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SUSTAINABLE FISHERIES MANAGEMENT PROJECT (SFMP)

GIS Training for Fisheries Commission Zonal Officers: A Training Report.



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THE
UNIVERSITY
OF RHODE ISLAND
GRADUATE SCHOOL
OF OCEANOGRAPHY



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Cover photo: A group picture of participants (Credit: Hen Mpoano)

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SNV: <http://www.snvworld.org/en/countries/ghana>

ACRONYMS

FC	Fisheries Commission
GIS	Geographic Information System
GPS	Global Positioning System
HM	Hen Mpoano
QGIS	Quantum GIS (a GIS software)
SFMP	Sustainable Fisheries Management Project
US	United States
USAID	United States Agency for International Development

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SECTION 1: INTRODUCTION

1.1 Background

Geographic Information Systems (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. It is primarily comprised of a database management system and spatial analytical software. The ability of the system to integrate attribute information is the main strength of GIS. The GIS technology is revolutionizing geographic analysis and has applications in many scientific fields. Within the fisheries sector, GIS is applied to optimize sampling, explain the spatial distributions of marine fisheries species and/or communities, and for the analysis of data to assist with decision-making.

Working closely with the Ministry of Fisheries and Aquaculture Development and the Fisheries Commission (FC), the United States Agency for International Development (USAID) - Ghana Sustainable Fisheries Management Project (SFMP) seeks to build the capacity for the adoption of this growing technology within the fisheries sector. In collaboration with the FC, the SFMP organized a 3-day training for zonal officers of the FC within the 4 coastal regions of Ghana to equip them with the needed skills for the application of GIS in fisheries data management. The course was designed to help FC officers develop a systematic understanding of spatial analysis methods and learn practical skills in using GIS for database management, data sharing, sampling, analysis, and visualization in support of ecosystem management.

1.2 Objective of the Training

The main objective of the training was to provide participants with fundamental skills in GIS, Remote Sensing and GPS data collection strategies for effective fisheries data management and decision making. The training was designed to introduce participants to the basic underpinnings of GIS as well as build some basic skill sets for spatial data capture, management, manipulation, analysis and visualization.

The specific objectives of the training were:

- To provide participants with a comprehensive understanding of the theories, assumptions, and context of GIS.
- To equip participants with relevant, practical and applicable skills required to facilitate change for improved performance.

1.3 Date and Participants

The training was organized in the Greater Accra Region, at Ampomah Hotel, East Legon from Tuesday, November 28 to Thursday, November 30, 2017. The training benefitted Zonal officers of the FC working within the four (4) coastal regions where SFMP activities are being implemented.



Figure 1: Cross section of participants receiving instructions from the facilitator (left) and a group photo of participants (right)

SECTION 2: TRAINING DELIVERY

2.1 Participants' Expectation

Prior to the training, participants were entreated to list their expectation for the 3-day training. The purpose was to ensure that their specific GIS need were addressed in the course of the training while sticking with the planned program. Some of the expectations of the participants are listed in table 1.

Table 1: Some of the expectations of participants

Able to use GIS to track movement of canoes at landing sites
Use GIS to plot fisheries activities at the zone
Know how to use the GPS very well for Data Capture and Area Calculation
To be able to read and interpret maps and GIS data
Understand and manipulate digital data
Enter data from paper into a GIS database
To be able to use GIS to build queries and get answers
To understand the basic concept of GIS
To be able to take coordinates of fish pond locations using GPS units and using the data within the GIS environment
To be able to map out and trace client's location in my zone/district
To use GIS to analyze data
To learn how to Incorporate GIS into my work in marine fisheries and aquaculture
To learn more about coordinate conversion

2.2 Training Modules

The training was purely hands-on with some PowerPoint presentations on some key concepts. The training modules were designed according to the objectives to address the day-to-day activities of the officers. The instructions were also carefully delivered to meet the expectations for the training. QGIS and Google Earth pro were the main software adopted for the training. The following modules were treated during the training period:



Figure 2: Training in session


2.2.1 Fundamentals of GIS

A Geographic Information System (GIS) is a computer-based tool for mapping and analyzing things that exist and events that happen on Earth. GIS technology integrates common database operations such as query and statistical analysis with the unique visualization and geographic analysis benefits offered by maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of public and private enterprises for explaining events, predicting outcomes, and planning strategies.


