of some selected populations of black-chinned tilapia (*sarotherodon melanotheron*) in Ghana.

Lawrence Armah Ahiah was born at La in the Greater Accra region of Ghana. He obtained his B. Sc. (Hons) Biological Sciences degree in 1996 at the Kwame Nkrumah University of Science and Technology, Kumasi. Recognized as the best science teacher by the Ministry of Education, he continued his teaching profession until 1998 when he joined the Fisheries Commission as an Aquaculture Farm Manager.

As the Farm Manager and Training Coordinator, Mr. Ahiah's basic schedule included: the production of fingerlings for fish farmers, training of fish farmers and newly employed staff of the Fisheries Commission in aquaculture, and conducting trials on new aquaculture technologies. To enhance his capacity in his field work, Mr. Ahiah travelled to Japan (2000), Uganda (2004), Thailand (2004) and South Korea (2011) for short courses in Fisheries Management, Aquaculture, Artificial spawning of catfish and Fish Processing respectively.

In 2005, Lawrence pursued his Master of Philosophy degree in the University of Cape Coast and graduated successfully in 2008. The title of his project work was "Observations on the growth and survival of *Oreochromis niloticus* fed on formulated feeds", which led to the development of pelleted floating tilapia feed for the fish farmers in Ghana. Mr. Ahiah was transferred to the Upper West Region where he became the Regional Director of Fisheries from 2010-2015. He was then posted to the National Headquarters of the Fisheries Commission in 2015, to assist the Head of Administration and Operations.

Mr. Ahiah is highly motivated to pursue further studies and he is currently pursuing a Ph.D. Aquaculture program at the University of Cape Coast under the sponsorship of the UCC/USAID Fisheries and Coastal Management Capacity Building Support Project.



MICHELLE NAA KORDEI CLOTTEY (Ghana)

Visiting Ph.D. Student, Fisheries Science

Ph.D. research topic: Population Dynamics of Seabream fish population in Ghana.

Michelle Naa Kordei Clottey, is a Ph.D. student with special interest in fish stock assessment, at the Department of Fisheries and Aquatic Sciences, University of Cape Coast. Michelle earned her MPhil Fisheries Science degree in 2014 and a BSc Oceanography and Fisheries degree in 2011 from the University of Ghana, Legon. She received full funding for her graduate research work (Effects of microbial loads on the physiological condition and fecundity of some selected fishes in the Volta Lake (Stratum II)) from the Royal Society/ Leverhulme Africa project. After graduate studies, she offered voluntary services briefly at the Department of Marine and Fisheries Sciences in the University of Ghana, prior to her appointment as a Teaching Assistant. Her major responsibilities included helping conduct practical sessions, invigilating interim assessments for the undergraduate students, assisting final year undergraduate students with their research projects, and the writing of reports for the department. She has a publication with the African Journal of Aquatic Science and has submitted academic papers to other journals for publication.

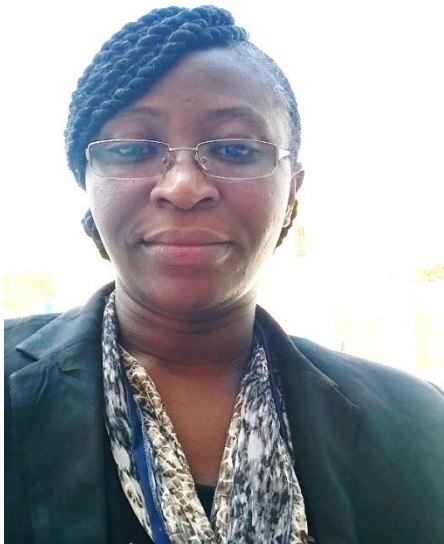


Michelle is currently enrolled in a Ph.D. program at the University of Cape Coast (UCC) at the Department of Fisheries and Aquatic Sciences (DFAS). She was awarded a full scholarship by the UCC's project funded by USAID.

