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USAID/UCC FISHERIES AND COASTAL MANAGEMENT CAPACITY BUILDING SUPPORT PROJECT

YEAR THREE ANNUAL REPORT

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UNIVERSITY OF CAPE COAST

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Cover Photo: Cultural performance at the Conference on Fisheries and Coastal Environment, September 2017

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LIST OF ABBREVIATIONS

ANCORS	Australian National Centre for Ocean Resources and Security
ATL FM	Atlantic Radio Station
CBFMG	Community Based Fisheries Management Group
CCM	Centre for Coastal Management
CELS	College of Environment and Life Sciences
CSLP	Coastal Sustainable Landscapes Project
CDCS	Country Development Cooperation Strategy
CV	Curriculum Vitae
DFAS	Department of Fisheries and Aquatic Sciences
FAO	Food and Agriculture Organization
FishCoMGhana	Fisheries and Coastal Management Database of Ghana
FtF	Feed the Future
GIS	Geographic Information Systems
GITA	Ghana Industrial Trawlers Association
GSSP	Ghana Strategy Support Program
ICZM	Integrated Coastal Zone Management
IUU	Illegal Unreported Undocumented
KNUST	Kwame Nkrumah University of Science and Technology
MoFAD	Ministry of Fisheries and Aquaculture Development
MoU	Memorandum of Understanding
MPhil	Master of Philosophy
MEAS	Modernizing Extension and Advisory Service
METSS	Monitoring, Evaluation and Technical Support Services
PhD	Doctor of Philosophy
RUFORUM	The Regional Universities Forum for Capacity Building in Agriculture
UAV	Unmanned Aerial Vehicle
UDS	University for Development Studies
UCC	University of Cape Coast
URI	University of Rhode Island
USG	United States Government
WABiCC	West Africa Biodiversity and Climate Change

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EXECUTIVE SUMMARY

The Fisheries and Coastal Management Capacity Building Support Project is a five-year partnership project (2014-2019) between the United States Agency for International Development and the University of Cape Coast valued at US\$5.5 million. Notable achievements in the third year include the maiden conference on Fisheries and Coastal Environment also referred to as Accra 2017 culminated in a Communique and government's declaration of the *Red Alert*, in all forms of illegal, unreported and unregulated fishing in Ghana. The installation of equipment at the Fisheries and Coastal Research Laboratory was a major achievement, while modalities for an ISO certification advanced. The project hosted on separate occasions several dignitaries among others include the Administrator of the United States Environmental Protection Agency, a delegation from URI made up of the Associate Dean for Academic Affairs of the College of Environment and Life Sciences, Representatives from the Department of Natural Resources Science and the Department of Fisheries, Aquaculture and Veterinary Sciences to strengthen modalities for Academic Exchange and dual degree programs. The project conducted an Organizational Capacity Needs Assessment for DFAS and the CCM to identify areas for capacity strengthening and enhancement of both institutions with the assistance of AfricaLead. ACDI/VOCA provided the project with technical support for its livelihoods program through volunteer services with focus on snail farming and bee-keeping as supplementary livelihoods in coastal communities. In Year 3, the project led by the Vice-Chancellor of the university explored fruitful partnership opportunities at URI, University of Cincinnati and University of Akron in the States for strengthening capacity building, research, student mobility, resource sharing, and faculty exchanges among others. In Year 3, the project upgraded the competencies and skills of about a 100 professionals in the public and private sector through short courses on climate change adaptation and mitigation, fisheries management, integrated coastal zone management and geographic information systems for effective fisheries and coastal management practices. Key highlight was the training of 20 journalists from 15 media houses in Ghana to improve upon their reportage in fisheries issues. Five (5) academic and technical staff took part in a training program in Maritime Safety and Security Department of the Regional Maritime University in Ghana to build their capacity in the operation, maintenance, safety and handling of the research boat *RV Sadinella*. The last batch of five (5) MPhil students to receive funding by the project to undertake Masters Programs at DFAS beginning 2017/2018 academic year were admitted while four (4) of the PhD students traveled to the United States to complete the segment of their academic work at URI.

1.0 INTRODUCTION

1.1 Ghana's Marine Fisheries Sector

There is a good justification for Ghana to boast of natural resources such as gold, timber, cocoa, diamond, bauxite, manganese and water resources such as fish. The benefits derived from fish and fisheries in the country put Ghana on the globe as one of the most important fishing nations in West Africa. The country's fishing industry comprises resources from marine waters, inland or freshwater bodies and coastal lagoons. Marine fisheries in Ghana are important for employment, income generation, nutrition, and food security. The marine fisheries sector contributes 3-5% to the country's annual gross domestic product (GDP). In spite of the economic importance of the sector, production from marine capture fisheries has been declining since the mid-1990s, from almost 420, 000 tonnes to 202,000 tonnes in 2014, which indicates revenue losses in the sector. The economic benefits from the fisheries have reduced partly due to lack of effective fisheries management.



Figure 1: Artisanal fishermen at a typical predominantly rocky beach in Ghana

Ghana faces increasing challenges of managing its coastal and marine resources, especially marine fish stocks and the overharvesting of other coastal resources. The overexploitation of fish and the pollution of marine and coastal ecosystems are just some of the problems the country faces along its coastal zone. This has come about as a result of non-compliance with and ineffective monitoring and enforcement of fishing rules and regulations, lack of education, training, research, data gathering and analysis, and low government investments in capacity building for natural resource management in the country. Lack of adequate human resource capacity, good governance and well-functioning regulatory structures are a threat to natural resource management in Ghana.



Figure 2: Beach seining in the Ankobra estuary

Non-compliance, lack of effective monitoring and enforcement of fishing rules and regulations provide fertile grounds for illegal, unregulated and unreported (IUU) fishing. Available fisheries statistics data show that number of fishing vessels as well as fishers have increased beyond sustainable levels with corresponding decreases in fish catch, mainly due to open access nature of small-scale fisheries. Decreases in fish catch result in lower income levels of fishers, which in turn lead to increased levels of poverty particularly in coastal communities. There is a critical need to address the problem of decreasing fish catches, which can only be achieved through improved fisheries management if the Ghana Poverty Reduction Strategy is to be realized. Capacity building is an enabling condition for improved fisheries management.

This is a justification for the setup of the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project, which has the primary aim of promoting sustainable marine fisheries management in Ghana through capacity building of students, professionals and fishing communities, using effective partnerships across public and private institutions, both local and international. The project is sponsored by the United States Agency for International Development (USAID) through the Feed-the-Future (FtF) Initiative and it contributes to Government of Ghana's national fisheries policies and coastal development objectives.

1.2 Feed-the-Future (FtF) Initiative of the United States Government

Feed-the-Future (FtF) is a United States Government (USG) Initiative to address global hunger and food insecurity. In 2009, President Barack Obama of the United States committed US\$3.5 billion over a 3 year period to this global initiative, which was launched in 2010 with the aim of fighting hunger and poverty. FtF is coordinated primarily by the USAID based on the fact that every 1 per cent increase in agricultural income per capita reduces the number of people living in extreme poverty by between 0.6 and 1.8 per cent. No other investment has that return. FtF supports initiatives in fisheries and coastal management with funding in view of the fact that the capacity of most developing nations to utilize their coastal and marine resources, while sustainably protecting them from degradation to ensure long-term fish food production is lacking.

1.3 The USAID/UCC Fisheries and Coastal Management Capacity Building Support Project

The Fisheries and Coastal Management Capacity Building Support Project is a partnership agreement between the USAID and the University of Cape Coast (UCC) which was signed on 24th October, 2014 and implemented by the Department of Fisheries and Aquatic Sciences (DFAS) of UCC. The project provides DFAS with administrative, technical and financial assistance. USAID’s total contribution to this Project is up to the tune of US\$5,500,000, which is sub-obligated on yearly increments to enable DFAS effectively coordinate capacity building at various levels for sustainable marine fisheries management in Ghana over a period of five years (2014-2019). The USAID award represents a strategic investment from the American people for food security in Ghana as part of the USG FtF Initiative, and subject to the terms and conditions of the Agreement signed with the University of Cape Coast (PIL No.: 641-A18-FY14-IL#007).

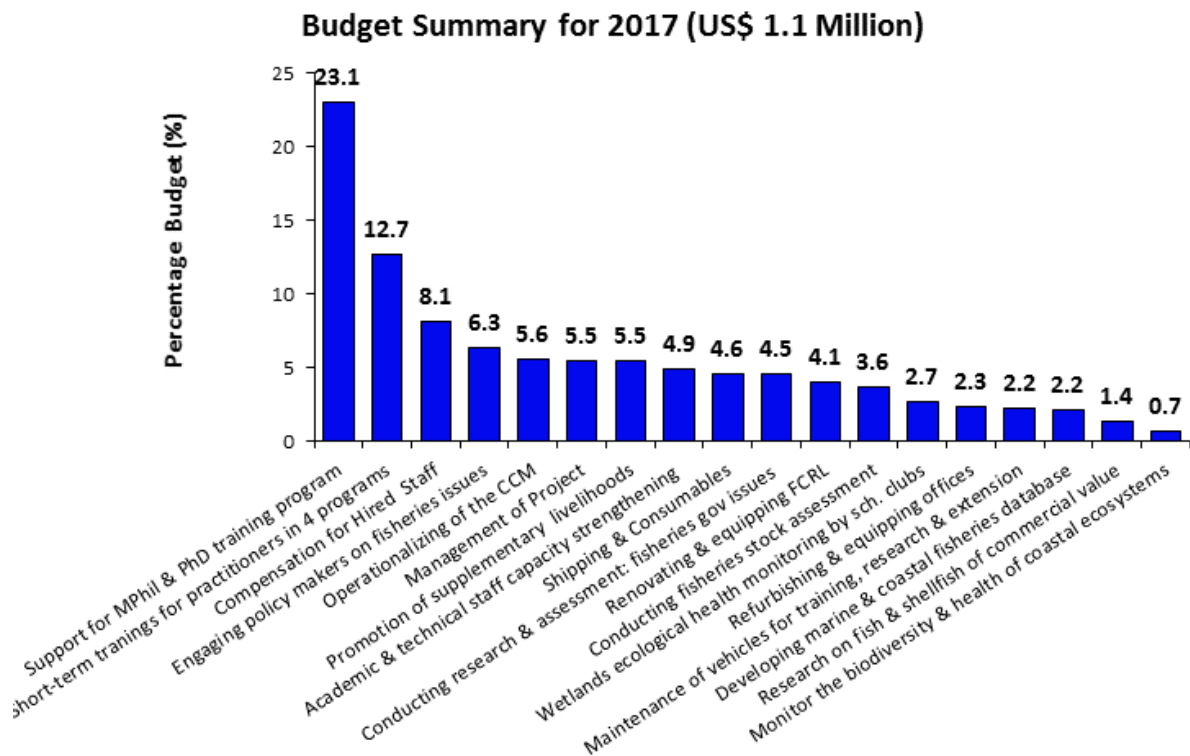


Figure 3: Overview of Year 3 Project Budget (US\$ 1.1 million)

The main purpose of the award is to contribute towards addressing capacity needs in fisheries and coastal management in Ghana. The project was modeled to respond to the issues raised in the SWOT Analysis. It aims at strengthening the institutional capacity of DFAS to train personnel for the fisheries and coastal management sector of Ghana, and support the establishment of a Centre for Coastal Management (CCM) at the University of Cape Coast. The award also supports the restructuring of integrated data and information support systems for fisheries and coastal management, which serve as building blocks for evidence-based policy formulation and decision making at all levels. Project activities contribute to USAID’s development strategy for Ghana as outlined in its Country Development Cooperation Strategy (CDCS), and also respond to USAID/Ghana Development Objective 2: Sustainable and

Broadly Shared Economic Growth. Expected outcomes from the five-year project include the building of significant capacity for sustainable marine fisheries and coastal management in Ghana, and management outcomes become more evident.

Local scientific capacities are being strengthened in specific areas such as the provision of quality and relevant educational programs, practical research, extension and advisory services to support the management of Ghana's fisheries and coastal resources, which will enhance the country's social and economic development. Relevant partnerships are being built with institutions with shared research and training interests by creating a platform for regular interaction and dialogues with local and foreign universities, particularly with Centres, Institutes and Departments at the University of Rhode Island (URI). This project has also formed important collaborations with relevant government partners including the Ministry of Fisheries and Aquaculture Development (MoFAD), the Fisheries Commission of Ghana, as well as libraries and research institutions with the idea to promote increased use of science and applied research for decision making, law enforcement, climate change adaptation and biodiversity conservation for poverty alleviation.



The capacities of academic and technical staff of DFAS and the CCM are continuously being strengthened to enhance the use of new technologies and scientific equipment, through the refurbishment of the fisheries and coastal research laboratory, library and offices of academic staff, acquisition of vehicles for field research, extension and the procurement of equipment for the creation of fisheries and coastal management database working with other international data sources and host centres. These will facilitate the training of 10 PhD, 20 Masters and 150 Undergraduate students. The award also includes funding for short courses on climate change adaptation and mitigation in coastal communities, fisheries and coastal management and Geographic Information Systems (GIS) for targeted professionals over the course of five years, which are all facilitated by the Centre for Coastal Management (CCM) as part of its operationalization.

The project also supports the implementation of a DFAS Strategic Plan, development of a Business Plan for CCM, policy dialogues, and critical research with the help of the refurbished Fisheries and Coastal Research Laboratory. The project conducts research to generate data and information to fill key knowledge gaps that are required for a more effective implementation of Ghana's Fisheries and Aquaculture Sector Development Plan, and undertakes community outreach and extension programs to improve long-term national capacity on fisheries and coastal issues, train personnel in relevant government agencies, and strengthen their links to a network of researchers within national and international research organizations.

1.4 The Department of Fisheries and Aquatic Sciences of the University of Cape Coast

The University of Cape Coast (UCC) is located close to the Atlantic Ocean, which makes the Department of Fisheries and Aquatic Sciences (DFAS) of UCC one of the leading institutions in the area of Fisheries and Marine Sciences in Ghana. DFAS has a vision to become an internationally recognized partner in the conservation of healthy aquatic ecosystems for sustained provision of goods and services, in collaboration with public and private institutions. This vision has been facilitated by the initiation of the USAID funding support to DFAS. The capacity of DFAS has been strengthened with the provision of adequate logistics and teaching infrastructure, which has made DFAS more attractive to an increasing number of students wanting to undertake studies at the School of Biological Sciences, and enhanced opportunities for institutional collaboration. DFAS now has a state-of-the-art laboratory with relevant modern equipment, which supports hands-on practical based training of students. This presents DFAS students with future academic prospects. DFAS offers undergraduate (BSc) degree in Fisheries and Aquatic Sciences and postgraduate (MPhil and PhD) degrees that expose students to:

- Oceanography, Limnology and Aquatic Ecology
- Integrated Coastal Resource Management including Petroleum Ecology and Climate Change Studies
- Aquaculture, bridging gaps between demand and supply in the fishing industry and aquaculture entrepreneurship
- Fisheries Science including fisheries ecology and organismic interactions



Figure 4: HoD congratulates some graduands of the Department of Fisheries and Aquatic Sciences during Congregation, September 2017

1.5 Monitoring and Evaluation (M&E)

Monitoring and Evaluation (M&E) is considered very critical both at the planning and implementation phase of all activities of the project to ensure that all project activities are directed towards achieving intended results. In Year 3, M&E activities commenced with the development of the Annual Workplan, falling on lessons learned from project participation in the Monitoring and Evaluation and Results-Based Management Training organized by AfricaLead in the previous year. As such, the project M&E team ensured that project activities were designed to be measurable using the appropriate indicators. The M&E team also made conscious efforts to ensure that activities planned to achieve results as indicated in the project

Results Framework. This approach was necessary to guard project planning, implementation and monitoring in a manner that measurable results would be achieved.

Prior to the commencement of project activities in Year 3, project management developed a comprehensive strategy and approach to the implementation of planned activities using the services and technical support of external facilitators, mainly from sister Departments of other universities in Ghana. The project Year 3 workplan was developed to bring on board external facilitators who assisted the project to carry out activities related to training and capacity building in fisheries management, Geographic Information Systems, Integrated Coastal Management and climate change as well as other activities related to supplementary livelihoods in coastal communities, ecological monitoring of wetlands and biodiversity, research on governance issues in fisheries, and fisheries and coastal research dialogue. In course of the year, the M&E team closely worked with the external facilitators and reminded them regularly on their M&E and reporting duties. To improve on M&E responsibilities and reporting by external facilitators, project management organized a workshop for all external project facilitators to brief them about the project M&E system and appropriate monitoring tools and skills for data collection for good reporting. In this workshop, the external facilitators were introduced to the Project's M&E system, project indicators, data collection methods and timely reporting.



Figure 5: Godfred Asiedu (standing), M&E Support Person for the USAID/UCC Fisheries Project, sensitizes Project external facilitators on their responsibilities and efficient reporting of field activities



Figure 6: Project team in a group photograph with technical facilitators at the M&E Workshop at CCM

In Year 3, AfricaLead organized a visit to the project to assess how knowledge acquired from the M&E and Results-Based Management training has been applied in project management. Officials from AfricaLead worked with the M&E team to review progress that the project has made towards setting up the project’s M&E system and provided the required support to the M&E team to ensure the project implements a sound M&E working system. During the M&E and Results-Based Management training organized by AfricaLead in the previous year, the project M&E team agreed to strengthen the existing project M&E system and also develop and implement an M&E system for DFAS in general using lessons learned from the training topic “Setting up an M&E System” as the Plan of Action after the training. The AfricaLead team assessed how well the project M&E team has done with the plan of actions which were agreed upon during the training, the challenges faced in their implementation and how AfricaLead could assist address the challenges in order to have a sound M&E system in place not only for the USAID support project but also for DFAS. The AfricaLead team was impressed with the progress made so far by the project M&E team towards improving the project M&E system and further recommended the following that:

- The project Results Framework be reviewed to include and describe all project activities
- An operational M&E system be developed for DFAS
- All project Reference Documents must be printed in hard copies and stored in the Project M&E database
- Data collection plans be developed for all project indicators

In Year 3, the project M&E team was part of a co-creation, coordination and collaboration meeting for Implementing Partners of the USAID/Ghana Fisheries and Coastal Management Program which consists of the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project, the USAID/Ghana Sustainable Fisheries Management Project and

the USAID/Ghana Sustainable Coastal Landscapes Project. The meeting was organized by USAID/Ghana which was hosted by the Coastal Sustainable Landscapes Project in their Takoradi office premises. The purpose for the meeting was for the 3 projects to identify areas and opportunities for collaboration and synergies and share lessons learned across projects. The M&E team also benefitted from presentations by USAID/Ghana on reporting project outcomes, performance monitoring principles, establishing baselines and setting targets for performance indicators. Information and knowledge acquired by the M&E team were used to improve upon the project M&E system and USAID/Ghana reporting requirements.

In Year 3, ACDI/VOCA assigned a livelihoods consultant to work for the project as a volunteer to assist in finding solutions to some of the challenges associated with the implementation of supplementary livelihood activities in coastal communities in the Western and Central Regions. The M&E team worked closely with the livelihoods consultant in the field to inspect all livelihood activities being implemented by the project. Inspection of snail farms and bee hives as supplementary livelihood activities in the communities as well as conversations with community members indicated that some progress had been made with their implementation but the progress had rather occurred on a slow pace. Those observations indicated that more innovative ways were required in addition to implementing some of the recommendations from the livelihoods consultant in order to achieve improvements in Year 4. The Year 4 Workplan was developed taking into account the recommendations made.