A working GIS integrates five key components: hardware, software, data, people, and methods. Below are some selected slides from the presentation.

What is GIS?

- Geographic Information System is a **computer program** used for **capturing, storing, managing, integrating, manipulating, analyzing and displaying** data related to **positions on the earth's surface**
- It allows us to view, understand, question, interpret, and visualize data in many ways that reveal **spatial relationships, patterns, and trends** in the form of digital map, globes, reports and charts



Components of GIS



How Does GIS Work?

Ask...
What is the problem you are trying to solve or analyze, and where is it located? Framing the question will help you decide what to analyze and how to present the results to your audience.

Acquire...
What you need to find the data is needed to complete your project. The type of data and the geographic scope of your project will help direct your methods of collecting data and conducting the analysis.

Examine...
You will only know for certain that your data is appropriate for your study after thoroughly examining it. This includes how the data is organized, how accurate it is, and where the data came from.

Analyze...
Geographic analysis is the core strength of GIS. Depending on your project, there are many different analysis methods to choose from. GIS modeling tools make it relatively easy to make these changes and create new output.

Act...
The results of your analysis can be shared through reports, maps, tables, and charts and delivered in printed format or digitally over a network or on the web. You need to decide on the best means for presenting your analysis, and GIS makes it easy to tailor the results for different audiences.

Importance of GIS

- Cost Savings from Greater Efficiency
- Improved Communication
- Better Record Keeping
- Managing Geographically
- Better Decision Making

Figure 3: Selected slides from the presentation

2.2.2 Introduction to Google Earth pro

Google Earth is a geospatial software application that displays a virtual globe, which offers the ability to analyze and capture geographical data. It is the high-end version of Google's mapping and exploration tool, once priced US \$399 a year but now available for free.

Participants were introduced to the functionality of this software for digitizing vector data (points, lines and polygons) and generating simple maps.

2.2.3 Introduction to QGIS

QGIS (previously known as Quantum GIS) is a cross platform free and open-source desktop Geographic Information System (GIS) application that supports viewing, editing, and analysis of geospatial data. It functions as Geographic Information system (GIS) software, allowing users to analyze and edit spatial information, in addition to composing and exporting graphical maps. QGIS supports both raster and vector layers. Some of the concepts covered were;

- Exploring the QGIS interface
- Coordinate systems
- Basic Vector analysis
- Symbology
- Exploring the attribute table
- Dealing with raster data
- Map Composer
- Importing spreadsheets into the QGIS
- Performing spatial/table joins
- Styling attribute information

2.2.4 An introduction to GPS

The Global Positioning System (GPS), originally Navstar GPS, is a satellite-based radio navigation system owned by the United States government and operated by the United States Air Force. It is a global navigation satellite system that provides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. It helps the user to know his position anywhere on the earth by giving solution to the problem- "Where on earth am I?"

The current GPS consists of three major segments. These are the space segment, a control segment, and a user segment. The United States Air Force develops, maintains, and operates the space and control segments. GPS satellites broadcast signals from space, and each GPS receiver uses these signals to calculate its three-dimensional location (latitude, longitude, and altitude) and the current time.

The training introduced the Zonal officers to the fundamentals of GPS and provided them with a step-by-step approach for collecting and processing primary data with both the traditional GPS receivers and mobile devices.