ROSINA COBBINA (Ghana)

Research proposal for Master of Arts in Marine Affairs, major professor Dr. Seth Macinko

Effort Control In The Artisanal Canoe Fishery Of Ghana: Implications And Likelihood Of Success



Rosina is from a family of seven and is married and a mother of three boys.

She received her Senior Secondary School education at the Tema Secondary School in Ghana where she offered science majoring in Physics, Chemistry and Biology. She completed a Bachelor's degree in Renewable Natural Resource Management in 2004 at the Kwame Nkrumah University of Science and Technology, (KNUST), in Ghana where she majored in Freshwater fisheries and Watershed Management.

Promoting food and nutritional security at the both the national and regional level has always been her interest. Rosina is currently a Senior Fisheries Officer at the Fisheries Commission of the Ministry of Fisheries and Aquaculture Development in Ghana. She is also helping

the Fisheries Committee for the West Central Gulf of Guinea, (FCWC) in promoting regional cooperation towards the sustainable management of fisheries in Ghana, Benin, Togo, Liberia, Nigeria and Cote d'Ivoire. Rosina is mostly seen as the quiet type of person (introvert) but is friendly, ready to listen to and ready to help others. She loves team work, cooking and inspirational gospel music.

MARGARET FAFA AWUSHIE DZAKPASU (Ghana)

Ph.D. Student, Oceanography and Limnology

Margaret Fafa Awushie Dzakpasu is a Ph.D. student in the University of Cape Coast (UCC) with funding from the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project. She obtained her BSc. (Fisheries and Aquatic Sciences) in 2009 and MPhil (Oceanography and Limnology) in 2013 from UCC. She has since worked as a Research Assistant in the Department of Fisheries and Aquatic Sciences (DFAS), UCC. Prior to starting her Ph.D. studies, she was involved in numerous



field and laboratory activities in the department. She supported undergraduate students on the U.S. National Science Foundation (NSF) International Research Experience Program in UCC. She served as a research assistant on the Fishing for Security Project in the Central and Western Regions in 2014. She was DFAS social media handler and contributed significantly to the visibility of the department. Her research interests include pollution assessment based on benthic macroinvertebrates, seashore ecology and brackish water ecology. Her interest in benthic ecology was born when she served as a research assistant onboard RV “Dr. Fridjof Nansen” for baseline monitoring of the Ghanaian coast in 2011 during her MPhil studies.

Margaret’s Ph.D. research focuses on developing some indices of aquatic pollution based on macroinvertebrate functional groups and other physicochemical parameters from six coastal wetlands in Ghana. In the wake of pollution and other degradation activities going on in wetlands in Ghana, this research will provide a basis for wetland monitoring and will inform stakeholders of necessary management strategies.

Margaret is passionate about teaching and research and aspires to be a leading aquatic ecologist. She holds certificates in Remote Sensing and Satellite Applications to Marine and Coastal Environment and Geographic Information System from the University of Ghana (March 2013) and University of Cape Coast (July 2016) respectively. She has three scientific publications to her credit. She is a member of the Ghana Science Association and Ghana Association of University Women. Margaret enjoys reading short stories, cooking, internet surfing and sightseeing.

Ph.D. research topic

Ecological Assessment of Some Coastal Wetlands in Ghana: a bio-indicator approach

The aim of this study is to describe the general distribution of macroinvertebrate functional groups in six coastal wetlands in Ghana and develop indices for water quality assessment based on the functional groups. Specifically, this study will:

- ✓ measure physicochemical parameters namely temperature, pH, salinity, turbidity, conductivity, dissolved oxygen (DO) concentration, biological oxygen demand (BOD), and total dissolved solids (TDS) for a period of one year.
- ✓ determine the concentration of nutrients such as nitrates, phosphates and silicates in water and sediments samples during the study period.