Throughout Year 3, the project M&E team followed with keen interest the implementation of all project activities planned for Year 3 and reported on progress accordingly to the Core Management Team on regular basis in order to ensure that activities were carried out in conformity with the timelines specified in the Workplan. The M&E team also fulfilled their obligation of entering all FY 2016 project results into the online FTFMS and the USAID AIDtracker+ database as well as all data reporting responsibilities to METSS.

2.0 PROGRAM COMPONENTS, MANAGEMENT AND ACTIVITIES IN YEAR 3

2.1 Activities Completed in the Third Year

Key Activities Completed within the Third Year:

During the third year of project implementation, key programmatic actions completed include:

- Year 2 activities on fisheries governance, policy and research dialogue, strengthening community-based groups and promotion of supplementary livelihoods in coastal communities were completed.
- AfricaLead conducted an Organizational Capacity Needs Assessment for DFAS and the CCM to identify areas for capacity strengthening and enhancement of both institutions.
- Project management participated in a co-creation, coordination and collaboration meeting for Implementing Partners of the USAID/Ghana Fisheries and Coastal

Management Program to identify areas and opportunities for collaboration and synergies and share lessons learned across projects.

- ACDI/VOCA provided the project with a livelihoods consultant who worked as a Volunteer and an Advisor to provide technical assistance on snail farming and bee-keeping as supplementary livelihoods in coastal communities.



Figure 7: ACDI/VOCA provided the project with a livelihoods consultant who worked as a Volunteer and an Advisor to provide technical assistance on snail farming and bee-keeping as supplementary livelihoods in coastal communities

- Project management collaborated with management officials of the USAID/Ghana Sustainable Fisheries Management Project to develop approaches for undertaking the Leadership for Fisheries Management Course in Year 3.
- The project hosted a delegation from URI made up of the Associate Dean for Academic Affairs of the College of Environment and Life Sciences, Representatives from the Department of Natural Resources Science and the Department of Fisheries, Aquaculture and Veterinary Sciences to discuss Academic Exchange Programs and the running of joint degree programs.



Figure 8: Some deans from the University of Rhode Island

- The project participated in an eight-member delegation from the University of Cape (UCC) led by the Vice-Chancellor, Prof. Joseph Ghartey Ampiah to the United States of America (USA) to strengthen the relationship between UCC and some selected Universities in the US. The purpose of the meeting was to explore fruitful partnership

opportunities for strengthening capacity building, research, student mobility, resource sharing, faculty exchanges among others.

- The project organized a National Stakeholder Conference on fisheries and coastal management research dialogue in Accra to deliberate on issues of fisheries and coastal management concern in Ghana to inform policy formulation.
- Project management organized a joint meeting with the USAID/Ghana CSLP Project, Friends of the Nation and Hen Mpoano to discuss community wetlands monitoring program with schools and the possibility of integrating UCC students into the program to learn and carry out research.
- Teachers from selected schools in the Central and Western Region were trained as trainer-of-trainers in wetlands ecological health monitoring to engage students in community wetlands conservation
- The project organized a short course on climate change adaptation and mitigation in coastal areas for middle-level professionals to understand the causes and effects of climate change in coastal communities and to discuss adaptation and mitigation strategies. Short courses on Geographic Information Systems (GIS) and Integrated Coastal Management were also organized.

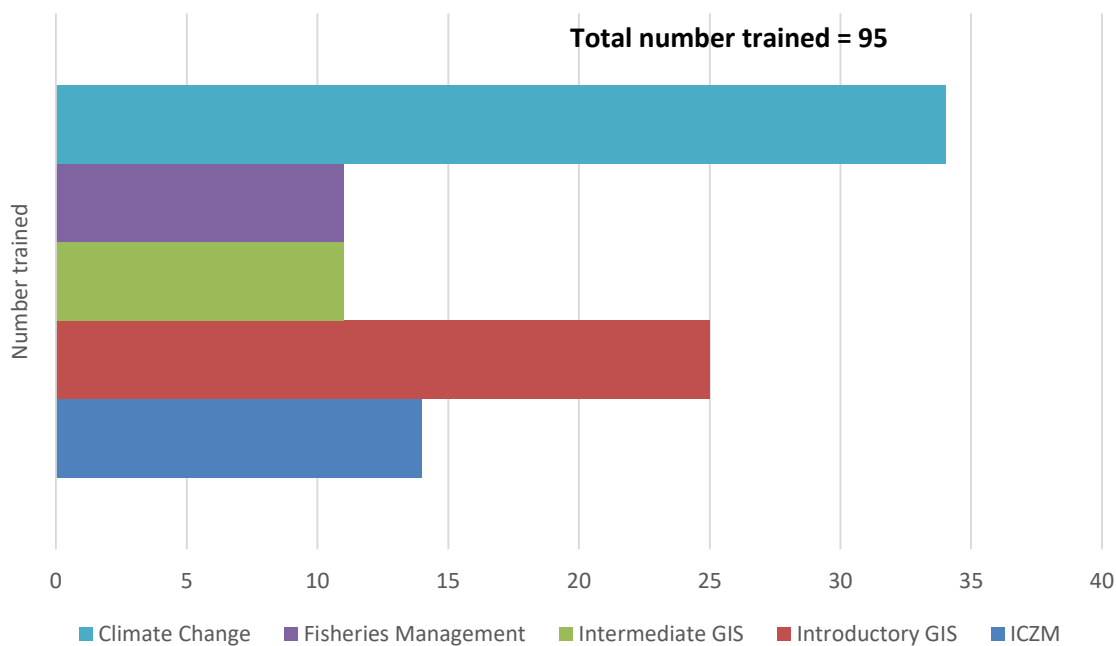


Figure 9: Number of personnel trained in the various short courses led by CCM

- The project tested the 5-day training manual on fisheries management and conducted fisheries management training for professionals in the fishing industry, administrators and policy makers.



Figure 10: *The project tested the 5-day training manual on fisheries management that was developed*

- The Administrator of the United States Environmental Protection Agency paid a visit to the project to discuss climate change issues and their impacts, and participated in a discussion on climate change impacts on public health at the University of Cape Coast.



Figure 11: *Administrator of US EPA, Ms Gina McCarthy visits the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project and delivers a talk on how the USA is playing a leading role in addressing climate change*

- The USAID/Ghana Mission Director paid a visit to the project and the Central Region as part of his departure from post program. In course of the visit, he interacted with and had a working dinner with selected staff and students of DFAS and CCM, paid courtesy calls on the Central Regional Minister and the Vice-Chancellor of UCC and also inspected project facilities including the fisheries and coastal research laboratory.



Figure 12: The USAID/Ghana Mission Director Mr. Andrews Karas visits USAID/UCC Fisheries Project

- The Project Manager participated in the Feed the Future annual partners meeting with the Ghana Government and stakeholders working to advance food security goals under the U.S. government’s global hunger and food security initiative.



Figure 13: Excerpts from the Feed the Future Partners Meeting in Accra (March 21-22, 2017)

- The project participated in a workshop on the development of a fisheries co-management policy for Ghana organized by the USAID/Ghana Sustainable Fisheries Management Project.

- The project officially launched the Fisheries and Coastal Management (FishCOM) online database with the participation of collaborating institutions.
- The project organized Proposal Writing and Strategic Planning workshops for DFAS, CCM and sister Departments at UCC with facilitation by an expert in proposal writing from Belgium.
- The project participated in the USAID/Ghana Implementing Partners workshop organized by USAID/Ghana METSS and AfricaLead.
- The project participated in the USAID/Ghana Sustainable Fisheries Management Project Implementing Partners workshop organized by the SFMP at the Elmina Beach Resort.
- The project participated in the Leadership for Fisheries Management training course organized by the USAID/Ghana Sustainable Fisheries Management Project.
- Four (4) members of DFAS and CCM academic staff embarked on a study tour to the Australian National Centre for Ocean Resources and Security (ANCORS) at the University of Wollongong in Australia to build their capacity in Law of the Sea and Maritime Regulation and Enforcement.
- Five (5) members of DFAS Academic and Technical staff took part in a customized training program organized by the Maritime Safety and Security Department of the Regional Maritime University in Ghana to build their capacity to properly and safely man, operate and maintain the project research boat *RV Sadinella*.
- The last batch of five (5) MPhil students to receive funding by the project to undertake Masters Programs at DFAS beginning 2017/2018 academic year were admitted.
- The project completed the installation of laboratory equipment and ISO certification of the fisheries and coastal research laboratory after consultations with the Ghana Standards Authority.
- Project team met with officials from the USAID West Africa Biodiversity and Climate Change (WABiCC) Program at UCC to introduce their projects and discuss potential areas for collaboration and synergies between the two projects.
- The maiden Conference on Fisheries and Coastal Environment as part of the project activity on Engaging Policy Makers to Address Fisheries and Coastal Issues was organized in collaboration with the USAID/Ghana Sustainable Fisheries Management Project (SFMP).
- A delegation of project officials paid a courtesy call on the new Minister of Fisheries and Aquaculture Development to introduce the USAID Fisheries and Coastal Management Capacity Building Project to her and explore potential areas for collaboration between the Ministry and the Project.
- Project's fisheries governance and policy research facilitators made a presentation and submission on fisheries and coastal environmental sanitation: role of Metropolitan, Municipal and District Assemblies (MMDAs) to the National Development Planning Commission (NDPC) for inclusion in Medium-Term Development Plans.
- Over twenty (20) environmental journalists representing different media houses and representatives from the Ministry of Fisheries and Aquaculture Development (MoFAD)

and the Ministry of Sanitation and Water Resources were trained in effective reportage on fisheries and coastal management issues.

- The project organized a three-day workshop to deliberate on a Workplan for Year 4 and developed a strategy for the successful implementation of all planned activities. The workshop brought together key project stakeholders like the USAID, MoFAD and the FC. The workshop discussed achievements, successes and challenges in Year 3, and ways forward for improvements in Year 4.



Figure 14: Year 4 work planning held at Prampram. In attendance was the Minister of Fisheries and Aquaculture Development, Hon. Elizabeth Naa Afoley Quaye and the Deputy-Minister of Fisheries and Aquaculture Development, Hon. Francis Kingsley Ato Cudjoe and the Vice-Chancellor of the University of Cape Coast, Professor Joseph Ghartey Ampiah

- The project organized the first ever Conference on Fisheries and Coastal Environment in Ghana. This was led by the Centre for Coastal Management and the Department of Fisheries and Aquatic Sciences in collaboration with the University of Rhode Island and the Ministry of Fisheries and Aquaculture Development (MoFAD).



Figure 15: Conference on Fisheries and Coastal Environment at the College of Physicians and Surgeons, September 2017

56 News Visit www.graphic.com.gh #STOP SALAMSEY Daily Graphic, Tuesday, October 17, 2017.

Senior Minister issues 'red alert' against illicit fishing methods

By Mary Mensah, ACCRA

THE Senior Minister, Mr Yaw Osafo-Maafa, has stated that plans are afoot for the establishment of three development authorities, including the coastal development authority.

He said the coastal development authority would assist the four coastal regions, namely: Volta, Greater Accra, Central and Western regions, to boost the local economies of those areas, while creating employment to improve their quality of life.

Fishing industry

Mr Osafo-Maafa said this at the closing of a three-day conference on Fisheries and Coastal Environment in Accra.

The Ministry of Fisheries and Aquaculture Development organised the conference in collaboration with the University of Cape Coast (UCC) and the University of Rhodes Island to help sanitise the fishing industry.

It was on the theme: "The Changing Marine Fisheries and Coasts: Challenges and Opportunity for Changing Mind."

Mr Osafo-Maafa expressed the regret that many of the fishermen and fisheries

the various fisheries practitioners and associations to do more in getting their members to comply with the laws regulating the fisheries industry.

"To the chief fishermen, the question I do ask frequently is: what has become of the traditional authority that you exercised over the fishermen in the areas of ensuring rational fishing practices, including the observation of the traditional systems of the close season?" Mr Osafo-Maafa queried.

Neighbouring countries

He, however, indicated that when those same fishermen resulted to the neighbouring

of illegal fishing methods were abandoned.

"Yes, when in their own country, measures are put forward to attempt to address the problems in the fisheries, they are strongly resisted. This must stop," he stressed.

He therefore declared "red alert," to all forms of illegal, unreported and unregulated (IUU) fishing methods in the country and tasked the relevant law enforcement agencies to carry out the order to the letter.

Mr Osafo-Maafa also called on the media to partner the government and other stakeholders to fight illegal fishing, as in the case of illegal mining, to ensure sustainable

Innovative ways

For his part, the Vice Chancellor of the University of Cape Coast (UCC), Professor Joseph Chartey, said the conference reaffirmed the commitment of the UCC to the sustainability of fisheries and coastal resources of the country, which brought very significant contributions to food security, employment and poverty alleviation.

"By virtue of our strategic location, UCC is proud to be organising this conference, but most importantly, I am pleased it comes at a critical time; a time when all key stakeholders, government, fisheries

worsening coastal environment."

Policy linkages

The Director of the Centre for Coastal Management (CCM) of the university, Professor Denis Worlanyo Aheto, said the conference was designed to strengthen policy linkages and enable researchers, journalists and think tanks to connect their voices to sustainable fisheries and coastal development agenda of the country.

Therefore, the conference discussed sub-themes on fisheries and coastal governance policy, fisheries economics and value chains, ocean and coastal environment, marine culture

• Mr Yaw Osafo Maafa (4th left), Senior Minister, interacting with Nana Kodwo Condou VI (3rd right) Paramount Chief of the Edina traditional area after a conference. Picture: GABRIEL AHIABOR

Figure 16: Major highlight of the Conference on Fisheries and Coastal Environment as captured on page 56 of the Tuesday, October 17, 2017 edition of the national newspaper, Daily Graphic

3.0 PROJECT OUTPUT1.1: IMPROVED INFRASTRUCTURE

3.1 Activity 1.1.1: Renovating and Equipping Fisheries and Coastal Research Laboratory

Renovation works at the fisheries and coastal research laboratory was largely completed in Year 2 but the installation of equipment and laboratory certification procedures continued into Year 3. The installation of equipment in the refurbished laboratory was also largely completed towards the end of Year 3 with a few finishing touches yet to be fully completed after engaging the Ghana Standards Authority for a long time about the installation and certification process.



Figure 17: *The main laboratory and research laboratories with some installed equipment*

Based on knowledge and information gathered from the initial enquiries, the Ghana Standards Authority was identified as the most competent agency to undertake the installation of equipment and assist DFAS to acquire the certification. Project management developed Terms of Reference for required services based on which the Ghana Standards Authority conducted a preliminary assessment, prepared and submitted a financial and technical proposal for consideration by the project covering a sum of one-hundred and forty thousand Ghana Cedis (GHS 140,000.00) as proposed applicable charges. The charges were considered too high for the project to cope. Project Management therefore contacted MES Equipment whose service charges were within project budget to undertake this activity to meet the standards for an ISO certification based on the Terms of Reference. This sets the laboratory in pretty much good condition for DFAS staff and students' research and academic work beginning Year 4 and also for extra income generation by DFAS as a project exit strategy as indicated in the recently drafted DFAS Business and Strategic Plans. A detailed laboratory management plan has been

prepared as part of the Department's Strategic and Business Plan that proposes running the laboratory as an internally generated income venture for DFAS.

In course of time, the project conceived the idea of converting the containers which were used to ship the laboratory equipment to Ghana as a storage facility for some DFAS equipment and also as offices for DFAS Technical Staff. DFAS officially requested for space from the University for putting up the facility which was granted. Following the approval, a piece of land was provided close to the College of Agriculture and Natural Sciences (CANS) by authorities of the School of Biological Sciences for the purpose. DFAS then liaised with the UCC Directorate of Physical Development and Estate Management (DPDEM) to develop the facility as a GIS hub and office space for Technicians. The project sought approval from USAID to carry out such an activity according to project regulations. USAID then asked for the appropriate documentation needed for the approval (i.e. approval letter from the university, environmental compliance requirements, university approved shed construction plans), which were submitted. Project Management expects a response from the USAID to proceed or not to proceed with this activity in Year 4.

3.2 Activity 1.1.2: Refurbishing and Equipping office/Lecture/Computer rooms and Library

Eight (8) DFAS academic and technical staff offices in total were originally planned to be refurbished throughout life of project to enhance the capacity of DFAS in terms of infrastructure to improve delivery of quality teaching and research services. Two (2) offices were refurbished in the Year 1 and three (3) in Year 2. Unfortunately in Year 3, the planned schedule for the refurbishment of the remaining offices was disrupted for reasons including lapses in University procurement procedures, contracting and payment processes and then also due to the demise of the building contractor. These culminated in delays with completing refurbishment work on schedule. However, these challenges were overcome which led to the development of a new work schedule for completing refurbishment works on the rest of the three (3) offices. The new schedule was strictly followed leading to the completion of work on the three (3) remaining offices in Year 3. Refurbishment works on all eight (8) offices have successfully been completed as at the end of Year 3. The DFAS Departmental library has also been well refurbished with all equipment supplied.

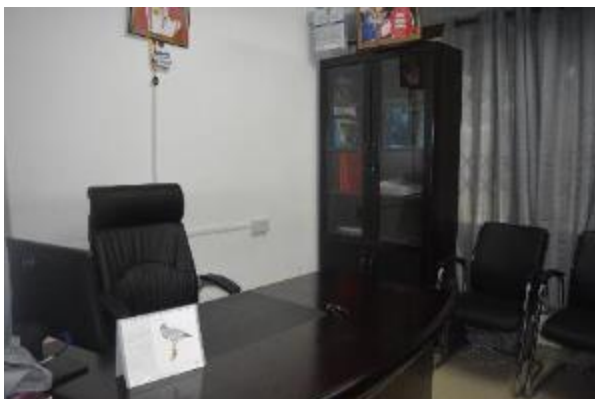




Figure 18: Renovated offices of some DFAS academic staff

In Year 3, project procurement processes to acquire books and subscribe to journals for the DFAS library were advanced after a long process of working with the University librarian and the Procurement Section of the University. After this matter was referred to the University librarian, he initially contacted different suppliers for quotations and invoices for procurement but after careful consideration by project management, a decision was taken not to approve the award of contracts because management was of the view that prices quoted were too high. The matter was brought to the Project Management Board who later advised that DFAS or the School of Biological Sciences can procure the books in bits on their own on condition that the amount involved in a single procurement does not go above a certain value, according to the University procurement policy. Project management therefore decided to work through the project bankers to acquire a bank card which was approved by the Director of Finance of UCC for the purchase of the books in batches and to also enable DFAS to subscribe to the journals. The bank card was successfully issued which facilitated the acquisition of library books in batches and subscription to academic journals. In going forward, regular maintenance is needed to keep offices, library books and all other equipment in good condition.

3.3 Activity 1.1.3: Acquisition of Vehicles to Support Educational, Training, Research and Extension Activities

As at the end of Year 3, all three (3) project vehicles originally planned to be procured to support educational, training, research and extension activities had been acquired. In Year 3, project management ensured that the vehicles were properly maintained through regular servicing by competent service providers. Maintenance of project vehicles and regular servicing was the primary responsibility of the project driver under the overall guidance of the Project Manager. In Year 3, project vehicles functioned as expected without any major challenges. Project management in collaboration with the project driver ensured that vehicle road worthy certificates and insurance policies for all the vehicles were renewed. All the vehicles were regularly serviced in accordance with servicing plans in Cape Coast for the Toyota vehicles and with Mechanical Lloyd in Takoradi for the Ford vehicle. In course of the year, one of the wind screens of the Ford vehicle was accidentally broken but was successfully repaired by Mechanical Lloyd after the vehicle insurance company (State Insurance Company) assessed the damage and paid for the cost of repairs. When the Ford truck was at the workshop, travel plans of DFAS staff and students were affected but alternative arrangements were made

to assist travelers to have other University vehicles for official duties and field work. Following the repairs, challenges with the use of vehicles were successfully resolved.