SECTION 3: CONCLUSION

3.1 Training Outcome

The three-day training brought together 16 FC Zonal Officers working within the 4 coastal regions of Ghana. The participants were taken through some fundamental concepts in GIS and some application of GIS relevant to their line of duty. They were well resourced with

spatial data (vector and raster), software (QGIS and Google Earth Pro) and mobile apps to help them apply this technology in their duties. The officers are now able to collect and process fisheries related data with GPS units/mobile devices; conduct some basic analyses with fisheries data and produce customized maps with new and existing data. Specifically, the officers are able to;

- Capture their own spatial data with GPS receiver/ mobile devices
- Explore GPS data on GIS platforms
- Conduct basic spatial analyses
- Produce thematic maps of their Zones
- Import text files into the GIS software for exploration
- Capture Data from Google Earth pro.

3.2 Evaluation of Training

The knowledge acquired by the participants were assessed with some practical assignments. The assignments ranged from the production of basic maps with QGIS and Google earth pro to the collection and processing of data using GPS receivers and mobile apps. Refer to Appendix 3 for some of the map products participants produced. The participants also evaluated the training workshop and provided the following;

- “The training was highly informative. The time however was quite short hence we couldn’t explore too many new features within the training period. An extension of the training period to at least, a week is recommended.”
- “The use of GPS in the coordination of our various zones would help us do our work easy and get accurate information about the zone.”
- “GIS, as I realized is a big area hence there should be a top up. Please impress upon our Directors to make good use of us so we can effectively discharge our responsibility of applying what we have learnt.”
- “The time allocated for the program was very short. It would be very good if the training is held regularly and for longer period (i.e. at least 2 weeks)”
- I will be grateful if more of such trainings are held for the zonal officers for effective applications.

APPENDIX 1: TRAINING PROGRAM

Ghana Sustainable Fisheries Management Project (SFMP) GIS Training for FC Zonal Officers

November 28-30, 2017
Ampomaah Hotel, East Legon, Accra

1.1 Objectives

- To provide participants with a comprehensive understanding of the theories, assumptions and context of GIS.
- To equip participants with relevant, practical and applicable skills required to facilitate effective fisheries data collection and management

1.2 Expected Outcome

The training is expected to introduce participants to the basic underpinnings of GIS as well as build some basic skill sets for spatial data capture, management, manipulation, analysis and visualization. Participants will be able to

- Capture and manage own spatial data
- Conduct basic spatial analyses
- Produce customized maps
- Import spreadsheet into the GIS environment

1.3 PROGRAM

DAY 1	
9:30am-10:00am	Participants Arrival and Check in
10:00am-10:30am	Participants Registration and Introduction
10:30am-10:45am	Coffee Break
10:45am-11:00am	Overview of SFMP and Training objectives
11:00am-1:00pm	Fundamentals of GIS
1:00pm-1:30pm	Lunch break
1:30pm-2:00pm	Basic GIS analysis
2:00pm-3:30pm	Introduction to Google Earth pro
3:30pm -3:45pm	Coffee break
3:45pm-4:45pm	Basic Analysis in Google Earth Pro
4:45pm-5:00pm	Evaluation and Closing

DAY 2	
8:00am-8:15am	Recap
8:15am-10:15am	Introduction to Quantum GIS <ul style="list-style-type: none"> • Exploring the interface • Coordinate systems • Basic Vector analysis
10:15am-10:30am	Coffee Break
10:30am-12:00pm	Introduction to Quantum GIS <ul style="list-style-type: none"> • Symbology • Exploring the attribute table • Dealing with raster data • Map Composer
12:00pm-1:00pm	My First Map
1:00pm-1:30pm	Lunch Break
1:30pm-3:30pm	My First Map
3:30pm -3:45pm	Coffee Break
3:45pm-4:45pm	My First Map
4:45pm-5:00pm	Evaluation and Closing
DAY 3	
8:00am-8:30am	Recap
8:30am-10:30am	An introduction to GPS <ul style="list-style-type: none"> • Fundamentals of GPS • Data collection with mobile app • Processing GPS data
10:30am-10:45am	Coffee Break
10:45am- 1:00pm	Dealing with Attribute information <ul style="list-style-type: none"> • Importing spreadsheets into the GIS environment • Performing spatial/table joins • Styling attribute information
1:00pm-1:15pm	Evaluation
1:15pm-1:30pm	Lunch and Departure