- ✓ determine the concentration of trace metals such as As, Pb, Hg, Cr, Cu, Cd, Fe, Zn, Mn and Ni in water and sediment samples from the wetlands.
- ✓ determine sediment particle size and organic matter content of the selected water bodies
- ✓ investigate the benthic macroinvertebrate communities present in the water bodies and categorize them into functional groups
- ✓ determine the functional structure (e.g., functional diversity, functional richness and functional evenness) of the benthic macroinvertebrate communities of the water bodies

REBECCA KYEREWA ESSAMUAH (Ghana)

Visiting Ph.D. Student, Integrated Coastal Management

Ph.D. research topic: Towards developing a decision support for prioritizing management of marine spaces in urban areas of Ghana- a case study of Fosu Lagoon.

Rebecca has a Bachelor of Science (1st Class honours) in Fisheries and Oceanography from the University of Ghana, and M.Phil. in Biological Oceanography from the same institution. Her research topics for these programs (2001-2006 and 2007-2011) focused on assessment of primary productivity in the Gulf of Guinea using remote sensing, and assessment of water quality of 7 selected major coastal lagoons in Ghana, respectively. These exciting programs, adding to her earlier roles/internship as librarian, Hospital OPD Assistant, and teaching assistant, earned Rebecca a job as an Oceanography lecturer at the Regional Maritime University.



Rebecca expects that her thesis working title ‘Towards developing a decision support for prioritizing management of marine spaces in urban areas of Ghana- a case study of Fosu Lagoon’ will feed into the USAID-UCC FCMCBS Project’s thematic area - Activity 2.1.5: Monitor the Biodiversity and Health of Coastal Ecosystems.

Rebecca’s expected research outcomes include:

- Establishing recent water quality of the Fosu Lagoon, within an urban pressured system.
- Identifying land use changes of the Fosu Lagoon catchment.
- Preparing a Social Network Analysis (SNA) of institutions (organizations/groups) involved with and responsible for coastal zone management.
- Elaborating a decision support system for coastal management with focus on governance.

Her advisors at the University of Cape Coast are Professor D. W. Aheto and Dr. E. Acheampong. While at URI she has been guided by Professor R. Burroughs (URI, Marine Affairs Department, Rhode Island). Rebecca’s experience on her 5-month first visit to the USA, through the project and with the Coastal Resources Centre (CRC) at URI as host, spans from several delightful interactions with warm people having a humbling wealth of knowledge to guide her research/stay to a very undeciding southern New England weather in contrast to a calm homey community setting. She is inspired by family, reading and writing, teaching, and coastal community sensitization voluntary work.

Her favourite quotes on innovation by Albert Einstein are:

"No problem can be solved from the same level of consciousness that created it."

Ghana’s coastal management will ‘arrive’ if steady positive steps are taken with cues from management success stories of places such as RI’s Narragansett Bay.

"Logic will get you from A to B. Imagination will take you everywhere."

She is just as encouraged by URI - Be inspired to think big!

JEMIMAH ETORNAM KASSAH (Ghana)

Visiting Ph.D. Student, Fisheries Science

Ph.D. research topic: Assessment of the fishery and nutrient value of Atlantic Chub Mackerel (*scomber colias gmelin*, 1789) in Ghana.



Jemimah Etornam Kassah studied for a Bachelors' degree in Oceanography and Fisheries at the University of Ghana, graduating in 2008 with honors. She enrolled in the year 2010 at the Norwegian University of Science and Technology in Trondheim, Norway for an MSc. in Marine Coastal Development with a specialization in Marine Biology and Biochemistry under the Quota Scheme Scholarship; graduating in 2012. Her thesis was titled "Development of biofouling on salmon cage nets and the effects of anti-fouling treatments on the survival of the hydroid *Ectopleura larynx* (Ellis & Solander,

1786)". Her work identified trends in the formation of fouling communities on salmon cage netting and the use of hot water and drying as an ecologically friendly anti-fouling treatment. She is currently enrolled in the Ph.D. Fisheries and Aquatic Sciences program at the Department of Fisheries and Aquatic Sciences, University of Cape Coast as a beneficiary of the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project. Her thesis area is on the population dynamics and biology of Atlantic chub mackerel.