4.0 PROJECT OUTPUT 1.2 INCREASED TECHNICAL AND SCIENTIFIC KNOWLEDGE

4.1 Activity 1.2.1: Academic and Technical Staff Capacity Strengthening

The USAID/UCC Fisheries and Coastal Management Capacity Building Support Project aims to build capacity in different forms and at different levels including strengthening the existing staff, institutional and infrastructure capacity of DFAS to deliver quality service to their clients. A baseline assessment was needed to determine existing capacity against which improvements in capacity will be measured. In Year 3, an Organizational Capacity Assessment for staff of DFAS and CCM was conducted by AfricaLead. The assessment identified DFAS capacity strengths and weaknesses and made recommendations for improving the capacity of academic and technical staff for effective fisheries and coastal management planning, training, research, and extension work. Findings from the assessment were subsequently integrated into the design and development of project activities.

To continue with ongoing DFAS academic and technical staff capacity strengthening activities, three (3) members of DFAS academic staff and one (1) project staff who are more involved in the Integrated Coastal Management aspects of the project participated in a study tour to the Australian National Centre for Ocean Resources and Security (ANCORS) at the University of Wollongong in Australia in Year 3.



Figure 19: Three DFAS academic staff (from left to right) Dr. Isaac Okyere, Prof. John Blay and Prof. Denis Aheto build capacity at the University of Wollongong in Australia

ANCORS offered a 50% discount on course fees due to the special relationship between ANCORS and DFAS. While at ANCORS, the participants of the study tour received education and training on ocean law, maritime regulation and enforcement, maritime security, natural

marine resource management, and also received marine policy development advice. The participants learned from taking part in ANCORS short courses to gain experience to improve on the short courses that are run by the CCM. Participants also learned about how ANCORS operates in terms of their strategy for managing short courses, their overall management and administrative structure, funding and income generation mechanisms. Subsequently, these experiences will be applied to improve upon the operationalization of the CCM and the running of short courses as a business.

Similarly in Year 3, two (2) members of academic staff of DFAS also attended a Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) Biennial Conference and 5th African Higher Education Week in South Africa to present some key findings of the project in the Ghanaian fisheries sector over the past two years to the audience. The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) is a network made up of over fifty African universities with a mandate to oversee graduate training and networks of specialization in agriculture and related subjects in the countries and universities where it works. This was intended to market the project on an international platform and give more visibility to the project worldwide. The purpose of this travel was to use this international platform to showcase the capacity building collaboration between the USAID/Ghana (as a donor organization) with UCC (as a public institution in Ghana) in the area of fisheries and coastal resource management and explore opportunities in collaborating with other partner institutions in Africa.



Figure 20: *Dr. Noble Asare (left) and Prof. Denis Aheto (right) showcase the USAID/UCC Fisheries Project at the RUFORUM Biennial Conference by poster presentation*

The UCC team prepared and presented a poster that described the USAID/UCC project as a capacity building partnership program designed to strengthen the knowledge, skills, and relationships to enable organizations, groups, and individuals to reach their set goals in fisheries and coastal resource management and governance in Ghana which includes strengthening institutional systems, processes, and rules of engagement. The poster presentation highlighted requirements for developing the foundation for effective partnerships and identified the role of higher education and research institutions in national development. This conference enhanced the capacity of the two (2) academic members of staff particularly on issues pertaining to how partnerships and innovations to strengthen higher education in Africa are formed. The two conference participants also took the opportunity to explore and establish important links with

two Universities in Cape Town, South Africa which will benefit DFAS and CCM in the areas of students' supervision and examination.

In Year 3, DFAS contracted the Maritime Safety and Security Department of the Regional Maritime University (RMU) in Accra to organize specific short courses for academic and technical staff of DFAS concerning how to properly and safely man, operate and maintain the projects research boat, the RV Sadinella. Training participants were taken through short courses and training in basic maritime safety, security and survival. Two (2) technical staff, two (2) academic staff and one (1) students of DFAS participated in five (5) specific courses; Elementary First Aid, Personal Survival Techniques, Personal Safety & Social Responsibility, International Ship and Port Facility Security as well as Life Boat and Steering (Simulator). The participants were issued with certificates of participation at the end of the 2-week program at the RMU.



Figure 21: Certificates presented to five DFAS personnel by the Maritime Safety and Security Department of the Regional Maritime University (RMU) in Accra

This training activity was directly linked to the registration and licensing of the research boat by the Ghana Maritime Authority and the Fisheries Commission. The Ghana Maritime Authority and the Fisheries Commission require that qualified and certified personnel by a competent Authority, who are able to properly and safely man, operate and maintain a vessel at sea and in inland water bodies are in place before a vessel could be registered and licensed. This activity therefore provided an enabling condition for the registration and licensing of the research boat for sea worthy.

4.2 Activity 1.2.2: Operationalization of the Centre for Coastal Management

Human resource capacity is critical in the operationalization of the Centre for Coastal Management. In Year 3, operationalization of the Centre moved a step forward as a Director was appointed by the University to oversee matters related to the advancement of the Centre. The appointment of a Director for the Centre facilitated remarkable improvement towards its operationalization with respect to organization and the implementation of the Centre's activities. With this development, the Centre has become more organized as an independent



Figure 22: Mrs Vera Cudjoe, Administrator for Centre for Coastal Management

entity from DFAS. Project Research Assistants have been assigned with clearly defined roles and responsibilities to assist in the Centre's operations. General roles and responsibilities of the Centre under the project were also more clearly defined in Year 3. An important challenge for the Centre relates to the inability to recruit more members of staff at different levels to support the Director in performing relevant functions. Part of the problem comes from government's freeze on public sector employment and also the limited resource capacity of the Centre to engage staff on project basis or fixed-term contracts. Regardless the limitations, the Centre played its role very well to ensure that project activities were implemented in an effective and timely manner with the support of external facilitators and research assistants on the project.

Beginning Year 3, the Centre effectively supervised all Year 2 activities which were carried over to Year 3 to be fully completed. More effective strategies and approach were also developed for the implementation of all Year 3 activities. Implementing the new approach, the Centre played a more active role in the implementation of all its activities particularly those which were carried out in collaboration with external Technical Assistants. The Centre continued to engage the services of external Technical Assistants in Year 3 but the Technical Assistants acted more as facilitators who played facilitating roles in the implementation of project activities. The Centre rather played a more active role in the organization of activities providing official, administrative, financial, logistics, material and other resource support unlike in Year 2 where the external Technical Assistants undertook all activities with less involvement of the Centre. This enhanced more efficiency and ensured that project activities were implemented in an effective and timely manner to achieve intended results. This approach also applied to other activities carried out by the Centre such as the training in Integrated

Coastal Management, Fisheries Management, GIS and Climate Change as well as Research in Fisheries Governance and Policy Dialogue issues.

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CENTRE FOR COASTAL MANAGEMENT
 SCHOOL OF BIOLOGICAL SCIENCES
 COLLEGE OF AGRICULTURE AND NATURAL SCIENCES
 UNIVERSITY OF CAPE COAST

WELCOME! The Centre for Coastal Management (CCM) at University of Cape Coast is part of the School of Biological Sciences and has a special relationship with the Department of Fisheries and Aquaculture Sciences (DFAS), its "nursery ground". It has the vision of becoming a Centre of Excellence in Coastal Management that contributes to global efforts at ensuring healthy coastal ecosystems for sustained provision of goods and services, and a mission to support the achievement of optimal balance between conservation and exploitation of coastal resources. CCM therefore has three focal activities: capacity building, research and extension in coastal and fisheries management.
(Prof. Denis Worlanya Aheto, Director)

VISION
 To become a Centre of Excellence in coastal management with the capacity to advance healthy coastal ecosystems for sustained provision of goods and services in collaboration with public and private institutions locally and internationally.

MISSION
 The Centre for Coastal Management (CCM) at the University of Cape Coast, hereafter referred to as the Centre, aims to achieve an appropriate balance between the conservation and utilization of Ghana's coastal resources through integrated scientific research, education of the future generation of scientists and coastal management practitioners, and community collaboration and outreach.

SHORT COURSES
 As part of its capacity building activities, the Centre organises short term training programmes every year in the following:
 Climate Change Adaptation and Mitigation in Coastal Areas
 Fisheries management
 Fisheries Leadership
 Integrated Coastal Zone Management (ICZM)
 Introductory Geographic Information Systems (GIS) and Leadership
 Advanced Geographic Information Systems (GIS)

SERVICES
 The Centre is involved in research, extension, outreach and offers consultancy in the following areas:
 Fish stock assessment
 Coastal ecosystems biodiversity and conservation
 Pollution and ecological health of coastal ecosystems
 Building the capacity of community-based groups in coastal resource management
 Training coastal community members in selected supplementary livelihood programmes
 Coastal spatial planning

Email: ccm@ucc.edu.gh Call: +233 332 096 806

Funded by the United States Agency for International Development (USAID) through the USAID-UCC Fisheries and Coastal Management: Capacity Building Support.

Figure 23: Flyer developed to publicise CCM's functional operations and services provided

As part of activities to operationalize the Centre for Coastal Management, the Centre hosted a Coastal Management Specialist from Belgium with expertise in project proposal writing and institutional strategic planning over a two-week period in Year 3 to draft a Strategic Plan for DFAS and to train staff of CCM and DFAS on project proposal writing, grantsmanship and project management, and assisted to identify funding sources, as were specified in the Terms of Reference (TOR). The training had an overall aim of positioning DFAS and CCM to coordinate funding and engage in effective resource mobilization (such as infrastructure, logistics, and personnel) to access grants nationally and internationally. As part of this workshop, the proposal writing expert assisted DFAS staff to review the Department's existing strategic plan and draft a new plan for the next five years (2017 – 2022). In the strategic planning sessions, more emphasis was laid on the existing DFAS Strategic Plan 2012 - 2017, but also concentrated on the necessary steps required to build foundations that serve as a basis to populate several parts of the strategic plan as well as a structure for the implementation of the plan itself.



Figure 24: DFAS holds strategic planning workshop

He also assisted them to revise a previously submitted but unsuccessful European Union Intra Africa Mobility proposal in 2016 based on comments received from the donors for a possible resubmission in 2017. He also took workshop participants through a virtual proposal development exercise as part of the capacity building exercise. Requirements of the 2017 Call were critically analyzed and compared with the 2016 Call so as to improve the contents of the 2016 application, to improve on the quality and completeness of information provided, to focus on the uniqueness of the proposal and its partnership, and to produce a logical structure of the project for its implementation.





Figure 25: *Proposal writing workshop for CCM*

Seventeen (17) members of DFAS staff and fifteen (15) students participated in this workshop. The workshop was run based on participants' expectation to understand the steps needed to draft a strategic plan and project proposal and to have the structure of these documents ready by the end of the workshop. It was an information collection workshop and not really writing the strategic plan for DFAS or writing a proposal because the understanding of the strategic planning and proposal development processes were required before drafting of such documents can start. Project management is hopeful that with the knowledge gained from the workshops, drafting teams would be able to finalize the DFAS strategic plan and also to be able to write proposals with enough quality.

The Centre further initiated the creation social media platforms and successfully created a Twitter account (@ccm_ucc) and YouTube channel (Centre for Coastal Management). These platforms are enhancing CCM communications and helping the Centre gain global recognition. In addition to social media platforms, the Centre commenced an upgrade of the existing website in the light of effective communications and dissemination of CCM activities and interactive use of the site. This is aimed at facilitating the use of the CCM website as a registration portal for all short courses offered at the Centre. The ongoing upgrade will also enable regular distribution of newsletters to inform the public about both CCM and project activities.



Figure 26: CCM Twitter page



Figure 27: CCM website currently being upgraded

4.3 Activity 1.2.3: Support for Postgraduate (MPhil & PhD) Training Program

The activity on postgraduate support and training was originally designed to train 10 PhD and 20 MPhil fully funded students in DFAS programmes in Fisheries Science, Integrated Coastal Management, Oceanography and Limnology or Aquaculture. Five (5) PhD and 10 MPhil students were admitted in the 2015/2016 academic year while 5 PhD and 5 MPhil students were admitted in the 2016/2017 academic year through a competitive selection process. In Year 3, the last five (5) MPhil students were admitted to begin their studies in the 2017/2018 academic year. This allows for enough time for all the PhD and MPhil students to complete their studies in time before end of project in September 2019. In Year 3, postgraduate student activities were monitored to ensure that students satisfied all admission, School of Graduate Studies, project, DFAS and University of Cape Coast requirements during the period in collaboration with their academic supervisors, and also to ensure that students were on course to complete their studies within schedule. Monitoring postgraduate student activities indicated that research students have been assigned with academic supervisors and have either completed developing their research proposals and have proceeded with research or were still going through the process. MPhil students who are undertaking coursework also attended lectures regularly.



Figure 28: HoD of DFAS (centre) in a group photograph with some postgraduate students and other staff of the Department

During the development of the project Year 3 workplan, the project proposed to USAID to consider and approve support for additional six (6) PhD students on part scholarships to cover fees for various programmes of study within DFAS without a need for additional funding from USAID in course of the project. It was indicated to USAID that funding for these additional students will come from the budget for research that are to be carried out by project external Technical Assistants as part of activities being undertaken by the Centre for Coastal Management (CCM). This approach was intended to use PhD students to conduct part of the research that is outsourced to the short-term Technical Assistants to support capacity development of younger faculty and students, while the Technical Assistants would be used as mentors to supervise these research topics in collaboration with academic staff of DFAS. Following approval from USAID, 6 additional PhD students were admitted in Year 3 to enroll

in various programmes of study at DFAS. This brought the total number of postgraduate students who are currently studying with scholarship under the project to 36.

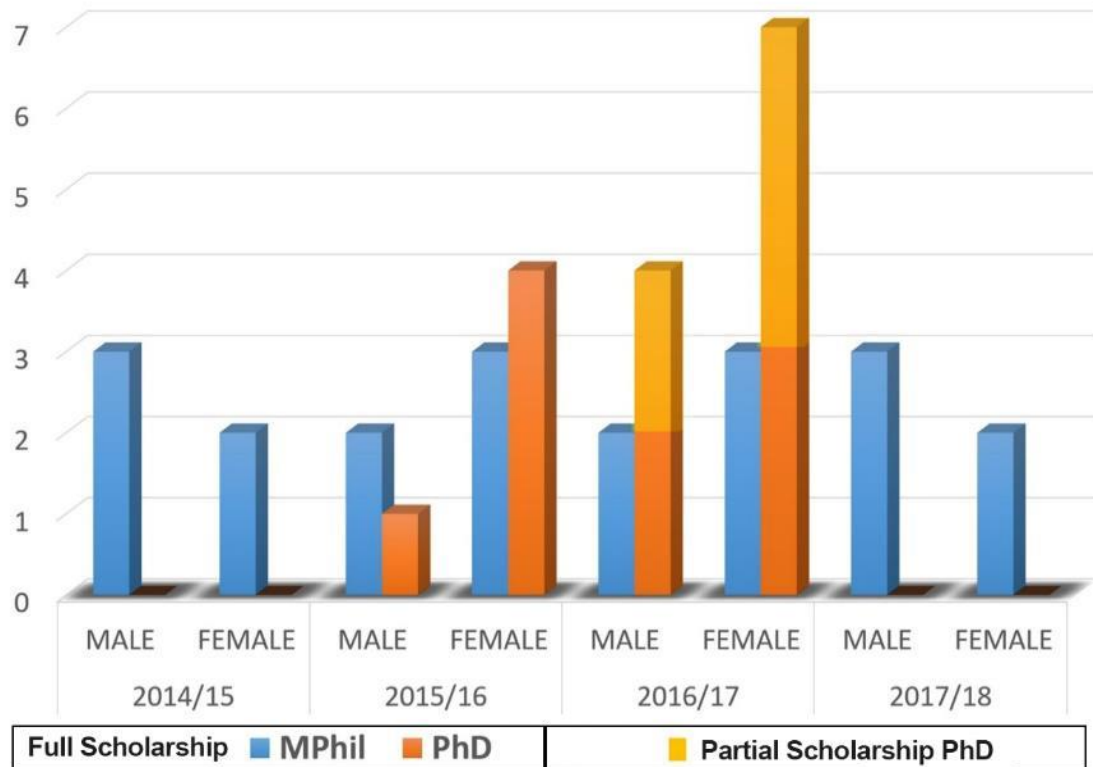


Figure 29: Total number of 36 students enrolled on the USAID/UCC Fisheries Project scholarship programme

Plans about PhD students spending some time at the University of Rhode Island (URI) as part of their study programme were also further advanced in Year 3 with four (4) of the first batch of 5 PhD students travelling to URI to enroll into a 1 semester research program at URI. The students are expected back in Ghana at the end of the semester in December 2017 to finalize the write up on their thesis. The possibility of UCC DAFS PhD students undertaking dual degree program was also discussed extensively between the leadership of URI and UCC in Year 3 when delegates from the College of Environment and Life Sciences of URI paid a working visit to the UCC. This visit was a follow up to previous exchange visits of high level officials of both universities in early 2016 to strengthen their partnership as spelt out in the MOU and begin negotiations of specific terms for further collaboration and exchange of faculty and students.

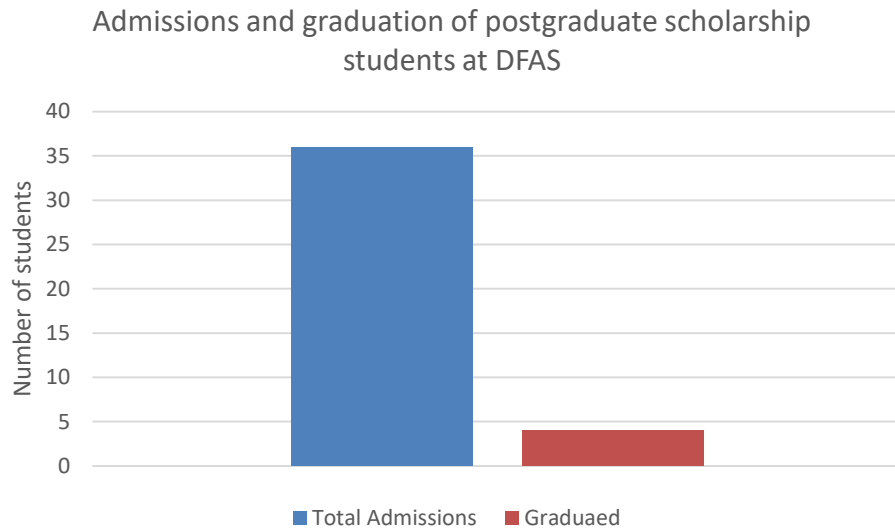


Figure 30: First group of DFAS MPhil students graduated in 2017

4.4 Activity 1.2.4: Undergraduate Research Grants

This project activity is aimed at supporting the advancement of undergraduate studies by providing financial support in the form of small grants to final year undergraduate students of DFAS and other sister universities in Ghana to assist them financially to carry out field research for their dissertation. Only DFAS undergraduate students benefitted from this programme in FY 2015 and FY 2016. In course of implementation of the programme and from lessons learned in FY 2015 and FY 2016, project management found out that the project saved some funds from this activity because numbers of DFAS final year undergraduate students were always not up to the number of students budgeted for to be supported by project funds for this activity. In planning for Year 3 therefore, project management took a decision to fund final year undergraduate students from the Departments of Fisheries of other sister Universities that the project collaborates with in the implementation of project activities from the undergraduate research grants budget on competitive basis. Four (4) Fisheries Departments were identified to benefit from the grants; Department of Fisheries and Watershed Management, Kwame Nkrumah University of Science and Technology (KNUST), Department of Marine and Fisheries Science, University of Ghana (UG), Department of Fisheries and Water Resources, University of Energy and Natural Resources (UENR) and Department of Fisheries and Aquatic Resources Management, University for Development Studies (UDS). A total of 20 field research grants (5 per institution) worth US\$500 per student were awarded to students from the above Universities in Year 3 in addition to 9 undergraduate students of DFAS to support their final year small research projects.