APPENDIX 2: PARTICIPANTS LIST

GHANA SUSTAINABLE FISHERIES PROJECT-HM PARTICIPANTS ROSTER INFORMATION

Required in English

Please Print

Title of Course: _____ GIS TRAINING FOR FISHERIES COMMISSION
ZONAL OFFICERS _____

Activity: _____ TRAINING
WORKSHOP _____

Date: _____ 28-30 NOVEMBER, 2017 _____

Length of Course: Less than three days Three days or longer

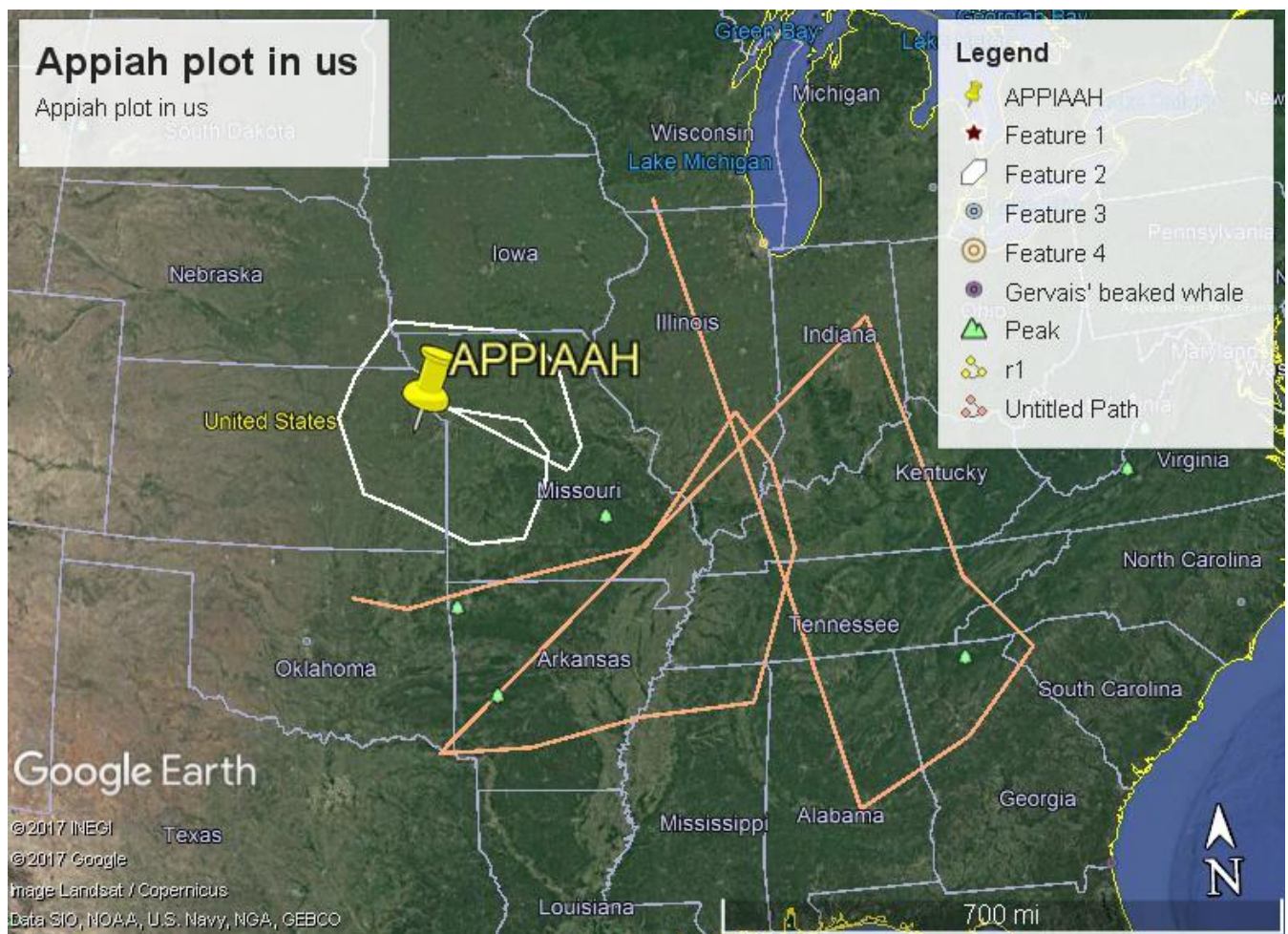
First Name	Surname	Organization	Email if available	Phone number	Sex				Do you wish to receive messages on SFMP?				
					M	F	Y	N	F	Y	N		
PROMISE	GAVOR	FC KETA ZONE	gavorpr@yahoo.com	0247232456	X			X					
MOSES	BOSOO	FC ADINA ZONE	-	0242639345	X			X					
UNIQUE K.	DAVOR	FC DENU ZONE	-	0542633048	X								