Jemimah has worked in varied backgrounds in the fields of aquatic biology and aquaculture as an aquaculture officer, feed supervisor, fingerling nursery supervisor, quality control officer and project coordinator. These have given her experience in breeding, fingerling transport and handling, feed and feed formulation, water quality analysis, quality control; project management, report writing, public speaking and public relations among others. She is also an avid historian who still finds time to research into the history of various Ghanaian ethnic groups; as well as write poetry and other forms of prose. She also loves to sing and dance.

INNOCENT GUMULIRA (Malawi)

Research proposal for Master of Environmental Science and Management, major professor Dr. Graham Forrester.

Bio-Economic Analysis Of Usipa (Engraulicypris Sardella) Fishery In The South East Arm Of Lake Malawi



Born and raised in Malawi, a country located in Southern East Africa, Innocent Gumulira graduated with a degree in Aquaculture and Fisheries Science from Bunda College of Agriculture a constituent college of the University of Malawi in 2004. After graduating he taught Sciences at high school for 5 years before joining the Fisheries Department as a researcher in Fish Biology and Ecology in 2011. He joined URI MESM department fall 2016 after acquiring a full scholarship from USAID through FISH project.

Tries to create and maintain as many friends as possible by being a friendly person himself.

ELLIOT LUNGU (Malawi)

Research proposal for Master of Environmental Science and Management, major professor Dr. Graham Forrester

Effect of Emergent Aquatic Vegetation on diversity, abundance and distribution of fish.



Elliot Lungu is first born in the family of six children and is married to Mercy with two sets of twins.

Attended his secondary education at Mitundu Secondary School lying in outskirts of the Malawi's capital Lilongwe and graduated from the Chancellor College (a constituent college of the University of Malawi) with a Bachelor of Science (Biology) and minor in Food and Nutrition Sciences. He also has a certificate and a diploma in in Fisheries Management from the Malawi College of Fisheries.

Currently serving as District Fisheries Officer, Elliot has special interest in sustainable fisheries production with special emphasis on governance/leadership processes and also new issues of Climate Change. Thinking through why people/animals behave the way do in trying to find best ways to sustain fisheries contribution to food and nutrition security and sustainable livelihood to humanity.

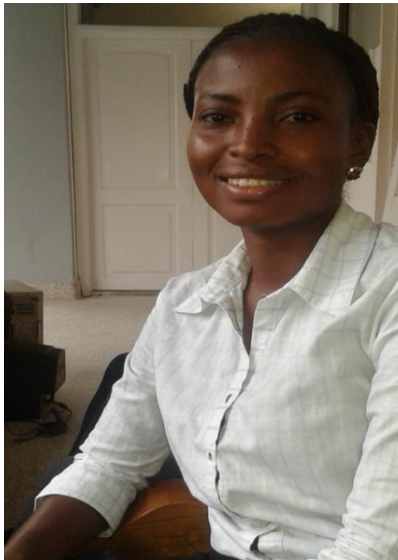
Elliot is highly sociable, but working as team, doing some indoor games, watching documentaries, current affairs and discussing issues, are some of his hobbies.

Has gained admission to the University of Rhode Island to pursue Master of Environmental Science and Management

EVELYN TAKYI (Ghana)

**Research proposal for Master of Science in Biological and Environmental Sciences,
major professor Dr. Marta Gomez-Chiarri**

**Determination Of Population Genetic Structure Of Sardinella (Sardinella Aurita
And Sardinella Maderensis) In The South CECAF Region In West Africa For
The Management Of The Ghanaian Sardinella Stocks**



Evelyn is a Ghanaian from the Volta region. She comes from a family of 5 and the last born to the parents. She graduated from the Accra Girls' Senior High School, Accra, attending from 2005 to 2008. She gained admission to the University of Cape Coast in the year 2010 to pursue a Bachelor's degree in Biological Sciences and majored in Molecular Biology and Biotechnology. She graduated in 2014 and served as a teaching assistant for a year in the department of Molecular Biology and Biotechnology, University of Cape Coast. She has gained an admission to the University of Rhode Island to pursue Master of science in Biological and Environmental Sciences. Evelyn is social and loves to read, listen to music or watch a movie during her leisure periods.