A Memorandum of Understanding (MoU) covering terms and conditions of the support was developed and signed between DFAS and the other Universities. The purpose of the MoU was to strengthen the collaboration between DFAS and the other Universities through the award of undergraduate field research grants by the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project implemented by DFAS to final year undergraduate students

of the other Universities to undertake research for their final year projects. This program will be evaluated and undertaken again in Year 4 depending on the success.



Figure 31: Department of Fisheries and Aquatic Sciences graduating class of the 2016/17 academic year who benefited from small grants awarded by the USAID/UCC Fisheries Project for their undergraduate projects

5.0 PROJECT OUTPUT 2.1: INCREASED MARINE AND COASTAL RESEARCH AND RESOURCE ASSESSMENTS

5.1 Activity 2.1.1: Conducting Fisheries Stock Assessment

One of the main challenges confronting the marine fisheries sector in Ghana is the issue of declining fish stocks. To address this challenge, the long-term conservation and sustainability of exploited fish stocks should be a priority. Information on the status of stocks is required from time to time to guide management decisions about the exploitation of targeted fish species. This important information is generated through fish stock assessment research. The activity on fish stock assessment research started in Year 2 through Year 3 with a primary objective to provide information on the status of stocks of some selected commercially important marine fish species in Ghanaian coastal waters. Research was conducted from 6 designated fish landing sites along the entire coast of Ghana, namely, Elmina, Sekondi, Half Assini, Apam, Tema and Keta for the gathering of data and information on selected fish stocks. Data was collected on daily catch (kg) per canoe, semi-industrial and industrial boats, size distribution, maturity stages; length-weight relationships from beach seine and offshore

catches, salinity and surface temperatures of water for monitoring upwelling indices which have a direct correlation with the status of stocks. Length-based assessment methods were used to estimate growth and mortality characteristics, exploitation rates and size at first capture of cuttlefish *Sepia officinalis*, shrimp species, Carangidae (e.g. *Caranx hippos*, *C. chrysos*, *Trachurus spp.* and *Decapterus spp.*) and Sparidae (*Pagellus spp.*, *Dentex spp.*, and *Pagrus spp.*). In addition, the data obtained covered various aspects of the biology of the targeted species including, the length-weight relations, sex-ratios, condition factor, food and feeding habits, sexual maturity, spawning and fecundity. Otoliths of fish specimens were removed for analysis to establish age structure of the stocks. These were carried out to generate data and information on the status of stocks to inform fisheries management decision making.

Initial analysis of the data and information gathered from the assessment research indicated decline in stocks of the selected species which were attributed to increased fishing effort. The data and information generated in Year 2 was inadequate to predict the actual status of fish stocks in Ghana's waters. To have a more reliable representative data on stocks required an all-year round sampling which informed project management decision to approve a request from the project fish stock assessment Technical Assistant to undertake the research for an additional 6 months' period in Year 3. Following the approval, the activity on fish stock assessment continued in Year 3 with the routine monthly fishery surveys and data collection. The collection of monthly length-frequency data were compiled to allow application of the length-based FAO FISAT program to estimate growth and mortality parameters and the appropriate Surplus Production Model for Maximum Sustainable Yield (MSY) estimation respectively.

To obtain more reliable data and information to determine the status of fish stocks, an all-year round sampling is required. This informed the decision by project management to approve a request from the project fish stock assessment facilitator to undertake the research for an additional period. Upon granting of the request, the research was continued throughout the first quarter and ended in the quarter under review. Sample-based fishery surveys aimed at gathering monthly data on the landings (kg) and species abundance from canoes at Half Assini, Elmina, Tema, and Keta, semi-industrial boats from Sekondi, Elmina, Apam and Tema as well as industrial vessels from Sekondi and Tema were conducted. Monthly length-frequency data was compiled after the end of the survey to estimate growth and mortality parameters and the estimation of Maximum Sustainable Yield (MSY).

The status of selected commercially important marine fish stocks was progressively monitored and compared with previous records, growth and mortality parameters as well as the determination of exploitation levels of the selected fish stocks, different measures of effort in the fisheries were identified, and the most reliable catch per unit efforts for the fisheries determined. Results obtained from the survey again indicated decline in catches of targeted fish stocks due to increase in fishing effort. Summary of findings from the assessment showed that annual catches for artisanal and semi-industrial vessels have gradually declined since the mid-1980s. Tuna catches however showed an increasing trend possibly due to the wider geographical reach, mostly beyond Ghana's fishery waters. The sizes of most of the targeted species landed were below the minimum permissible landing sizes of commercially important

fish species specified in the fisheries law. This supports the adoption of urgent control measures such as closed seasons to conserve fish stocks.

The survey showed that the estimated MSY for artisanal, semi-industrial and trawlers were 237,255 metric tons, 19,949 metric tons and 20,450 metric tons respectively, at an optimum fishing effort (Fmsy) of 9,045 canoes, 1062 semi-industrial vessels and 103 trawlers respectively. Comparison of annual fish catches since the mid-1980s with the estimated MSY values indicate that MSY has been surpassed for both artisanal and industrial fisheries sectors, which is a revelation of growth overfishing as shown by lower modal sizes of the landed fish species falling below the minimum permissible landing sizes of commercially important fish species. Fishing beyond MSY has negative implications both on the sustainability of stocks and livelihoods. This justifies the urgent need for the enforcement of fishing rules and regulations. It was concluded from findings of the research that ecosystem-based fisheries management should be adopted instead of single-species fisheries management approach to manage all species.

5.2 Activity 2.1.2: Conducting Research and Assessment on Marine Fisheries Governance Issues

In Year 3, the implementation of the activity on research and assessment on marine fisheries governance issues was combined with the activity on engaging policy makers to address coastal and fisheries issues. Most of the activities on research and assessment on marine fisheries governance issues have therefore been reported as part of activities in section 6.5 of this report. Year 3 activities were centered on implementing the outcomes of research and policy dialogues conducted in Year 2 at the district, regional and national levels. They were focused on sets of principles and actions to guide activities at the various landing beaches and various government implementing levels as agreed upon nationally.

The activity on research and assessment of marine fisheries governance issues focuses on surveys and reviews on traditional governance structures or customary social arrangements, local governance and decentralization as well as collaborative/community rights based management and their legal dimensions, environment, sanitation, children, gender and tourism issues. A thorough assessment and a good understanding of the issues are critical for effective fisheries management particularly at the community level. There are about 189 fish landing sites in the Western and Central regions, 93 in the Western and 96 in the Central region. In Year 2, research on marine fisheries governance issues was carried out from 60 landing sites in 7 coastal districts in the Western and Central regions. To have more confidence in the data generated research was extended to cover the other landing sites in Year 3. In Year 3, all the issues identified and the information collected through the research were validated.

Results from the assessments indicated that traditional fisheries governance is closely linked with the customs and traditions of the various ethnic groups in a fishing locality. These vary from one landing beach to another depending on the ethnicity of the community. The research found out that even though some of the landing sites do not have recognized chief fishermen,

traditionally, chief fishermen play a lead role in the governance system but their authority have declined over time. The power of chief fishermen to govern the landing beaches generally reduces from the rural community, through the peri-urban communities to the urban areas. Furthermore, the power of the chief fishermen is affected by issues such as chieftaincy disputes and political affiliation. Women fishers are led by chief fish processors who traditionally fix fish prices at the landing beach and also serve as arbitrators in settling disputes that arise among female fish processors. The way power is exercised varies markedly from landing beach to landing beach. The power of chief fish processors also reduces from the rural areas to the more urban fishing communities. Traditionally, the chief fish processor works with the chief fisherman but she is not a part of the governance structure of the landing beach.

Information from the research showed that fishing methods used in most of the landing beaches include light fishing, chemical fishing, bomb fishing and trawling. While majority of fishermen attest to the presence of illegal fishing methods, there was usually the blame game where one ethnic group accuses the other of engaging in the act. Results showed that prospects of adopting a management strategy that would lead to a sustainable exploitation of the resource is high among many fishermen but on condition that Government shows a lot more commitment and support for such efforts. This could be achieved by first depoliticizing the issues in the fisheries, especially with respect to pre-mix fuel allocations and sales and also making alternative livelihood schemes available to the fishing communities. For instance it was noticed that an effort at banning light fishing for six months in the Nzema area of the Western region by traditional authorities came into effect in May 2016. The rationale was to test the impact of light fishing on fish stocks. Fishers expected government to support the idea and possibly extend it to the rest of the country. There were reports of occasional breaches of the ban on light fishing but the initiative appeared to be yielding results.

The research also showed that some Ghanaian fishermen spend up to six months within the year fishing in the Ivory Coast and they fully comply with fishing rules and regulations because the rules are strictly enforced in the Ivory Coast, which underscores the suggestion that, Ghanaian fisheries law enforcers should learn from the Ivory Coast. Fishermen were hopeful that fish stocks could recover but they were reluctant to take the initiative. The results showed that 60% of fishermen interviewed wanted to see Illegal Unreported and Unregulated (IUU) fishing banned, 40% supported a ban on light fishing, and 80% wanted bomb fishing banned. Out of 240 fishermen interviewed, only 18 representing 7.5% were in support of a closed fishing season while 8 representing 3.3% supported restricted access canoe fishery. In most instances, fishermen indicated that for as long as trawlers continued to fish for small pelagics in near shore waters, illegal fishing by canoe fishermen would continue.

It was concluded through the research that there is a huge disconnect between the local government administration and traditional fisheries authorities. Community by-laws are either not applied or enforced to regulate fishing activities at the community level. Nevertheless, local government administration demonstrated their willingness and preparedness to partner with fishermen in controlling and regulating the fisheries and managing the environment. Through this activity, traditional fisheries authorities and local government were brought together to deliberate on fisheries governance issues, management of landing beaches, and provision of

services by the local governments to keep the beaches clean. It could safely be concluded that achieving effective fisheries governance in the coastal fishing communities is possible but not until political influence in the fisheries especially that related to pre-mix fuel distribution and sales, and the transshipment of juvenile fishes are abandoned. Results from this study will be appropriately packaged and disseminated widely to reach policy makers as science and evidence-based inputs for marine fisheries policy formulation and advice in Ghana.

Through this activity, it was been found out that there is a general perception by fisheries stakeholders that, illegal fishing practices coupled with ineffective governance systems particularly at the community level are mainly responsible for the decrease in fish catch and degradation of the coastal environment. However, this presents an opportunity for reform in the fisheries sector as there is the willingness and agreement by all stakeholders that change is needed, and the change has to occur from bottom-up rather than top-down, and supported by the District Assemblies and traditional authorities. This formed the basis for engaging policy makers at the national level through activities described in section 6.5.

5.3 Activity 2.1.3: Research on Fish and Shellfish of Commercial Value

The background to the activity on research on fish and shellfish of commercial value is that production from Ghana's marine capture fisheries have decreased in the past few decades, which justifies the need to conduct research on aquaculture to assess the culture potential of certain commercially important aquatic species that can help close the gap between fish demand and supply. One of the widely-proposed mechanisms by fisheries experts to address the challenge of fish production decline is the uptake and development of aquaculture. However, there is inadequate scientific knowledge on the biology and culture potential of many fish species, which is also a challenge that must be addressed if aquaculture is to be promoted as a viable business. In terms of aquaculture production, the commonest fish cultured in Ghana is the Nile tilapia *Oreochromis niloticus*, a freshwater fish. The culture potential of other species has received little or no attention. This project activity therefore is aimed towards intensifying scientific studies on the biology and culture of brackish water fish resources, mainly the black-chinned tilapia *Sarotherodon melanotheron* and the mangrove oyster *Crassostrea tulipa*, two resources which are endemic to coastal areas of the country.



Figure 32: DFAS MPhil (Aquaculture) research student investigating the effect of some ingredients in fish diets on the growth of *Sarotherodon melanothron*

Research is currently being conducted by DFAS PhD and MPhil Aquaculture and Fisheries Science students who are ably supervised by competent experts at DFAS and also through joint studies with colleagues from the Department of Fisheries of other universities. Findings from the research on fish and shellfish aquaculture will inform the decision by project management to promote the aquaculture of viable species as an additional supplementary livelihoods activity in coastal communities in addition to snail rearing and bee keeping with the aim of reducing fishing pressure on capture fisheries and promoting responsible fishing. In Year 3, a research scientist was engaged to identify brackish water bodies in the Central Region suitable for mass oyster spat production, and construction of tidal ponds for fish culture. Outcomes from the research will inform management's decision to set up oyster demonstration farms and fish culture demonstration ponds for the purpose of training coastal inhabitants in oyster and fish rearing in Year 4.

The research being undertaken by a second year PhD candidate to investigate the potential of selective breeding in the propagation of the most common coastal species of tilapia, blackchin tilapia progressed steadily in Year 3. Findings from this research will inform the decision on whether or not to promote the use of the species on fish farms, especially in coastal Ghana, by improving its culture performance.



Figure 33: Hapa-in-pond setup for the research of Lawrence Ahia, a PhD student in Aquaculture on selective breeding of blackchin tilapia (*Sarotherodon melanotheron*)

Also in Year 3, one DFAS MPhil Aquaculture student who was supported by the project completed his research on the use of locally available natural ingredients for the formulation of tilapia feed, which will significantly contribute to existing knowledge on tilapia aquaculture in Ghana.



Figure 34: Tilapia feed preparation: pelleting (left) and drying (right), by DFAS MPhil Aquaculture student

One of the 6 additional DFAS PhD students who started their course in Year 3 continued his scientific studies on the biology and culture of oysters on the topic; a study on the fishery, aspects of the biology and culture of the mangrove oyster *Crassostrea tulipa* population at Densu Estuary in Ghana supervised by senior academic advisors at DFAS who are experts in the field. To facilitate the research, a community entry strategy was employed by paying an initial visit to the communities near the Densu estuary. The PhD student and supervisors and an MPhil Aquaculture student who is also conducting research on oysters, visited members in the community to discuss their research and to seek their consent. While in the community, discussions were also held with oyster fishers association within the communities.



Figure 35: DFAS visits led by Prof. Kobina Yankson to communities near the Densu Estuary as part of a community entry strategy to facilitate research of postgraduate aquaculture students

On the Departmental level, DFAS also conducted research on oysters to explore oyster farming as a possible supplementary livelihood option for coastal dwellers, with the background that oysters are an important source of food and income for coastal communities in Ghana. DFAS conduct field experiments to test strategies to collect oyster spat from water bodies that have thriving natural populations to assemble information on suitable oyster spat collectors in Ghana and other parts of the world. Spatial and temporal distribution of spat as well as the most efficient material for collecting oyster spat would be determined. The information gathered will be collated and well documented to serve as a reference. Five (5) coastal ecosystems were selected, one each in five different communities for the field experiments based on presence of thriving populations of oysters. These include the Whin Estuary at New Amanful in the Western Region, the Benya Lagoon at Elmina, Amisano Estuary at Amisano and Narkwa Lagoon at Narkwa, all the Central Region, and the Densu Delta area near Tsokomey in the Greater Accra Region.



Figure 36: Some materials (PVC pipes, tiles and coconut shells) prepared into preferred sizes and drilled, to be constructed into units for use as cultches to collect oyster spat.



Figure 37: Bamboo (*Bambuseae*) to be used to construct racks (left) and oyster shells made into a sample cultch unit for the experiment.

In Year 3, there was also a collaborative research that was conducted between DFAS and SFMP in the Densu delta in the Greater Accra Region which is particularly looked at the role of women in oyster fisheries and how that could be enhanced for wealth creation. It was concluded from this collaborative research, that oyster populations have huge potential to supplement livelihoods of coastal dwellers and therefore its culture must be promoted as a business that can contribute significantly to the incomes of fishers and local economies, and reduce pressure on already depleted capture fisheries.

5.4 Activity 2.1.4: Analysis of Value Chains of Fish Trade

This activity is departmental driven involving students, research assistants and academic staff of the Department. Similar to the activity on research on fish and shellfish of commercial value, the activity on the analysis of value chains of fish trade is also a research activity which is currently being undertaken by a DFAS female PhD student who was admitted in Year 3. She is currently working on the topic “Value chain analysis of *Pseudotolithus species* towards food security in Ghana”. She explains that a value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production and delivery to final consumers and that fish value chain consists of input supply,

harvesting, processing, marketing and consumers with support activities such as inputs required, access to credit, technological development, storage facilities, etc.

She argues that *Pseudotolithus species* has been reported to be commercially important throughout the Atlantic coast of West Africa. Though much work has been done on various aspects of the biology and ecology of the fish such as the length-weight analysis, studies on food preference and food habits, there is almost no data on the commercial status of this important fish to portray a clear picture of the value chain of the species. It is against this background that she developed a proposal to research on the value chain of the species towards food security in Ghana which focuses on the economics and management of the fishery for this fish. She intends to estimate the catch contribution by different fisheries sectors in terms of quantity, size and price, investigate the production costs of different forms of processing, pricing and exports, develop a market map for the sale of the fish, establish the economic value of the species along the supply chain and project the overall livelihood outcomes, and examine the roles played by different institutions in the cassava fish trade in the Central and Western regions of Ghana.



Figure 38: Researcher interviews fishers at Anlo Beach (top left). Freshly processed (bottom-left) and smoked (right) Croakers

The information she generates from her research will serve as a baseline for management and decision making on the fishery for the fish. The study is expected to produce data on the value chain analysis of the sciaenids of which *Pseudotolithus species* is part to serve as a baseline on the issues of production (harvesting), processing, marketing, export and consumption. Profit margins and revenue generated from the export of this fish will also be established by this research. The study will identify and address challenges along each step of the value chain, provide information to inform policy making and create opportunities for the actors and other stakeholders involved in the fishery. This research has the potential to generate useful

information and knowledge on value chains of fish trade and will be supported by the project in Year 4. Field data collection run in Year 3 and will continue until September 2018 where data analysis will begin.

5.5 Activity 2.1.5: Monitor the Biodiversity and Health of Coastal Ecosystems

Advancing the conservation and sustainable management of biodiversity is critical for food security and poverty reduction. The degradation of coastal ecosystems therefore poses a significant threat to biodiversity and food security particularly in coastal communities, which must be an issue of management concern. The activity on monitoring the biodiversity and health of coastal ecosystems aims at finding solutions to some of the challenges facing these ecosystems in Ghana through research. In Year 2, the project initiated research in a coastal lagoon at Half Assini in the Western Region in collaboration with researchers from the Kwame Nkrumah University of Science and Technology (KNUST) Institute of Renewable Natural Resources which was aimed at providing baseline scientific information for assessing the status of coastal ecosystems for rehabilitation and improved management. The research involved periodic assessment of fish species, benthic invertebrates, and mangrove communities in the lagoon and its associated wetlands to gather baseline scientific information for future monitoring. Aquatic environmental conditions, occurrence of algal blooms and invasive species were also investigated.



Figure 39: Aerial photograph of the Awiane Lagoon currently being assessed for restoration in the Jomoro District, captured with a drone

Continuous monitoring of the physicochemical and nutrient status of the lagoon in Year 3 revealed that the sandbar between the sea and the lagoon had been washed off allowing seawater to enter the lagoon at high tide. The wave-driven lagoon flushing therefore changed the physicochemical dynamics of the lagoon, resulting in two distinct regimes at two different sampling sites. Salinity at the beach end of the lagoon increased from freshwater to brackish

but further assessment of fish stock was required to determine whether the changes in the physicochemical conditions had affected fish diversity. The sampling site farther away from the beach however, maintained typical freshwater conditions indicating that the effect of the influx of the seawater was only partial. Draining of water from the lagoon into the sea by gravity following the breaching of the sandbar resulted in reduced water depth of the lagoon.