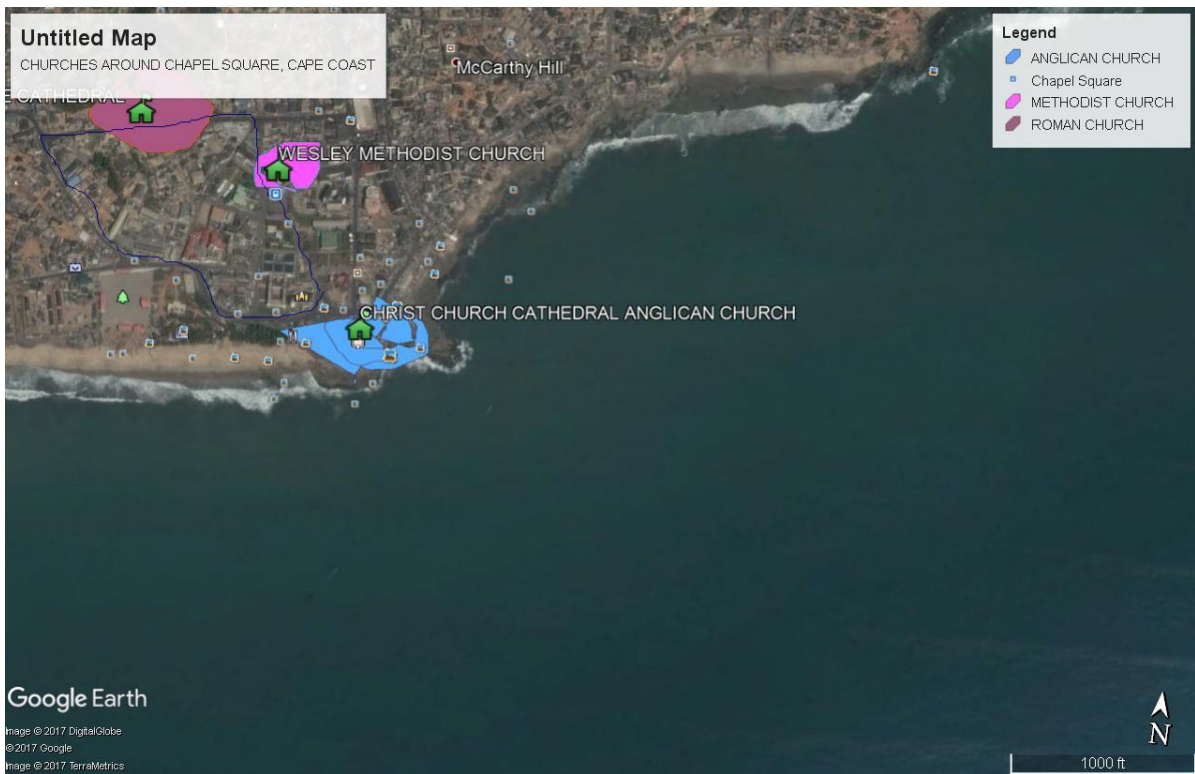
First Name	Surname	Organization	Email if available	Phone number	Sex	Do you wish to receive messages on SFMP?		
					M	F	Y	N
JOANA	TWUMASI	FC LEKMA ZONE	joanatumasius@yahoo.com	0263312718		X	X	
JOSEPHINE	L. ASARE	FC SHAMA ZONE	joashket@gmail.com	0242629263		X	X	
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PAUL	ADJINTETTEY	FC A.M.A. ZONE	pauladjintetty@yahoo.com	0242205828	X			
WENDY-ELL	QUARTY-PAPAFIO	FC KPAND O ZONE	wenbeck5@yahoo.com	0244805689	X			