SAMANTHA VIDA OSEI (Ghana)

**Research proposal for Master of Science in Biological and Environmental Sciences,
major professor Dr. Graham Forrester**

Influence of Climate on Abundance of Demersal Fish In Ghana



Samantha Vida Osei is a Fisheries Research Officer working at the Fisheries Scientific Survey Division of the Fisheries Commission in Ghana. She holds a Bachelor of Science Degree in Oceanography and Fisheries from the University of Ghana and Certificates in Ecosystem Approach to Fisheries Management from the Wageningen UR Centre for Development Innovation- Netherlands and in Marine and Inland Waters Resources Assessment and Monitoring from the United Nations University Fisheries Training Programme - Iceland. Vida is a member of the Scientific Working Group of the Fisheries Committee for the Eastern Central Atlantic

(CECAF) subgroup south for the assessment of both pelagic and demersal stocks. When she is not glued to work she loves to cook, read mostly novels or volunteer for community work.

APPENDIX 2 STUDENT ORIENTATION UPON ARRIVAL AT CRC

THE
UNIVERSITY
OF RHODE ISLAND
GRADUATE SCHOOL
OF OCEANOGRAPHY



WEEK ONE

WEEK OF: 9/1/16 -9/7/16
ORIENTATION TO URI 1

Thursday, September 1

Time	Location	Topic
8:30 – 11am	GSO	Orientation
11am- 12pm	GSO	Meet & Greet with CRC
12 – 4pm	URI Main Campus	Student IDs, bus pass, books, laptops, phones

Friday, September 2

Time	Location	Topic
8 – 9am	URI Main Campus	Walking Tour of URI
9:00am	Graduate Village	Sign leases
9:30 am – 10:30pm	GSO/CRC	I94 , copy of all travel documents
10:30 to 12:00	URI	Complete laptops, phones, etc. Set up laptops & Wi-Fi, Buy school supplies
1 – 2:30pm	Multicultural Center Hardge Forum	Immigration Orientation (bring ALL travel documents)
2:30pm	Health Services	Immunizations (Ivy & Rosina)
4:30 – 6:30pm		Pizza Social & Salsa Lesson (Fee \$100)
4:15 - 10:30pm	McCoy Stadium	Pawtucket PawSox Baseball Game

Saturday, September 3

Time	Location	Topic
9:00am	Wakefield, Narragansett, RI	Food & Apartment Shopping

<p><u>KEY:</u> Mandatory Optional Degree-specific</p>

Orientation Week 2

Sunday, September 4

Time	Location	Topic
9am – 3pm	Washington County	Tour
6pm – 12am	Outside of Memorial Union	URI First Night

Monday, September 5

Time	Location	Topic
All Day	-	LABOR DAY (U.S. Holiday)

Tuesday, September 6

Time	Location	Topic
830am – 12pm	CBLS 100	URI Graduate Student Orientation (Nikki will drop off)
12:15 – 1pm	Office of International Students & Scholars	Register (Sabrina will walk you from CBLS to the OISS Office)
1:30pm	Health Services	Immunizations (Elliot, Innocent, Vida, & Evelyn)
1:30 – 4:30pm	CI Building	Marine Affairs Department Orientation (Ivy & Rosina) (Sabrina will walk you from OISS to CI)

Wednesday, September 7

Time	Location	Topic
All day	-	Classes begin
5:30pm	Hillel Center	Welcome Week BBQ

Friday September 9

Time	Location	Topic
8:30am	Newport or W. Warwick TBD	Social Security Cards

URI Upcoming Events (optional)

- Friday, September 16: 5:30pm – MAF BBQ (Peninsula Rd., Matunuck)
- Saturday, September 17: 7:00am – Ram Tour of Martha's Vineyard (Cost \$15)
- Saturday, September 24: 9:30am – 12:00pm – Clamming Class (North Kingstown Town Beach)
- Sunday, September 28: 8:00am – 6:00pm – Ram Tour – The Big E (carnival) (Cost \$12 per ticket)