Monitoring of biodiversity and ecological status of the lagoon continued throughout Year 3 in order to have a year round comprehensive baseline data on the lagoon and to support arguments for the removal of solid wastes from the lagoon. In Year 3, some PhD students of DFAS also carried out research on ecological health status of coastal ecosystems including developing ecological indices for monitoring pollution in estuaries and lagoons. These studies were expanded to include new studies with focus on mangrove ecology, systematics and assessments of anthropogenic impacts.

In collaboration with the District Assembly, the project plans to apply results from the research as scientific basis for managing the lagoon and to facilitate the removal of solid wastes in and around the lagoon to be deposited at an appropriate location to increase its depth and storage capacity, and decrease pollution in the lagoon. In addition to removing solid wastes from the lagoon, the project worked with the community, the traditional authority and the Environmental Health Unit of District Assembly to find appropriate ways for improving conditions in the lagoon through the development of a by-law to protect the lagoon, to create a buffer zone around the lagoon, dialogue with the community on the location of sanitary sites and provide resources for solid waste collection by the District Assembly. If these approaches are well developed and implemented, it will ensure that the lagoon is kept in a healthy state that can continue to support the benefits that community people derive from it. This will serve as a demonstration for the conservation and sustainable management of other lagoons and wetland areas in Ghana.

5.6 Activity 2.1.6: Developing Marine and Coastal Fisheries Database

Management decision making processes require access to quality data and information. The activity on developing marine and coastal fisheries database is aimed at organizing historical scientific data, new field observations and experimental results on the marine/coastal environment and fisheries in Ghana into a comprehensive database that can easily be accessed by researchers, students, marine and coastal environmental as well as fisheries managers in the country and elsewhere to support teaching and learning, research and management decision making. In Year 2, the project in collaboration with the Sustainable Fisheries Management Project (SFMP) organized a national dialogue on research needs for the management of marine/coastal fisheries and environment in Ghana. One of the outcomes from the dialogue was the development of concrete actions for pursuing the development of the marine and coastal fisheries database and data management. Discussions were held on how to harmonize research and projects outputs from national institutions to enhance fisheries and coastal management in Ghana. As a way forward to the discussions held in the workshop, the project hired a database programmer to design such a database.

To proceed with this activity, the project officially registered the domain name “FishCoM Ghana” referring to “Fisheries and Coastal Management” (<http://www.FishCoM Ghana/index.html>) in Year 3. After that a strategy for critical data collection, management and online distribution was outlined followed by actual collation and standardization of historical data, new marine/coastal research and fisheries data to populate the database. The project organized a database workshop in Accra that brought together collaborators for a national dialogue on sharing of scientific data and information and to develop modalities for the sharing of information as well as issues to deal with access to the database. This workshop was used to officially launch “FishCom Ghana”. During the workshop, collaborating partners signed Memorandum of Understanding (MoU) regarding the operation of the database. Many institutions including the following participated in the workshop:

- Environmental Protection Agency of Ghana
- Ministry of Fisheries and Aquaculture Development & Fisheries Commission
- University of Energy and Natural Resources
- University of Ghana
- Kwame Nkrumah University of Science and Technology
- University for Development Studies
- Council for Scientific and Industrial Research
- University of Rhode Island
- United States Agency for International Development and
- Civil Society Representatives

FishCoMGhana was launched in the second quarter. During the launch, the Pro-Vice Chancellor of the University of Cape Coast, in his address, described the FishComGhana initiative as a national but global platform where all people present are key players. He made an emphasis on the fact that fish and other resources from water bodies around the globe have been depleted, hence the need to plan strategically, provide scientific evidence, advocate and participate in the execution of the plan to ensure food security. He concluded by saying that the launching of FishCoMGhana will therefore provide the impetus to achieve the viable objectives being envisaged.





Figure 40: Launch of the Fisheries and Coastal Management (FishCoM Ghana) Database with attendance by the leadership of the University of Cape Coast led by the Pro Vice-Chancellor, Prof. George Oduro

USAID/Ghana was of the view that through the FishCoM Ghana initiative, challenges with the management of Ghana's fisheries and coastal resources will be addressed, and that the database will provide researchers, students and other stakeholders with credible data to protect and sustainably manage Ghana's marine and coastal assets. The database will also help to tackle some globally important issues like the impacts of climate change. USAID/Ghana therefore urged all collaborating institutions to work together towards improving the management and governance of marine fisheries and other coastal resources.

The Minister for Fisheries and Aquaculture Development thanked USAID/Ghana and the people of the United States for their generous support towards the development of science in Ghana and for supporting the Fisheries and Coastal Management Capacity Building Project. The Minister acknowledged the fact that in certain circumstances, research data may be hidden, expensive to obtain, or difficult to interpret to advance the cause of development and therefore the FishComGhana initiative is an important one.



Figure 41: Head of Department of DFAS Dr. Noble Asare signs MoUs with partners to enable sharing of information on FishCoM Ghana database (left); Dr. Brian Crawford (extreme right), of SFMP, donates some aquaculture books to DFAS at the launch of FishCoM Ghana Project and received on behalf of DFAS by Dr. Denis Aheto).

She was of the view that the initiative will offer an efficient and easy access to data for decision-making and it will serve as a platform where competitive and intellectual battle can take place to promote the understanding on Ghana's fisheries and other aquatic living resources to ensure their sustainable exploitation.

The first phase of developing the marine and coastal fisheries database, the data management platform on Ghana's aquatic living resources and coastal management (FishCoMGhana), was completed in Year 3. There is online access to the database and tracking indicates that it is attracting a lot of visits. A team was constituted to manage activities related to the publication of new research data on the site which include reviewing all items to ensure accuracy before they are published on the site, provide updates for the contents of all the menu items on the site, and manage inquiries/communications from users of the site. The team is the body authorized to access the secured back-end of the database and oversee its day-to-day operations. For security and quality assurance reasons, members of the team include academic staff members of DFAS and CCM as well as persons with knowledge on the nature of the database. In Year 3 also, a workshop was organized for the team to learn the process of security clearance for the administration of FishCoMGhana. The database management team was also equipped with the needed skills to enable them manage aspects of the database involving the publication of new research data, key menu updates, and how they can track the use of the site by visitors and respond to inquiries/email communications regarding the use of the online database.

Also in Year 3, the marine and coastal fisheries database team organized a workshop to plan progress on the database into Year 4. The purpose of the workshop was to discuss issues related to the management and further development of FishCoMGhana for the management and distribution of Ghana's fisheries and coastal research data. A Geographic Information Systems (GIS) expert from the team that is facilitating the activity on developing material and conducting training on GIS participated in this workshop to provide technical assistance to support the development of the marine and coastal fisheries database moving forward.

Since the launch of the FishCoMGhana database, the project has mostly relied on the services of an external Information Technology (IT) specialist to build the website and the back-end of the database, which means that the IT specialist has been the one who manages the FishCoMGhana database, controls the publication of scientific literature, manages online communications between users of the FishCoMGhana database, and the scientists responsible for the data that is published as part of the database. In addition to the external IT specialist controlling the operations of the database, management of Geographic Information Systems (GIS) data related to Ghana's coastal environment and fisheries resources were not included in the FishCoMGhana database. This background information necessitated the organization of the workshop to train DFAS database team to take over the administrative responsibilities related to FishCoMGhana database which does not require specialized IT skills.

The training focused on defining and implementing rules regarding the system security of the FishCoMGhana database, and how to publish new content and communication with users of the database. Strategies for the management of maps and other GIS-based data on the

FishCoMGhana database were also developed. The workshop was planned to answer the following questions:

1. What are the important guidelines for ensuring an efficient and user-friendly management of GIS-based data online?
2. What (hardware) infrastructure will be needed for the management of GIS data as part of the FishCoMGhana database?
3. How can FishCoMGhana include different GIS applications, for example, to host numeric GIS data and images?
4. What criteria should be used to assess the quality of GIS data before it is accepted for publication on the FishCoMGhana database?
5. Given the limited DFAS staff time and GIS expertise, which of the available software will be appropriate for the management of GIS-based data on FishCoMGhana?

The external IT specialist provided information on the strengths and weaknesses of GIS application and links to free GIS. The workshop provided answers to these questions which have been documented to inform future project activities related to advancing the development of the marine and coastal fisheries database. The following activities have been planned in Year 4:

- All papers/articles that will be downloaded from the FishCoMGhana database will be preceded with a fresh page containing a statement indicating the name of the database, and the date and time the paper/article is downloaded from database
- Maps and other GIS-based data will be effectively managed
- A gateway to the Ghana Fisheries and Aquatic Science Society journal will be included
- Training will be provided to enhance the editorial competency of FishCoMGhana managers
- FishCoMGhana will be publicized around the country and
- Members of FishCoMGhana editorial team will be provided with smart mobile phones to enable them edit and post materials on FishCoMGhana.

6.0 PROJECT OUTPUT 2.2: COMMUNICATION, EXTENSION AND OUTREACH IMPROVED

6.1 Activity 2.2.1: Developing Material and Conducting Training on Integrated Coastal Management

The coastal zone in Ghana supports a majority of the Ghanaian population with the provision of a variety of goods and services. In spite of the importance of the coastal zone, public perception is that Ghana's coastal zone and associated resources are plagued with many challenges including resource degradation and ineffective management. This can largely be attributed to the lack of stakeholders' knowledge and understanding of the basic principles and skills to address the challenges in the coastal zone. Due to the fact that coastal issues are multifaceted, training in Integrated Coastal Management (ICM) is therefore a priority of the

USAID/UCC Fisheries and Coastal Management Project Capacity Building Support Project to support efforts geared towards addressing some of the problems in the coastal one. Conducting effective training in Integrated Coastal Management to build the required capacity for addressing the challenges in Ghana's coastal zone requires standard and up to date training materials.

In Year 2, the project developed a training curriculum and training manuals on ICM and tested them in a 5-day training workshop that brought together training participants who are stakeholders in issues related to coastal resources management and planning in the Central Region including administrators at the district level. The ICM training is targeted towards spatial planners, disaster managers, District, Municipal and Metropolitan Assemblies, environmental and fisheries officers, fishermen/fishmongers, and community-based fisheries and coastal management groups. An ICM training manual with PowerPoint presentations, videos of interactions of the coastal zone and human activities and other materials including an instructor guide were developed for the testing.

In Year 3, the project organized an ICM training for stakeholders at the national level and district levels. The training targeted in particular, middle-level professionals from marine and coastal-related governmental and non- governmental institutions at national and district levels in order to build their capacities and competencies to confront coastal management challenges in Ghana. Planning for the training program started with the identification of a training facilitator who partnered with DFAS and CCM to successfully deliver the training. Terms of Reference were developed for the training facilitator with roles and responsibilities of DFAS and CCM in the process clearly defined. The facilitator's role was to publish training manuals developed for capacity building in ICM and conduct a five-day training course using the published training modules. He was also tasked to organize all communications on the training workshop, provide media communication covering, print electronic outlets in coordination with CCM, and coordinate with CCM to identify participants for the course including acquisition of all relevant materials for the course.



Figure 42: Participants of the 2017 ICZM short course profile a coastal community in the Central Region

Eight (8) modules prepared for the training were successfully delivered, with active participation, interactions and discussions among participants as well as conducting fieldwork that covered issues presented. Module 1 covered Introduction to ICM, module 2 Coastal Ecosystems in Ghana, module 3 Opportunities, Uses and Concerns of the Coastal Zone, module 4 Types of Integration and the ICZM processes, module 5 Coastal Management Instruments, module 6 Co-Management and Community-Based Management of Coastal Resources, module 7 Coastal Profile and module 8 Fieldwork with emphasis on Coastal Profiling and Coastal Environmental Health Assessment.

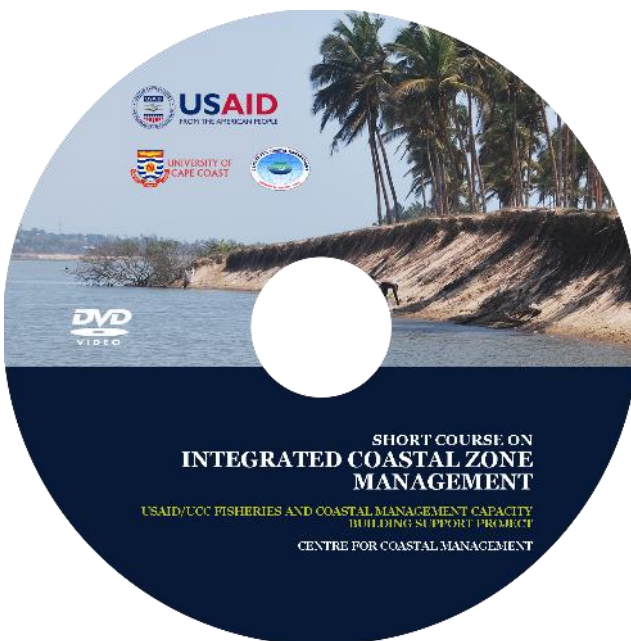


Figure 43: Video documentary produced for the ICZM short course

In all, thirteen (13) people participated in the ICM training course, seven (7) males and six (6) females. At the end of the training, participants were requested to assess the training from their individual points of view. For an overall assessment of the workshop 55% of participants rated their understanding and purpose of the workshop as excellent, 36% of participants rated their understanding and purpose of the workshop as very good and 9% rated it as good. This was interpreted to indicate that the training was important for the participants. Based on the overall

assessment of the training, it can be concluded that the capacities of majority of participants have been improved by the training, which will improve on their work performance and efficiency. The training therefore contributed to assembling the enabling conditions for the sustainable management of Ghana's coastal ecosystems and resources for the benefit of communities and future generations.

6.2 Activity 2.2.2: Developing Material and Conducting Training on Fisheries Management

Sound scientific and technical knowledge as well as management capacity are required for the sustainable management of fisheries. Scientific and technical knowledge will inform and guide effective fisheries management strategies that promote sustainable exploitation based on a set of defined objectives. However, there is inadequate technical and management capacity for fisheries in Ghana, hence the urgent need to develop and implement required capacity building programmes. To respond to this need, in Year 2, the project collaborated with other relevant governmental institutions and key fisheries experts from other universities in Ghana to develop a training curriculum and modules on fisheries management for short training courses, targeting different stakeholder groups (fisheries extension offices, district assembly personnel, community leaders, fishermen and women groups). The primary objective of the programme was to promote sustainable fisheries management at the local level. The modules depended on strategies developed from the needs assessment of the community-based groups conducted in Year 1. It comprises of a 5-day training programme on fisheries management that is tailored to small-scale fisheries. It is intended to train professionals in the fishing industry, business, administrators and policy makers to gain first-hand technical knowledge to support community fisheries management programs. The course comprises of 5 modules which are Module 1: Importance of fish to man, state of world and Ghana's fisheries, impacts of fishing on aquatic ecosystems and man, fish and aquatic resources of Ghana; Module 2: Fisheries management: the need, processes and data requirements; Module 3: Scope and approaches of fisheries management; Module 4: Fisheries management planning, fisheries regulations and institutions; and Module 5: Strategies for fisheries management.

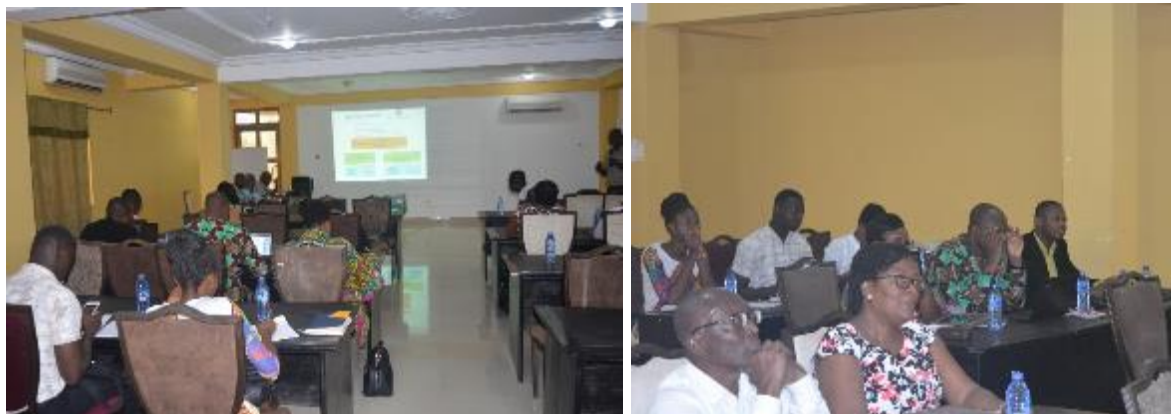




Figure 44: Participants and facilitators at the Fisheries Management Short Course, CCM

In Year 3, the programme was tested using middle-level fisheries stakeholders including participants from the District Assemblies, Ministry of Fisheries and Aquaculture Development, the Fisheries Commission, NGOs and fishing communities. The training curriculum was later finalized based on contributions received from the test training and inputs from DFAS academic staff. After the curriculum was finalized, training was conducted to contribute to professional capacity development for sustainable fisheries management at different levels in Ghana. A total of eleven (11) participants took part in the fisheries management training course, seven (7) males and four (4) females. It is expected that participants will share the knowledge gained from participating in the training course with their colleagues in their respective institutions and also apply the skills in their normal day-to-day operations. Another training course in fisheries management is scheduled for Year 4.

6.3 Activity 2.2.3: Developing Manuals and Updating Training Materials on Climate Change Adaptation and Mitigation

Climate change involves a complex of effects that collectively may dramatically modify the natural environment and have profound influence on our coasts and fisheries, most of which are likely to be negative. For example, atmospheric and ocean temperature variability and the resultant shifts in ocean currents are likely to contribute to large-scale and catastrophic decreases in fisheries productivity. Governments and coastal communities therefore need to adopt strategies to enable them to cope with the impacts of climate change. However, the capacity for adaptation and mitigation to the impacts of climate change at different levels is lacking in Ghana. This necessitated the project to develop the short course on climate change adaptation and mitigation in coastal communities to train middle-level professionals who will contribute towards addressing the impacts of climate change particularly in coastal communities in Ghana.

One of the training programs that have been developed by DFAS and also being implemented by the project is the short course on Climate Change Adaptation and Mitigation in Coastal Areas, which is a 5-day intensive course for professionals working in coastal economies, environment and population/health. This course was developed particularly for economic and physical planners as well as disaster management officials at the district level within Western and Central Region in order for them to understand the causes and effects of climate change in coastal communities and the role of human activity in the process, identify and analyze threats to assets and communities, identify and assess current climate change adaptation strategies in Ghana. The objective of the course is to build the capacity of district planning officers and disaster management staff to incorporate climate change considerations into their district spatial planning and technical advisory services and to support disaster management efforts at the district level.

In Year 3, the project organized a short course on climate change adaptation and mitigation in coastal areas with an expert from KNUST as a facilitator for people from relevant agencies who work across the coast of Ghana. The external facilitator was tasked to compile and publish the training manual on climate change, and build the capacity of district level planners and professionals working in coastal economies on climate change adaptation, organize all communications on the workshop and provide media communication covering print and electronic outlets in coordination with CCM, compile all materials including PowerPoint presentations of the modules, videos, charts and other relevant materials needed for classroom, laboratory and field exercises, coordinate with CCM to identify participants for the course including acquisition of all relevant materials for the course, and facilitate the training workshop. The course included the delivery of modules in training sessions in Cape Coast as well as field trip activities to the Western Region using a field guide for coaching participants. The field module complemented knowledge gained in the class by further giving participants the opportunity to discuss challenges, best practices in seafront development and impacts on fish related livelihoods and discuss models for flood plain management at the community level for district engagement.