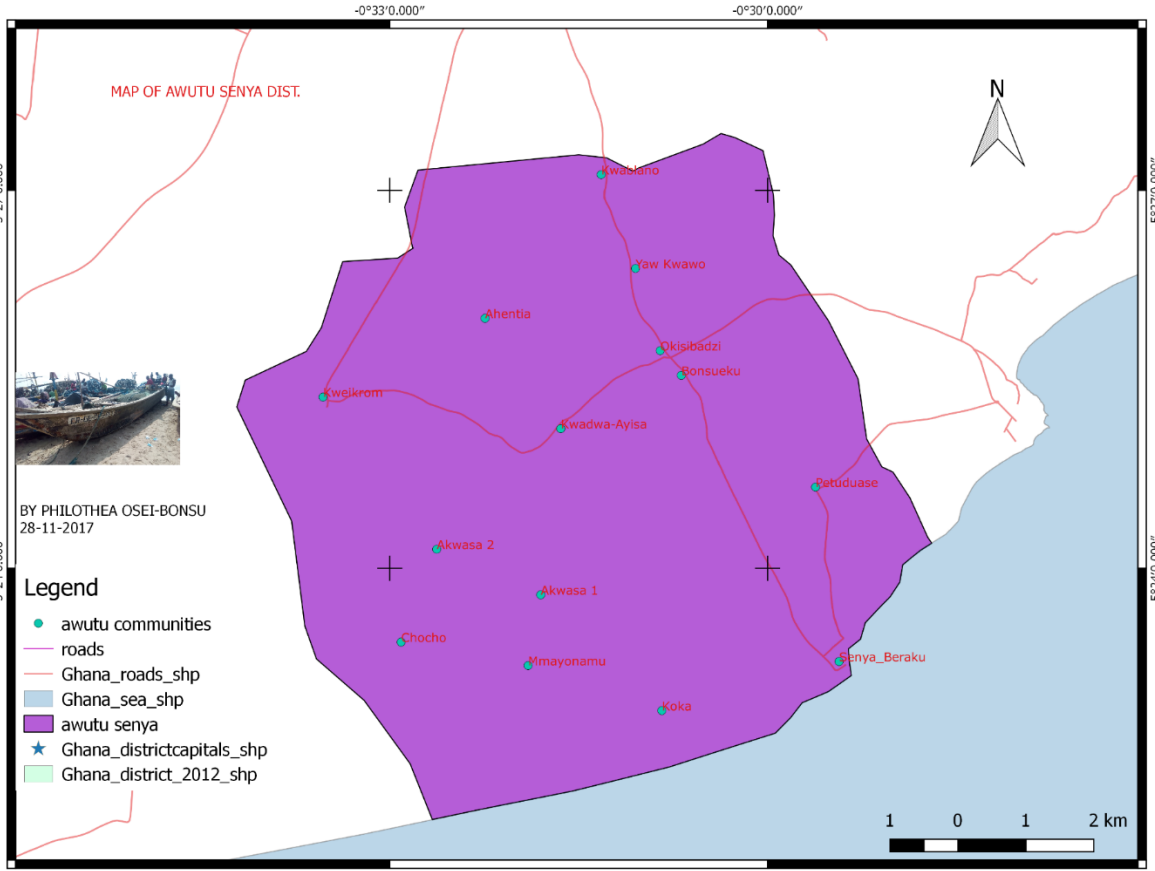
First Name	Surname	Organization	Email if available	Phone number	Sex	Do you wish to receive messages on SFMP?			
					M	F	Y	N	
ANTHONY	APPIAH	FC WINNEBA ZONE	appiahanton@gmail.com	0208123127	X		X		
EDEM	ADZAKU	FC CAPE COAST ZONE	eadmanuel@yahoo.com	0244974257	X				
ARAFAT	SALIFU	FC AXIM ZONE	salifuarafat@yahoo.com	0204096401	X				
PHILOTHEA	OSEI-BONSU	FC AWUTU SENYA ZONE	plyebuah@gmail.com	0209163920		X	X		
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LUTTERODT B.	KENNETH	FC DANGME EAST ZONE	lutterodtkenneth@yahoo.com	0244501744	X		X		