Figure 45: *Climate Change Short Course by CCM, May 2017*



Figure 46: Field experience on climate change issues during the Climate Change Short Course, May 2017

Prior to delivery of the course, the course facilitator conducted a needs assessment for district and regional level planners, national disaster management organizations and other relevant personnel and also developed training workshop outline for presentations of courses and practical exercises. The course was delivered based on the documentation of best practices on climate change adaptation and mitigation strategies especially within the African sub-region. Altogether 18 participants were trained in the course, 12 males and 6 females. At the end of the programme, the course was evaluated by the trainees where 45% of the trainees rated the overall content as excellent, 35% thought it was very good while the remaining 15% thought it was good.

Towards the end of Year 3, project management requested for approval from USAID to run an additional short course on climate change for journalists from different media groups in Ghana which was approved. The course was therefore organized for seventeen ((17) journalists (8 males and 9 females) to provide first-hand information on the causes of climate change, the role of human activities and adaptation strategies for vulnerable coastal communities in Ghana. The course was made up of five (5) units which are; Introduction to Coastal Ecosystems, Science of Climate Change, Climate Change Vulnerability Assessment, Communication of Climate Change Issues and Field activity. After the course, participants gained new knowledge and experience on coastal settlement planning, vulnerability, appropriate adaptation, and communication of climate change issues.

6.4 Activity 2.2.4: Developing Material and Conducting Training on the use and Application of Geographical Information Systems (GIS)

Increasing human activities and climate change tend to have adverse impacts on our coasts. Floods and shoreline erosion impact negatively on the lives of people, property and coastal ecosystems in Ghana. Coastal resources, particularly mangroves, are increasingly being harvested for fuel wood and fish smoking without replacement by replanting. These are coupled with lack of baseline data and information on our coasts, and management plans to effectively respond to these challenges. This underscores the urgent need to design new approaches for managing coastal resources in sensitive tropical environments. Geographic

Information Systems (GIS) can play an important role in the management of these coastal resources. GIS represents a powerful tool to understand the dynamics of coastal processes.

In spite of the importance of GIS in fisheries and coastal management, the capacity to utilize GIS tools in the work of DFAS, CCM and other collaborating agencies is lacking. In responding to that need, a basic curricula and training manual in GIS has been developed for the project with the support of an external expert in collaboration with other institutions and tested on postgraduate students and lecturers of DFAS as training participants. Additional experts from UCC, KNUST and Forestry Commission were used as facilitators. Strengthening of GIS capacity for DFAS and CCM, Development and Planning Officers within the coastal districts of Ghana continued in Year 3 with a goal of establishing GIS capacity of resource managers for spatial analysis, planning and management of coastal landscape resources on the basis of an advanced course.

A GIS expert was identified and contracted to assist the project to undertake this activity. Project management developed Terms of Reference for the GIS expert and to fashion out exactly how the activity will be undertaken in terms of timelines, the needed logistics and sharing of tasks and responsibilities. The GIS expert conducted a needs assessment to determine the viability and usefulness of GIS technologies to the districts and organize two (2) training courses (Introductory and Intermediate GIS) based on a combination of lectures, hands-on exercises, and individual projects, targeting stakeholders from Town and Country Planning Department and District level staff based on the modules developed in the previous year. The Intermediate GIS course is designed to build on the "Introduction to GIS" course. It provides participants with a comprehensive understanding of the theories, assumptions, and context of spatial analysis, which is so much relevant to the principles of coastal management. A total of thirteen (13) training participants, eight (8) males and five (5) females representing UCC, the Fisheries Commission and the District Assemblies in the Central and Western Regions participated in the Introductory GIS course, while eleven (11) participants, seven (7) males and four (4) females were trained in the Intermediate GIS course.

A GIS Intermediate training course manual was developed for the course with the support of an expert reviewer with many years of experience as a lecturer, trainer and researcher at the University of Cape Coast Department of Geography and Regional Planning. In his review, he provided feedback on the scientific and technical value of the content of the manual, and also provided a constructive and informative critique of the manual. PowerPoint presentations which provide theoretical notes for each of the modules were also prepared in addition to developing the training manual. The GIS course is divided into six (6) modules. Module 1 on Spatial Overlay and Geo-processing provides an introduction to spatial analysis and presents the concept of spatial data overlay and geo-processing. Module 2 On Spatial Query introduces the concepts of spatial queries and how it can be used to retrieve data from an existing database to answer geographic questions. Module 3 on Land Cover Classification and Land Use Analysis introduces the theoretical, applied and practical aspects of digital remote sensing (satellite images) for land cover mapping. Module 4 on Surface Analysis introduces the concept of surface modeling using digital elevation model (DEM). Module 5 on Watershed Analysis provides an introduction to Watershed delineation. Module 6 on Change Management

is geared toward deepening the understanding of the challenges, techniques, and the problems associated with initiating and implementing major change in an organization.



Figure 47: Participants at the GIS Short Course in April 2017

The purpose of the short courses on GIS was to strengthen the capacity of natural resource managers and development planning officers in decision support systems to sustainably manage and utilize fisheries and coastal resources in Ghana. The course focused on strengthening spatial analysis capabilities and empowered participants to assume responsibility for designing, managing and sustaining development in coastal Ghana using GIS. It also focused on strengthening the GIS capabilities of DFAS and CCM within the University of Cape Coast to provide effective research and extension services. The GIS training course external facilitator donated an Ipad Mini2 and maps designed to show the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project intervention sites to the Centre for Coastal Management after the organization of the training program.



Figure 48: CCM receives iPad Mini tablet to help pilot UAV

Also towards the end of Year 3, project management requested for approval from USAID to run an additional short course on Introductory GIS which was approved. The course was organized for eleven ((11) participants (7 males and 4 females) from municipal/district

assemblies along the coast. Participants gained a broad perspective on land cover and land use mapping and tools used in land mapping from the course.

In Year 3, training on the operation of unmanned aerial vehicles (UAV) for scientific analysis and coastal environmental planning was also undertaken. The training workshop was undertaken for staff and research assistants of CCM. The purpose of the training which was facilitated by the SFMP Project by Mr. Chris Damon of the Environmental Data Centre, URI was meant to build the capacity of the staff in all aspects of UAV operations. The training covered Ghanaian flight regulations, flight safety, UAV handling and flight control, mission planning and image acquisition and post-processing. At the end of the training, participants were qualified as Primary UAV Pilots and Field Spotters and could meet the minimum requirements necessary to fly a DJI Phantom 3 Professional UAV, which the SFMP procured for the project to facilitate coastal management research at the CCM.



Figure 49: UAV flight training by Mr. Chris Damon of the Environmental Data Centre, URI

In order for the UAV to be commissioned, an official application for a permit was submitted to the Ghana Civil Aviation Authority (GCAA) and permission (flight permit) was granted to use the UAV for academic purposes after satisfying all application requirements including pilot tests and certification. The SFMP has also outlined a sustainability plan for the long-term maintenance of the UAV by the CCM. A short hands-on training course was also conducted

by the SFMP project for staff of the CCM and the Department of Geography and Regional Development at UCC to man the UAV. During the training, the UAV was set up at an appropriate place with permission sought from local land owners, and was launched for days. The training combined some classroom work with flying practice.

6.5 Activity 2.2.5: Engaging Policy Makers to Address Coastal and Fisheries Issues

In Year 3, the activity on engaging policy makers to address fisheries and coastal issues was conducted alongside the activity on conducting research on marine fisheries governance issues and therefore issues reported previously under the activity on conducting research on marine fisheries governance issues also apply to the activity on engaging policy makers to address fisheries and coastal issues. Research conducted in Year 1 provided baseline data and information required for continuous policy dialogue on fisheries and coastal management issues. Results from the research showed an overall public perception that, the fisheries sector in Ghana is confronted with many management challenges, and stakeholders were of the view that there was the need for reform in the sector. One major management reform in the fisheries that was widely spoken about was a change from top-down to bottom-up approach, where fishers are actively involved in decision making which will lead to improved enforcement and compliance with fisheries and environmental laws and regulations.

In Year 2 and Year 3, the project implemented some of the findings from the research in policy dialogue series for sustainable fisheries and coastal management. To ensure continuous engagement with policy makers on fisheries and coastal management issues in Year 3, a number of approaches were adopted to ensure a successful implementation of this program component including a weekly radio programme to provide an effective extension service using local radio stations to dialogue with community-based fisheries management groups and discuss fisheries and coastal management issues; publications in national print media on fisheries and coastal management issues; research briefs were prepared and distributed to stakeholders. Members of staff of the Fisheries Commission and the Ministry of Fisheries and Aquaculture Development were actively engaged in these programme activities.

Meetings involving researchers with expertise in fisheries and coastal environment were organized which culminated in the birth of a Fisheries and Aquaculture Society of Ghana and the West African Journal of Fisheries and Aquaculture. The meetings involving scientists in fisheries and coastal environmental research was aimed at harnessing national expertise and resources to produce scientific information to better manage fisheries and the coastal environment in Ghana. Also, a national dialogue with non-governmental organizations and development planning officers of coastal districts of Western and Central Regions was held to discuss fisheries and environmental issues in the districts. This was a talk-shop on fisheries and coastal environment which presented CCM the opportunity to establish collaborations with the MMDAs, NGOs and Development Partners, and fisheries management stakeholders to network and market their research findings. It was recommended, among others, that CCM contacted the National Development Planning Commission (NDPC) to make fisheries and sanitation a priority in the Medium-Term Development Plans of coastal District Assemblies. Outcomes from the research and policy dialogue activities were appropriately packaged and

disseminated to reach policy makers as basis for fisheries and coastal management policy formulation, decision making and advice.



Figure 50: National stakeholders' dialogue on fisheries and coastal management in Ghana

As a follow up to the recommendation to contact the NDPC, the fisheries governance and policy research team made a presentation on Fisheries and Coastal Environmental Sanitation: Role of Metropolitan, Municipal and District Assemblies (MMDAs) to the NDPC. After the presentation, the team put together a write-up on the subject, discussed and submitted the write-up to the NDPC for inclusion in a 4-year Medium Term Development Plan. The write-up introduced the issues that are currently posing challenges in Ghana's coastal zone as a background to the fact that marine and coastal resources and ecosystems are currently under threat from anthropogenic activities and proposed strategies for addressing the issues. Issues were also identified regarding sanitation of the coastal environment such as the release of untreated sewage into coastal waters, dumping of domestic and industrial waste in coastal areas, sand mining/winning, and deforestation in coastal areas. Strategies to address these issues include government working to achieve the Sustainable Development Goals (SDGs) on environmental sanitation at the coastal towns through the MMDAs, providing public places of convenience along the beaches in all coastal communities, re-introducing 'town council officers' in all fishing communities to enforce sanitation rules and introducing award scheme for cleanest landing beaches at the district, regional and national levels as part of National Farmers Day programme. Other issues had to do with capacity building such as lack of staff with requisite technical skills and competences to manage coastal issues and lack of motivation to live and work in some coastal districts. The strategy proposed was to train students and other personnel based on assessment needs of the local communities to contribute knowledge for accelerated development of fishing communities. These were submissions on fisheries governance and policy issues that the project looks out for to be discussed and addressed at both the nationally and MMDAs level. The project team assured the NDPC of their willingness to have further discussions on the subject matter and any other issues bordering the project's areas of research that are of critical importance to national development. The project looks forward to further engagement with the NDPC on this issue in Year 4.

Also in Year 3, the project's fisheries governance and policy research team and the Director of CCM met with the Minister of Fisheries and Aquaculture Development to introduce the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project to her outfit, seek government's support and identify opportunities for collaboration between the project and the Ministry. An overview of the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project, scope and current status, capacity building activities and cooperation with the Ministry was presented to the Minister. Also, IUU fishing issues, compliance and enforcement, fisheries governance issues, which highlighted findings from a research perspective and gaps resulting from challenges with governance structures and the role of policy makers in policy reforms to ensure that fisheries and environmental issues are appropriately addressed were discussed.

As part of project management efforts to improve the communication of project activities to the wider public, the project identified that the capacity of Ghanaian environmental journalists to effectively capture and report fisheries and coastal environment issues was lacking. The project perceived that the ability of environmental journalists to effectively report and communicate fisheries and coastal environment issues could go a long way to inform people and cause behaviour change for improved fisheries and environmental management. In order to achieve this, the project organized a two-day training workshop aimed at building the capacity of journalist in environmental reporting to help advance this important course. Some selected media houses nominated and presented two people to participate in this program. The training was organized in a practical fashion which involved visits to some selected fish landing beaches across the four coastal regions along Ghana's coast that fulfilled the objectives of the exercise. At each landing beach, the training participants had about 2 hours to interact with fishing communities for their reports. It was mutually agreed that participants of the training produced materials for their respective media houses and promote adequate publicity of the findings of the project. Women in particular were encouraged to take part in this training programme. Over twenty (20) environmental journalists representing different media houses and representatives from the Ministry of Fisheries and Aquaculture Development (MoFAD) and the Ministry of Sanitation and Water Resources were involved in this exercise.

The most exciting part of this activity in Year 3 was the organization of the maiden Conference on Fisheries and Coastal Environment with the theme "The Changing Marine Fisheries and Coast: Challenges and Opportunities for Changing Minds". This was organized by the project in collaboration with the USAID/Ghana SFMP project and the Ministry of Fisheries and Aquaculture Development (MoFAD). The purpose of the conference was to bring together different fisheries and coastal environment stakeholder to share and discuss data and information, and develop a roadmap for implementing ideas that will strengthen policy making processes and enhance sustainable fisheries and coastal management in Ghana. The conference provided an opportunity for a more holistic discussion on a resource that is shared by millions of people, yet, under threat and mismanaged. The conference was organized in the form of panel discussions, keynote presentations as well as the presentation of research papers. The Conference on Fisheries and Coastal Environment reaffirmed the commitment of all

stakeholders in the sector to the sustainability of fisheries and coastal resources of Ghana which make very significant contributions to food security, employment and poverty alleviation.



Figure 51: Working sessions at the Conference on Fisheries and Coastal Environment



Figure 52: The Minister for Fisheries and Aquaculture Development, Hon. Elizabeth Naa Afoley Quaye (middle), Prof. Livingstone K. Sam-Amoah (Provost - College of Agriculture and Natural Sciences, UCC) and Mr. Justice Odoi (USAID - Environmental Specialist and USAID/UCC Fisheries Project activity manager) in a group photograph with some project personnel



Figure 53: Stakeholders at the Conference on Fisheries and Coastal Environment



Figure 54: *Press briefing after the closing ceremony of the Conference on Fisheries and Coastal Environment*

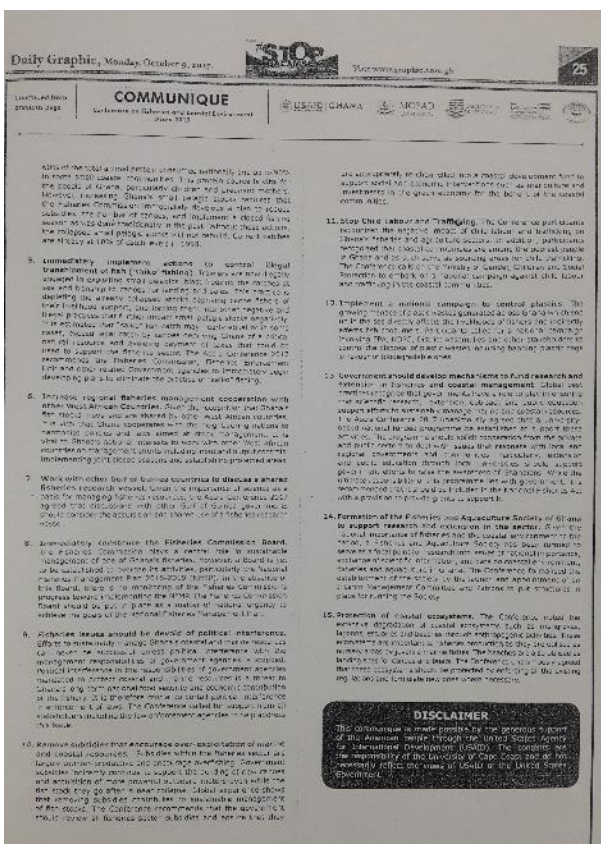
The conference promoted collective problem solving and strengthening of the legislation on the role of traditional authority in decision-making. The conference sought to be an innovation that will contribute to improve upon management measures needed to rebuild fisheries and bring the needed reforms. The conference also addressed the need for sustainable management of Ghana’s other coastal resources such as mangroves, beach sand, salt, lagoons and estuaries among others and the rational management of our oil and gas resources, which have been politically and economically difficult to address. In all, about 200 people participated in the conference. 46 scientific presentations were made in four (4) thematic areas, and four (4) plenary sessions during the first two days of the conference. During the conference, the Fisheries and Aquaculture Society of Ghana was launched by constituting an 11-member interim management team and 7 patrons to oversee the affairs of the Society.



Figure 55: *The Senior Minister, Hon. Yaw Osafo Marfo addresses stakeholders at the Conference and declares the willingness of Government of Ghana to fight the menace of illegal fishing*



Figure 56: Editorial board and interim governing council of the Fisheries and Aquaculture Society of Ghana outdoors at the closing ceremony of the Conference



6.6 Activity 2.2.6: Building Institutional Partnerships and Collaboration

In Year 3, where appropriate project activities were implemented in partnership and collaboration with relevant institutions particularly USAID/Ghana and other Donor Partners, other USAID/Ghana supported projects like the Sustainable Fisheries Management Project (SFMP), the Coastal Sustainable Landscapes Project (CSLP), METSS, AfricaLead and ACDI/VOCA, NGOs, the Ministry of Fisheries and Aquaculture Development, the Fisheries Commission and other Universities in Ghana and elsewhere. The project continued to work together with relevant institutions in processes towards development of the fisheries management database. The institutions involved were assigned different roles to play towards

achieving intended objectives of that activity such as reviewing and discussing the Memorandum of Agreement drafted to guide the collaboration, getting clearance from the Legal Sections of the different institutions and their roles in collating and sharing data to feed the database. The project also actively collaborated with other universities in Ghana in carrying out activities of DFAS and CCM regarding the development of training manuals and conducting training, monitoring the biodiversity and health of coastal ecosystems, conducting research on fisheries and coastal governance and management issues and engaging policy makers to discuss fisheries and coastal governance and management issues. The project also collaborated with the universities in the co-supervision of students' research projects. Some other project activities such as wetlands ecological health monitoring using schools and communities were also implemented with Hen Mpoano, Friends of the Nation and the USAID/Ghana Coastal Sustainable Landscapes Project.

The project continuously engaged with the Fisheries Commission and the Ministry of Fisheries and Aquaculture Development to ensure that project activities were implemented in line with the vision and mission of the Commission and the Ministry and therefore of the Government of Ghana. Representatives from the Ministry were actively involved in the development of the project's training, research and outreach programs at different levels such as participating in and providing useful inputs into the testing of training modules based on their rich experience both in management and in the field. District Fisheries offices were the first point of contact when project activities were conducted in the field as a way of soliciting their views and support, and also for them to have a first-hand information about project activities in the field. Informal discussions were also held with some members of the Ministry to identify their training needs and how the project could support.

In Year 3, the SFMP project was a key partner to the project. Both projects collaborated in a number of activities including planning for the 2017 Leadership for Fisheries Management course, Ghana Industrial Trawlers Association-SFMP-UCC collaborative research on cuttlefish, equipping the fisheries and coastal research laboratory, support for 2 Research Assistants to assist in the work of the CCM and providing support and training in the use and application of Unmanned Aerial Vehicle (UAV) in fisheries and coastal management.



Figure 57: Staff from UCC receive training on the use of fixed wing drone through collaboration with the URI and SFMP

Cuttlefish is good quality fish exploited by both artisanal and industrial fishing fleet in Ghana with high export potential, but catches have been declining in recent years. In Year 3, a collaborative research focused on improving the dwindling cuttlefish stocks was initiated by the Ghana Industrial Trawlers Association (GITA) in partnership with DFAS to explore the potential of using industry-science collaboration as a mechanism for addressing some fisheries management challenges.

Other collaborators were the URI through the SFMP and Hen Mpoano. The research was co-funded by the SFMP, the UCC Fisheries and Coastal Management Project, and GITA. The study was aimed at improving cuttlefish stock by looking at their migratory patterns, identifying their breeding grounds, providing substrates that could serve as spawning receptacles for cuttlefish eggs, and experimenting whether their eggs could hatch under laboratory conditions. If successful, cuttlefish eggs landed by artisanal fishermen could be transferred from capture to the laboratory to hatch and released back to sea to replenish stocks. This research feeds into the Government of Ghana's objective of improving information on fisheries biology and stock assessment to support the rebuilding of fish stocks and harvest strategies as indicated in the Marine Fisheries Management Plan 2015 – 2019.



Figure 58: Collaborative research on Cuttlefish (UCC-SFMP-GITA)

The CCM has in the third year collaborated with SMFP on an activity led by the SFMP to train oyster fishers to manage the fishery. The Densu oyster group were trained on the ecology and biology of oysters. As part of the training, the oyster pickers were taken through oyster management. The training was to enable them understand the oyster fisheries and the science behind management decisions, and to help them own the idea of the management of the resource. This activity is geared towards the community based fisheries management of the Densu Delta. Pickers were taken through water quality monitoring and how to collect data on some basic physico-chemical parameters such as temperature, salinity, turbidity, and pH using simple tools- digital thermometer, refractometer, secci disc and pH strips respectively.

This was necessary for the bottom up approach of the management of the fisheries. In all, 168 pickers were trained comprising 21 men and 147 females at six sections of training sections, which begun on the 2 of March 2017. As a result of the training, the pickers now have great concern about the sustainability of the fisheries and are actively involved in the management processes. Pickers with the guide of other stakeholder, have suggested management measures, they deem appropriate and workable, for the Desnsu oyster fishery. The oyster pickers are now monitoring the quality of Densu delta on monthly basis with little supervision.



Figure 59: Oyster fishers read salinity values from a refractometer

Through the SFMP, the project also further strengthened the existing collaboration with the University of Rhode Island (URI) and advanced planning and preparations towards student and faculty exchange programs, and dual and joint degree programs. Discussions on the possibility of URI and UCC running dual and joint degree programs were enhanced which led to the promotion of further collaboration between the Schools of Business, Biological Sciences, Pharmacy and Physical Sciences of UCC and URI. The collaboration between URI and the UCC culminated in a high delegation visit by the UCC to the URI to deepen the partnership and fashion out the roadmap to the actual implementation of programs envisaged. The two universities met in a three-day series of events to progress the issue of pursuing dual and joint degree programs by both Universities in course of the visit to Rhode Island. The first batch of UCC students who are potentially going to enroll in dual degree programs compiled and submitted their CVs to the Project Manager for discussion at URI for possible programs and potential Advisors before the delegation travelled to the US. Discussions in Rhode Island also covered the issue of UCC academic staff members having Adjunct Professor status at URI. If successful, that will allow about 3-4 UCC academic staff to obtain Adjunct Professor status at URI which will allow them to be on students examination committees for the institution of dual degree programs. This required an application in the form of a letter of interest specific to the UCC-URI dual degree program. CVs with the list of publications of each interested applicant were submitted to the College of Environment and Life Sciences (CELS) at URI by interested DFAS Professors or Senior Lecturers. The following were some highlights of the meetings which took place at URI between delegates from the UCC and URI:

- It was concluded that there were no barriers to finalizing the dual doctoral degree program between URI/CELS/BES and the UCC/DFAS doctoral programs, except that the concept note needed to be finalized for respective approvals from both institutions, and formalization through a Memorandum of Understanding (MOU). The first batch of students to benefit from such a program potentially could occur in 2018.
- Discussions were also held to plan for the UCC PhD students who are currently visiting URI as part of their programs of study and conclusions were drawn on what time of

year was most appropriate for the study visit. URI mentors or potential mentors were and coursework to be undertaken at URI were identified.

- Partnerships and collaborations outside of USAID/UCC project related activities such as those with other colleges including Pharmacy, Business and Engineering, and perhaps more in the future also emerged.

In Year 3, officials from the USAID West Africa Biodiversity and Climate Change (WABiCC) Program visited UCC to meet with the project management team to introduce their project and what they do, and also get to know about the USAID/UCC Fisheries and Coastal Management Capacity Building Support Project. During the meeting, the Project Manager introduced the project to the visitors, described project activities, funding mechanisms and intended results throughout life of project. Since the project is situated within DFAS, he also introduced DFAS and its area of operation, staff strength and available infrastructure. Operationalization of the Centre for Coastal Management was also high on the agenda for discussion. The WABiCC team also introduced their project to the UCC team and their activities in the area of Aquatic, Endangered and Threatened Species and Combatting Wildlife trafficking. After the introductions of the programs and activities of both projects, it was agreed that DFAS students could be involved in some relevant WABiCC activities for their research which could be discussed further into the collaboration. The WABiCC team assured the UCC team that there is the potential for WABiCC to give funding to DFAS or CCM for students to carry out research related to the area of focus of WABiCC. It was also mentioned that WABiCC undertakes climate change vulnerability assessments with the United Nations University and could contribute in building the capacity of CCM in climate change vulnerability assessment.

The USAID's SFMP in collaboration with the CCM and the Department of Forensic Sciences of the University of Cape Coast developed a manual on illegal Fishing Practices in Ghana. The purpose of this manual is to inform fisheries stakeholders, Fisheries Watchdog Committees as well as fisheries enforcement personnel and marine police on how to detect whether fish has been caught with illegal methods, and describe both qualitative and scientific methods that can make a positive identification or not. The guide also describes what evidence would be needed to collect, how and what testing would be needed, to provide valid evidence in criminal cases against individuals using chemicals or other illegal methods or in possession of illegally caught fish.

6.7 Activity 2.2.7: Wetlands Ecological Health Monitoring Using School Clubs and Communities

As far as this activity is concerned, DFAS has put together a coastal zone wetlands educational curriculum made up of a teacher's guide, students' manuals, visual presentations, outdoor classroom and field data monitoring sheets and test questions as well as competitive scorecards for monitoring ecological health status of wetlands, governance issues and threats to the wetlands. This curriculum has been approved by the Ghana Education Service. The coastal zone wetlands educational curriculum is intended to educate senior and junior high school level and undergraduate university level students on the nature, types and importance of wetlands,

the ecological conditions, biodiversity and anthropogenic threats to coastal wetland habitats, and the techniques for monitoring the ecological health of wetlands.

In Year 2, the project signed Memorandum of Understanding (MoU) for cooperation with Hen Mpoano, Friends of the Nation and the USAID/Ghana Coastal Sustainable Landscapes Project (CSLP) as well as trained teachers from some selected schools in the Western and Central Region to jointly implement this activity using students from the selected schools. The purpose of the activity is to strengthen wetlands management school clubs in selected schools in the Western and Central region, intensify education on the ecological essence, values and functions of wetland resources to students in target communities, inculcate a habit of wetland resources conservation in school children and obtain a baseline data on wetlands ecological health monitoring parameters.



Figure 60: Quiz competition held for wetlands management clubs in Junior High Schools in the Western Region of Ghana

In operationalizing the MoUs, the Department of Fisheries and Aquatic Sciences organized a training workshop at the University of Cape Coast to sensitize and train teachers to facilitate the program and supervise their successful implementation. The objective of the workshop was to introduce the teachers to the training modules and ecological benchmarks for monitoring coastal wetlands, identify key issues and facilitate the development of monitoring and management programs for the selected wetlands using their students. A trainer-of-trainers workshop was organized to equip the interested teachers with information in biodiversity of wetland ecosystems and threats to wetlands. The training was facilitated by UCC instructors. Ten (10) teachers participated in the training workshop in addition to other teachers brought in

by partner organizations. The workshop was useful because some teachers were new to the wetlands management concept.



Figure 61: DFAS and partner NGOs train Junior High School teachers on wetland monitoring curriculum

Project management evaluated work done in Year 2 with the collaborating partners and made a decision to extend the MoU into Year 3, and to discuss ways that UCC students could be integrated into the program. After the extension of the MoUs, it was also agreed that UCC students could participate in the programme for their practical work in the field. During the joint evaluation exercise, Hen Mpoano reported that the program has successfully been carried out at Ampain JSS in the Ahanta District of the Western Region involving 100 students and 5 teachers and Ezulenuono SDA JSS in the Ellembele District of the Western Region involving 60 students and 5 teachers. Friends of the Nation also reported work done at Anlo Beach JSS in the Shama District of the Western Region involving 20 students and 4 teachers and Gomoa Dago DA JSS in Central Region involving 20 students and 4 teachers. The Coastal Sustainable Landscapes Project also worked at Akwidaa SDA JSS in the Ahanta West District of the Western Region involving 40 students and 5 teachers and Yabiw JSS in the Shama District of the Western Region. By participating in both classroom and field-based activities, students have gained knowledge and changed behaviour towards wetlands management and conservation. The students have adopted wetland areas for ecological health monitoring and management and have initiated actions to conserve these areas and make them useful.



Figure 62: Wetlands monitoring clubs measure physicochemical parameters of wetland ecosystems in the Western Region of Ghana

An interesting success story is the conversion of a polluted water body into a fish pond by students of Anlo Beach D/A JHS. In the case of Gomoa Dago D/A JHS, a lagoon has been adopted by the students for frequent clean-up exercises. In both communities, the traditional authorities have endorsed and actively supported the initiatives by the students. It was concluded after the evaluation that collaborating partners on the programme must work closely together to ensure uniformity and the overall success in the implementation of the program.

6.8 Activity 2.2.8: Strengthening Community-based Groups

International experience shows that good results are achieved when natural resources are managed with resource users that are organized into community-based groups. Hence, strengthening community-based groups for resource management is critical to well-managed fish stocks and healthy coastal ecosystems. In view of this, the project has identified and supported community coastal resource management groups in different ways throughout Year 2 and Year 3 to understand management structures, regulations, and by-laws and rules pertaining to the management of fisheries and coastal resources based on results from a needs assessment conducted in Year 1. The objective was to strengthen the capacity of community-based groups to acquire skills in conflict resolution, advocacy, negotiation, persuasive communication and behaviour change strategies to enhance coastal resources management.

Community-based groups were formed using a participatory process and strengthened in ways to be better positioned for fisheries management and to support development of coastal communities. After the formation of the groups, a community coastal resource management guide and manual were developed as training materials for the community-based groups. A validation workshop with representatives of key stakeholders in the fisheries sector such as the Fisheries Commission, both at the regional and district levels met to review and validate the manual and guide to ensure that community level issues were adequately captured in the manual. The training materials were used to train all members of the community-based groups in each of the selected. After the training programs, all community-based groups developed action plans for their activities within the communities which included strategies for ensuring the compliance of coastal resource use by-laws and regulations, implementing activities that would ensure the safety and cleanliness of beaches, networking with stakeholders such as the District Assemblies.

Through the strengthening process, community-based groups were empowered to embark on awareness creation and sensitization activities in the communities targeted towards behaviour change to desist from pollution of the coastal environment and the degradation of coastal resources. For sustainability, behaviour change campaigns in the communities were still embarked upon in Year 3. Efforts were made to involve other stakeholders and collaborators in this exercise, particularly government institutions who have the power to make management decisions. Capacity building and training of the community-based groups continued in Year 3 in order to provide further support needed to demonstrate the capacity of the various beneficiary groups to lead the management and utilization of their own resources and to successfully undertake supplementary livelihood activities in snail farming and bee-keeping. Members were provided with leadership and management training in 2 sessions to allow for time to practice what they had learned before the second training. The second session provided an opportunity for beneficiaries to acquire basic knowledge in business or enterprise creation. People were trained in all four communities so that they, in turn, will be able to train others to manage people and the demonstration farms. The training also equipped beneficiaries with basic business development skills to enable them set up and run their own businesses. Results achieved from supplementary livelihood activities are reported in the next section.

6.9 Activity 2.2.9: Promoting Supplementary Livelihoods in Coastal Communities

In addition to strengthening community-based groups to actively participate in coastal resource management decision making, capacities were also built to undertake supplementary livelihood activities in Year 3. The objective was to provide support for selected actors in the targeted coastal communities to undertake snail rearing and bee-keeping to enhance community livelihoods and also reduce fishing effort as a management measure. These activities were selected based on the needs assessments conducted in Year 1. The assessment confirmed that snail farming and bee-keeping value chains had a potential to generate additional income for beneficiaries and open up for the participation of many more people. The four pilot communities engaged in Year 3 were Narkwa in the Central Region for snail farming, Anlo

Beach in the Western Region for bee-keeping, Ankobra in the Western Region for snail farming and Half Assini in the Western Region for both bee-keeping and snail farming.

Technical experts from the Department of Entomology, Wildlife and Conservation Biology of UCC conducted both theoretical and practical training on demonstration farms for the community-based groups on the selected supplementary livelihood activities. Demonstration farms and sites for snail farming and bee-keeping were set up in the selected communities to provide practical experience to the community people as a way of learning by doing after they were provided with theoretical training. The groups formed in the communities served as the management committee of the demonstration sites and leaders of the trainees. They received training in leadership and team/group management which enabled them to provide leadership to the group and to mobilize them for all activities in relation to the development and management of the demonstration sites. The idea of demonstration farms and sites was to provide training for members to set up their individual farms. In Year 3, the project advanced plans to provide support to the beneficiaries to set up their own snail farms and apiaries.



Figure 63: Model snail farming unit being inspected by facilitators and trainees



Figure 64: *Inspection of bee hives by facilitators and trainees*

To ensure the successful implementation of the supplementary livelihoods program, in Year 3 the project requested for an expert (Volunteer) in supplementary livelihoods from ACDI/VOCA who came down for 2 weeks to work for the project to improve on the program. The Volunteer reviewed all relevant project documents, conducted field visits and interviews with members of staff and community-based groups engaged in implementing the snail farming and bee-keeping programs to assess training successes, gaps and beneficiaries' level of acceptance to building a business around the supplementary livelihoods. Summary of recommendations made after the visit were as:

- The project should focus more on snail farming and use the snail enterprise experience as a model for bee-keeping
- Snail farming should be developed as sustainable micro-enterprises
- There was the need to upgrade the snail demonstration farms, establish independent snail farms and for the project to design a support program for the snail farms; upgrade the free-range zones and upgrade the mini-paddocks
- Community people should transfer the skills and knowledge acquired from the demonstration farms to their own farms by asking for inputs
- The snail demonstration farms be operationalized as training facilities, breeding stations and experimental test-beds
- The communities must be mobilized to upgrade the snail farms as a group activity and provide hands-on training
- Find and buy healthy snails and use as breeding stocks in the demonstration farms that can successfully reproduce more snails for individual farms
- There should be a daily management checklist for the snail farms to count and record number of snails, remove dead snails, remove rotten food, add fresh food, fill water dish, sprinkle water to wet the substrate, remove invaders and change the substrate monthly.

APPENDICES

Appendix 1: List of Project Performance Indicators and FY 2017 Results

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
1	Quantities and/or sizes of fish landed by selected canoe fishermen in the Central and Western Region of Ghana	-	Increasing	Increasing	-	-	-
<p>Comments: This is a custom indicator which measures and/or describes change in quantities and sizes of fish landed by fishermen in the Central and Western Region of Ghana. These are determined by conducting periodic fish stock assessments. The nature of this indicator makes it difficult to set baselines, targets and performance achieved in a particular reporting period. Performance achieved using this indicator is therefore descriptive. Fish stock assessment conducted by the project in Year 3 indicated that quantities and sizes of fish landed by canoe fishermen have decreased over time since the mid-1980s mainly due to increase in fishing effort in terms of number of fishing vessels during the period. This is an indication of growth overfishing. The average size of sardinella landed in 1998 was recorded by the Fisheries Scientific Survey Division at 16 cm. The recent record of the average size was at 9.5 cm in 2016.</p>							
2	Fishing Mortality at MSY (F_{msy})	-	-	-	-	-	-
<p>Comments: This is a custom indicator of the USAID/Ghana Sustainable Fisheries Management Project (SFMP) which is only tracked by the USAID/UCC Fisheries and Coastal Management Capacity Building Project. Performance measured by this indicator is obtained by periodic assessments. In 2014, the SFMP estimated Fishing Mortality at MSY (F_{msy}) to be 0.40 as the rebuilding target and recorded 0.74. In FY 2017, the SFMP estimated Fishing Mortality at MSY (F_{msy}) to be 0.30 and recorded 0.80. This indicate an increase in fishing mortality and a severe decline in population size. Current fishing effort is well beyond the level of sustainability for the small pelagic stocks.</p>							

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
3	Biomass to produce MSY (B_{msy})	-	-	-	-	-	-
<p>Comments: This is also a custom indicator of the USAID/Ghana Sustainable Fisheries Management Project (SFMP) which is only tracked by the USAID/UCC Fisheries and Coastal Management Capacity Building Project. In 2014, the SFMP estimated Biomass to produce MSY (B_{msy}) of 310,476 tonnes as a rebuilding target and 182,726 tonnes was recorded. In FY 2017, the SFMP reported Biomass to produce MSY (B_{msy}) of 310,000 tonnes as the rebuilding target and recorded 30,000 tonnes. Current estimated biomass is much lower. Estimated biomass of total small pelagic species in Ghana declined sharply following the trends of landings. This suggests diminishing economic returns.</p>							
4	Number of hectares of biological significance and/or natural resources under improved natural resource management as a result of USG assistance	0	6.9	6.9	0	0	No
<p>Comments: In Year 3, the project continued to monitor the ecological conditions and assess the overall health status of the <i>Awiane</i> lagoon at Half Assini in the Western Region in order to acquire a more comprehensive baseline data on the lagoon with the objective to support decisions for the removal of solid wastes from the lagoon and also work with the community and their traditional authorities as well as the District Assembly to put the lagoon and its associated wetland area under improved management. This is work in progress.</p>							

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
5	Number of hectares in areas of biological significance and/or natural resource showing improved biophysical conditions as a result of USG assistance	0	6.9	6.9	0	0	No
<p>Comments: In Year 3, the project continued to monitor the ecological conditions and assess the overall health status of the <i>Awiane</i> lagoon at Half Assini in the Western Region in order to acquire a more comprehensive baseline data on the lagoon with the objective to support decisions for the removal of solid wastes from the lagoon and also work with the community and their traditional authorities as well as the District Assembly to put the lagoon and its associated wetland area under improved management. Areas in hectares of the lagoon and wetlands showing improved biophysical conditions will be determined. This is work in progress.</p>							
6	Number of training and capacity building activities conducted with USG assistance	0	40	10	17	170	Yes
<p>Comments: 10 training and capacity building activities were targeted for FY 2017. Altogether in Year 3, seventeen (17) training and capacity building activities were conducted; 2 trainings in Introductory GIS, 1 training in Intermediate GIS, 2 trainings in Climate Change, 1 training in Integrated Coastal Management, 1 training in fisheries management, 1 training in ocean policy at ANCORS in Australia, 1 training in safety at sea at the RMU in Accra, 1 capacity building in proposal writing, 5 trainings in supplementary livelihoods, 1 training in wetlands monitoring for school teachers, 2 UAV trainings and 1 capacity building activity in environmental reportage for journalists.</p>							