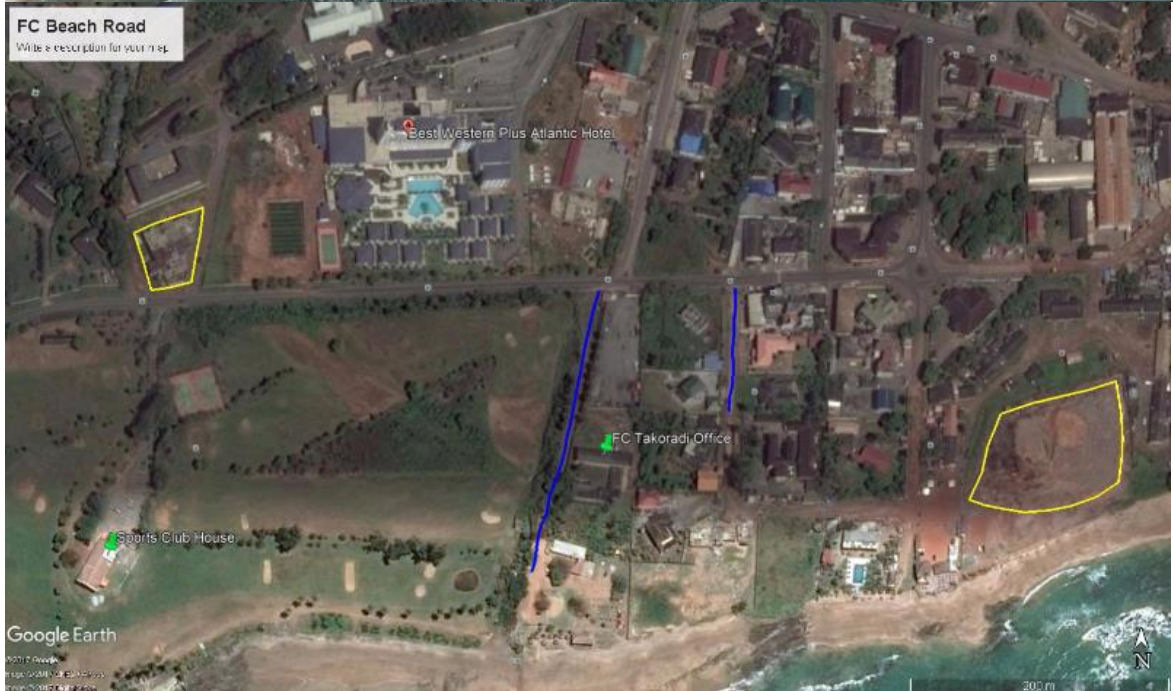
First Name	Surname	Organization	Email if available	Phone number	Sex	Do you wish to receive messages on SFMP?		
					M	F	Y	N
KUSI	BOATENG	SFMP (INTERN)	flintboateng90@gmail.com	0209436854	X			

APPENDIX 3: MAPS PRODUCED BY PARTICIPANTS













Fisheries hotspots in Ghana

This maps indicates areas of interest related to fishing activities in Ghana

Legend

- ★ Cape three points
- Feature 1
- ⚡ Gas pipe line
- ⚓ Sekondi landing beach
- 🛣️ Western corrdor highway