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
7	Number of people receiving USG supported training in natural resources management and/or biodiversity conservation	0	250	200	139	69.5	Yes
<p>Comments: Two-hundred (200) training participants were targeted to benefit from natural resources management and/or biodiversity conservation training in FY 2017. Eighty-seven (87) community members (23 males, 64 females) were trained in four (4) selected communities in supplementary livelihood activities, fisheries and coastal management, eleven (11) people (8 males, 3 females) in fisheries management, sixteen (16) people (9 males, 7 females) in Integrated Coastal Management and twenty-five (25) people (15 males, 10 females) in community wetlands management which sum up to one-hundred and thirty-nine (139) people (55 males, 84 females).</p>							
8	Number of person hours of training in natural resources management and/or biodiversity conservation supported by USG assistance	0	15000	3000	2610	87	Yes
<p>Comments: 3000 hours of training in natural resources management and/or biodiversity conservation was the target for in FY 2017. 2610 hours of training in natural resources management and/or biodiversity conservation was achieved representing 87 percent.</p>							

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
9	Number of individuals who have received USG supported long-term agricultural sector productivity or food security training	0	40	28	36	129	Yes
<p>Comments: Twenty-eight (28) students were targeted to receive long-term training in FY 2017. Altogether in FY 2017, thirty-six (36) students (12 males, 24 females) received USG supported long-term agricultural sector productivity or food security training; sixteen (16) PhD students (4 males, 12 females), and 20 MPhil students (8 males, 12 females). Twenty-nine (29) undergraduate students also received support for their field research in FY 2017.</p>							
10	Number of individuals who have received USG supported short-term agricultural sector productivity or food security training	0	250	50	102	204	Yes
<p>Comments: One-hundred and two (102) people (63 males, 39 females) received USG supported short-term agricultural sector productivity or food security training in FY 2017. Participants from relevant agencies received short-term training through the short courses Introductory GIS, Intermediate GIS, Climate Change, Integrated Coastal Management and Fisheries Management organized by CCM and DFAS. Four (4) DFAS staff (all males) received short-term training in Law of the Sea and Maritime Regulation and Enforcement at ANCORS, University of Wollongong in Australia, five (5) DFAS staff (4 males, 1 female) received training on how to properly and safely man, operate and maintain a boat at the Regional Maritime University (RMU).</p>							

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
11	Number of food security private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) receiving USG assistance	0	10	10	5	50	Yes
<p>Comments: Ten (10) community-based organizations were targeted to receive assistance in FY 2017. Five (5) of such organizations received technical assistance in supplementary livelihood activities (snail farming and bee-keeping), fisheries and coastal management in 4 selected coastal communities in the Western and Central region of Ghana in FY2017.</p>							

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
12	Number of private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) that applied new technologies or management practices as a result of USG assistance	0	10	8	5	62.5	Yes
<p>Comments: Five (5) Community-Based Organizations that received technical assistance in supplementary livelihood activities, fisheries and coastal management applied new management practices in bee-keeping and snail farming in FY 2017.</p>							
13	Number of members of producer organizations and community based organizations receiving USG assistance	0	200	200	87	43.5	No
<p>Comments: Two-hundred (200) members were targeted to receive assistance in FY 2017. Eighty-seven (87) members in total in the 5 Community-Based Fisheries Management Groups (CBFMGs) formed in 4 selected fishing communities received technical assistance in supplementary livelihoods activities (snail farming and bee-keeping), fisheries and coastal management by the project in FY 2017.</p>							

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
14	Number of farmers and others who have applied new technologies or management practices as a result of USG assistance	0	200	150	87	57	Yes
Comments: One-hundred and twenty-five (125) members of the 5 Community-Based Fisheries Management Groups (CBFMGs) formed in 4 selected fishing communities applied new management practices in snail farming and bee-keeping in FY 2017.							
15	Number of rural households benefiting directly from USG interventions	0	200	150	87	57	Yes
Comments: Eighty-seven (87) rural households benefited directly from project interventions through supplementary livelihood support in snail farming and bee-keeping in FY 2017.							
16	Score, in percent, of combined key areas of organization capacity amongst USG direct and indirect local implementing partners	-	95	-	80.13	80.13	Yes

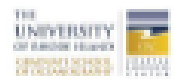
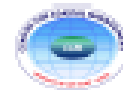
No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
<p>Comments: In FY 2017, AfricaLead conducted an Organizational Capacity Assessment for DFAS and CCM. The assessment covered 8 major areas; 1) Governance 2) Administration 3) Human Resources 4) Financial Management 5) Organizational Management 6) Program Management 7) Network Capacities and 8) Policy Analysis and Advocacy and arrived at a total score of 80.13% as the combined key areas of organization capacity.</p>							
17	Number of beneficiaries receiving improved infrastructure services due to USG assistance	0	150	120	136	113	Yes
<p>Comments: One-hundred and thirty-six (136; 89 males and 47 females) people made up of 11 senior staff members, 6 Research Assistants, 6 Administrative staff, 8 Technical staff, 5 National Service Personnel, 46 post-graduate students and 54 undergraduate students were beneficiaries of refurbished library, fisheries and coastal management laboratory, project vehicles and the premises of DFAS and the Center for Coastal Management in FY 2017.</p>							
18	Number of new research collaborations established between USG-supported beneficiaries and other institutions	0	10	10	8	80	Yes

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
<p>Comments: Ten (10) new research collaborations were targeted for FY 2017 but eight (8) of them were established with the following agencies particularly in relation to the activity on developing marine and coastal fisheries database; Environmental Protection Agency of Ghana, Ministry of Fisheries and Aquaculture Development & Fisheries Commission, University of Energy and Natural Resources, University of Ghana, Kwame Nkrumah University of Science and Technology, University for Development Studies, Council for Scientific and Industrial Research, University of Rhode Island.</p>							
19	Number of scientific studies published or conference presentations given as a result of USG assistance for research programs	0	10	5	47	940	Yes
<p>Comments: In FY 2017, 47 conference presentations were given, 1 during the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) Biennial Conference and 5th African Higher Education Week in South Africa and 46 during the conference on fisheries and coastal environment.</p>							
20	Number of dialogues and stakeholder consultations held on fisheries and coastal management	0	20	5	5	100	Yes
<p>Comments: In FY 2017, 5 major dialogues and stakeholder consultation events on fisheries and coastal management were held between the project and major stakeholders at different levels particularly in case of the project activity on Research, Governance and Policy on Fisheries and Coastal Management issues.</p>							

No.	Indicator	Baseline	Life of Project (LOP) target	Annual target	Performance achieved in reporting period (actual)	Performance achieved in reporting period (%)	On target? Yes/No
21	Percentage of graduates from USG-supported tertiary education programs employed	0	50	5	0	0	No
<p>Comments: No DFAS graduates were reported as employed in 2017. The first batch of MPhil students trained by the project graduated in FY 2017, which presents an opportunity for some of them to be employed either by the Centre for Coastal Management or DFAS or by other organizations.</p>							
22	Number of CSOs and government agencies strengthened	0	25	10	20	200	Yes
<p>Comments: Representatives of the following 20 CSOs and government agencies were strengthened through their participation in the GIS, Climate Change and Integrated Coastal Management short courses in the period under review; Fisheries Commission, Wester Regional Coordinating Council, KEEA Municipal Assembly, Shama District Assembly, Ellembele District Assembly, Jomoro District Assembly and Gomoa West District Assembly, Ga West District Assembly, NADMO, SNV, LUSPA, Keta North District Assembly, CSLP, Hen Mpoano, Western Regional Coastal Foundation, Ministry of Gender, Children and Social Protection, Ministry of Tourism, Ministry of Works and Housing, NDPC and the National Service Scheme.</p>							
23	Total number of direct beneficiary	0	500	300	340		Yes
<p>Comments: Three-hundred and forty (340) people (177 males, 163 females) benefitted directly in various ways as described above from project interventions in in FY 2017.</p>							

Appendix 2: Communique

1



COMMUNIQUE

Conference on Fisheries and Coastal Environment Accra 2017

Scientists from Ghana's universities and research institutions, civil society, private sector, fishermen and fishmongers, government ministries and agencies, representatives from the USAID Sustainable Fisheries Management Project (SFMP) of the University of Rhode Island, USA in all numbering 240, convened in Accra for the first Conference on Fisheries and Coastal Environment (CFCE), referred to as the Accra Conference 2017.

Supported by the United States Agency for International Development (USAID) and the University of Cape Coast from 25- 27th September, 2017, the Conference was opened by the Minister of the Ministry of Fisheries and Aquaculture Development (MoFAD), Hon. Elizabeth Naa Afoley Quaye (MP) and closed by the Senior Minister, Hon. Yaw Osafo-Marfo of the Office of the President of the Republic of Ghana. In attendance were the Vice-Chancellor of the University of Cape Coast, Professor Joseph Ghartey Ampiah, Deputy Minister of the Ministry of Fisheries and Aquaculture Development, Hon. Francis Kingsley Ato Cudjoe (MP), the USAID/Ghana Deputy Mission Director, Steven Hendrix and traditional authority.

Participants included the Provosts of the Colleges of Agriculture and Natural Sciences, and Health and Allied Sciences from the University of Cape Coast, Head of Local Government Service, representatives of the Ministry of Gender, Children and Social Protection, representative from the Ministry of Energy and Petroleum, leadership of the Council for Scientific and Industrial Research, the National Development Planning Commission, the Environmental Protection Agency, members of the Fisheries Commission, the Ghana National Canoe Fishermen Council, the National Fish Processors and Traders Association, and fishermen and fish mongers from the four coastal regions of Ghana.

The scientists were from the University of Cape Coast, University of Ghana, Kwame Nkrumah University of Science and Technology, University of Education, Winneba; University for Development Studies, University of Energy and Natural Resources, and Council for Scientific and Industrial Research. Civil society represented at the Conference included Imani Ghana, Hen Mpoano, Friends of the Nation, Free the Slaves and the Concerned Ghanaian Citizens in Fisheries.

The Conference provided a platform for researchers, journalists, political representatives and representatives from think-tanks to connect around issues of vital national interest concerning sustainable fisheries and coastal management in Ghana. The theme was **CHANGING MARINE FISHERIES AND COASTS: CHALLENGES AND OPPORTUNITIES FOR CHANGING MINDS**. Participants worked in interactive and dynamic sessions to consider issues in six main areas:



- Fisheries and coastal governance and policy
- Fisheries economics and value chains
- Ocean and coastal environments
- Mariculture and green businesses for the coastal environment
- Illegal, unreported and unregulated fishing practices
- Livelihoods and poverty reduction in coastal areas

Scientists and researchers made oral presentations on fifty-two (52) specific research topics and seventeen (17) posters. There were also four (4) keynote presentations delivered by key industry experts followed by panel discussions in plenary sessions. Five (5) special sessions and breakout working groups deliberated on topics such as Sustaining Fisheries & Coastal Research and Extension, Opportunities and Actions in the Post-Harvest Sector, Community-Based Fisheries Management, Child Labour and Trafficking in Ghana, Fisheries Stock Assessment and Current Status of Dwindling Food-Fish Stocks. Based on the deliberations, and considering the national importance of coastal ecosystems and fisheries to the people of Ghana, a number of specific recommendations were made:

1. **The small pelagic fish stocks which constitute 70% of the fish production are at record low levels.** This is due to many factors including open access in the canoe sector, increasing fishing capacity of all fleets, and excessive fishing effort. This is exacerbated by illegal fishing and costly input subsidies provided to the artisanal sector which has resulted in increased economic hardships for over 160,000 persons directly involved in the fishery, and the livelihoods of 2.2 million persons who indirectly depend on the fishery. Food security is also at risk and over 100,000 MT of low cost high nutritionally important fish protein supply is being lost annually. Economic hardships in fishing communities also create risks for maritime security, child labour and human trafficking in the fisheries sector. Urgent action is needed by all stakeholders in the fisheries sector to implement a suite of management measures to rebuild the fishery. This should include actions by MoFAD and the Fisheries Commission as well as support from fisherfolks and other stakeholders such as fish processors, marketers and their associations. Inaction means a continuation in declining trends, reduced food security, increasing poverty in fishing communities, and significant decrease in the sector's contribution to the national GDP.
2. **Increase emphasis on Ghana's fisheries post-harvest sector.** The fisheries post-harvest sector in Ghana directly employs as many as 130,000 people, including an estimated 30,000 women directly engaged in fish smoking. Recent innovations in smoker ovens, such as the "ahoto" oven, promoted by the Fisheries Commission, produce better quality fish with less smoke and drastically reduced levels of polycyclic aromatic hydrocarbons (PAH) which are cancer causing substances. Led by the Fisheries Commission, and supported by other stakeholders with USAID support, the "ahoto" oven and other innovations increase profits and incomes and thereby improving the wellbeing of coastal communities. These



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AND INTERNATIONAL COOPERATION



**UNIVERSITY OF
CAPE COAST**



**THE UNIVERSITY
OF GHANA**



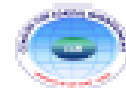
and other processing innovations should be given increased attention by the Fisheries Commission, Ministry of Health and relevant agencies.

3. **Immediately adopt and provide the resources for a new national co-management strategy for fisheries and coastal areas.** The importance of enabling local stakeholders to participate in and directly manage coastal, marine and estuarine resources is a recognized global good practice. Governments around the world acknowledge that working with local civil society and non-government organizations greatly increases their effectiveness in protecting and sustaining the resources on which their countries depend. Recognising the Fisheries Commission's intent to adopt a co-management strategy for the Ghanaian fisheries, the Conference expresses its support to this strategy and recommends that the Fisheries Commission moves forward as quickly as possible to adopt co-management as a national policy to enable local communities play a greater role in managing Ghana's fisheries and coastal resources.
4. **Boost Ghana's small pelagic fisheries through closed seasons and reduced effort.** The conference participants acknowledged the need to boost the small pelagic fisheries such as mackerel, sardines and anchovies. Small fish such as these contributes an average of 60% of the total animal protein consumed nationally and up to 90% in some small coastal communities. This protein source is vital for the people of Ghana, particularly children and pregnant mothers. However, increasing Ghana's small pelagic stocks requires that the Fisheries Commission immediately develops a plan to reduce subsidies, the number of canoes, and implement a closed fishing season as was done traditionally in the past. Without these actions, the collapsed small pelagic stocks will not rebuild. Current catches are already at 10% of catch levels in 1998.
5. **Immediately implement actions to control illegal transshipment of fish ('saiko' fishing).** Trawlers are now illegally engaged in exploiting small pelagics, blast freezing the catches at sea and tranship to canoes for landing and sales. This practice is depleting the already collapsed stocks depriving canoe fishers of their livelihood support, and forcing them into other negative and illegal practices that further impact small pelagic stocks negatively. It is estimated that "saiko" fish catch may nearly equal or in some cases, exceed legal catch by canoes depriving Ghana of a critical natural resource and avoiding payment of taxes that could be used to support the fisheries sector. The Accra Conference 2017 recommends the Fisheries Commission, Fisheries Enforcement Unit and other related Government agencies to immediately begin developing plans to eliminate the practice of "saiko" fishing.
6. **Increase regional fisheries management cooperation with other West African Countries.** Given the recognition that Ghana's fish stocks move and are shared by other West African countries, it is vital that Ghana cooperates with the neighbouring nations to



harmonize policies and laws aimed at stock management. It is vital to Ghana's national interests to work with other West African countries on management efforts including input and output controls, implementing joint closed seasons and establishing protected areas.

7. **Work with other Gulf of Guinea countries to discuss a shared fisheries research vessel.** Given the importance of science as a basis for managing fisheries resources, the Accra Conference 2017 agreed that discussions with other Gulf of Guinea governments should consider the acquisition and shared use of a fisheries research vessel.
8. **Immediately constitute the Fisheries Commission Board.** The Fisheries Commission plays a central role in sustainable management of one of Ghana's fisheries. However, a Board is yet to be established to oversee its activities, particularly the National Fisheries Management Plan 2015-2019 (NFMP). In the absence of this Board, there is no monitoring of the Fisheries Commission's progress toward implementing the NFMP. The Fisheries Commission Board should be put in place as a matter of national urgency to achieve the goals of the National Fisheries Management Plan.
9. **Fisheries issues should be devoid of political interference.** Efforts to sustainably manage Ghana's coastal and marine resources can never be successful unless political interference with the management responsibilities of government agencies is stopped. Political interference in the responsibilities of government agencies mandated to protect coastal and marine resources is a threat to Ghana's long-term national food security and economic contribution of the fishery. It is therefore crucial to curtail political interference in enforcement of laws. The Conference called for support from all stakeholders including the law enforcement agencies to help address this issue.
10. **Remove subsidies that encourage over-exploitation of marine and coastal resources.** Subsidies within the fisheries sector are largely counter-productive and encourage overfishing. Government subsidies indirectly continue to support the building of new canoes and acquisition of more powerful outboard motors even while the fish stock they go after is near collapse. Global experience shows that removing subsidies contributes to sustainable management of fish stocks. The Conference recommends that the government should review all fisheries sector subsidies and ensure that they are appropriately re-channelled into a coastal development fund to support social and economic interventions such as mariculture and investments in the green economy for the benefit of the coastal communities.
11. **Stop Child Labour and Trafficking.** The Conference participants recognized the negative impact of child labour and trafficking on Ghana's fisheries and agriculture sectors. In addition, participants recognized that coastal communities are among the poorest people in Ghana and as such serve as sourcing areas for child trafficking. The Conference calls on



the Ministry of Gender, Children and Social Protection to embark on a national campaign against child labour and trafficking in the coastal communities.

12. **Implement a national campaign to control plastics.** The growing menace of plastic wastes generated across Ghana which end up in the sea directly affects the livelihoods of fishers and indirectly affects fish consumers. Participants called for a national campaign involving EPA, NDPC, District Assemblies and other stakeholders to control the disposal of plastic wastes including banning plastic bags in favour of biodegradable ones.

13. **Government should develop mechanisms to fund research and extension in fisheries and coastal management.** Global best practices recognize that governments have a role to play in ensuring that scientific research, extension, outreach and public education support efforts to sustainably manage marine and coastal resources. The Accra Conference 2017 unanimously agreed that a university-based national funded programme be established to support these activities. The programme should solicit cooperation from the private and public sectors to deal with issues that resonate with local and regional governments and communities. Particularly, extension and public education through local universities should support government efforts to raise the awareness of Ghanaians. While the ultimate responsibility of this programme lies with government, it is recommended that it should be included in the National Fisheries Act with a provision to provide grants to support it.

14. **Formation of the Fisheries and Aquaculture Society of Ghana to support research and extension in the sector.** Given the national importance of fisheries and the coastal environment to the nation, a Fisheries and Aquaculture Society has been formed to serve as a focal point for research into issues of national importance, exchange of scientific information, and data on coastal environment, fisheries and aquaculture in Ghana. The Conference formalised the establishment of the society by the launch and appointment of an Interim Management Committee and Patrons to put structures in place for running the Society.

15. **Protection of coastal ecosystems.** The Conference noted the extensive degradation of coastal ecosystems such as mangroves, lagoons, estuaries and beaches through anthropogenic activities. These ecosystems are important to fisheries production as they are utilised as nursery areas by juvenile marine fishes. The beaches are also utilised as landing sites for canoes and boats. The Conference unanimously agreed that these ecosystems should be protected by enforcing all the existing regulations and formulate new ones where necessary.



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