Far Dwuma Nkodo
Securing Sustainable Fisheries

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Implemented by Hẹn Mpoano

Landing Site Mapping Using GeoODK Application
Training Manual for Community Mobilizers
This publication is available electronically on the Hen Mpoano website at http://www.henmpoano.org

For more information, contact:

Kofi Agbogah, Director
Email: kagbogah@henmpoano.org
Tel: +233 (0)31 2020 701

Hen Mpoano
38 J. Cross Cole Street P. O. Box AX 296
Windy Ridge Extension Takoradi, Western Region
East Tanokrom, Takoradi Ghana
Western Region
Ghana

Antoine Rougier, Ghana Country Coordinator
Email: antoine.rougier@ejfoundation.org

Environmental Justice Foundation (EJF)
Ghana Office, Cape Coast
Tel: +233 26 7962 411 / +233 55 6963 117

Compiled by:
Justice Nana Inkoom (gishm2017@gmail.com, justinkoom@yahoo.com)
Samuel-Richard Bogobley (sbogobley@henmpoano.org)
Emmanuel Obeng-Dekyi (eobeng@henmpoano.org)
Balertey Gormey (bgormey@henmpoano.org)

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Cover Photo: Field Demonstration meeting at Egya and Project Officer undertaking landing site mapping at Duakor, Cape Coast (Credit: Hen Mpoano)
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1. Background Information

This training manual was designed to aid a selected group of community mobilizers to understand the concept of mobile mapping and to introduce them to the practical use and application of the software application under Activity 2.22 of the Far Dwuma Nkodu project. As part of the projects first-year activity, the Fish Landing Site Mapping was conducted across the coastline of the Central Region and two other selected landing sites in the Ada East Metropolis. The key goal of Activity 2.22 is to identify and map the boundaries of the various landing sites and document land uses that conflicts with the primary use of the beach as a landing site. To productively use this training manual, it is suggested that the user uses it in connection with mobile devices with the GeoODK Mobile software application duly installed.

2. Training Manual Objectives

This training manual serves as an introduction to the use of the GeoODK program for mapping the boundaries of fish landing site. This manual seeks to explore the key functionality of the mobile software application and should not be considered as a fully exhaustive or conclusive manual in itself. Thus, not all aspects of the program’s operation are covered in this training manual. Additionally, the key objective was to introduce the tool to community mobilizers to aid them in mapping the boundaries of the fish landing site within the project area. Users can work through this manual at your own pace by following the steps and examples used to point out the operation of various program aspects for mapping equally similar boundaries as used in this manual. Prior to exploring its abilities, it is important to have the program installed and available while working through this manual. After it installation, the program could be run without connection to the internet.

3. Program Purpose

GeoODK\(^1\), developed over Open Data Kit (ODK) which handles form data collection but lacks spatial mapping component, is an open source platform for collecting, storing, editing and visualizing georeferenced information, along with a suite of tools to visualize, analyze and manipulate ground data for specific needs. The tool, developed and funded by the University of Maryland Department of Geographical Sciences and the International Institute for Applied Systems Analysis (IIASA) replaces

\(^1\) Visit [www.geoodk.com](http://www.geoodk.com) for a complete record of the program and it developers.
the paper based mapping approach by utilizing hardware capabilities of the phone to automate and centralize geolocation data.

It enables an understanding of the data for decision-making, research, business, disaster management, agriculture and more. As a multi-dimensional application, GeoODK seeks to provide an open source platform capable of handling spatial data collection. Characteristically, GeoODK provides opportunities for offline mapping, visualization of collected data on mobile devices, and eventual access to the collected points for further development in other geospatial desktop application platforms like QGIS\(^2\).

4. Requirements

In order to use the GeoODK program, the user will need the following hardware and software items. Hardware wise, the user will need any modern android mobile phone or tablets with good locational features. Software wise, a hardware phone or tablet running Android software versions 4.4 or recent is highly preferred. Additionally, users could download and install the GeoODK application from the google play store (see Table 1 below for some recommended hardware and software features). There are no special dependencies for installing and running the application. Depending on the nature and level of detail expected, it might be necessary to have a backup storage support like a microsd card to store aerial photographs or provide space support to host images downloaded as evidence of event or objects captured as part of the mapping activity.

Table 1: Hardware and Software specification for consideration before mapping.

<table>
<thead>
<tr>
<th>Hardware Specification</th>
<th>Software Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Android Mobile phones model years 2013 and beyond (LG, Infinix, Motorola, Sony, Samsung etc.).</td>
<td>KitKat 4.4 – 4.4.4</td>
</tr>
<tr>
<td>*Android Tablets model years 2014 and current (preferably Samsung Galaxy Tab A).</td>
<td>Lollipop 5.0 – 5.1.1</td>
</tr>
<tr>
<td></td>
<td>Marshmallow 6.0 – 6.0.1</td>
</tr>
<tr>
<td></td>
<td>Nougat 7.0 – 7.1.2</td>
</tr>
<tr>
<td></td>
<td>GeoODK Collect</td>
</tr>
</tbody>
</table>

5. Data Collection Using The Modified GeoODK Collect

Ahead of mapping with this tool, three key processes ought to be followed (see Figure 1, 2, & 3). First is the installation of the tool itself, the second is the development, configuration and integration of the

\(^2\) QGIS, also known as Quantum GIS is one of the widely used open source geographic information system application software for geospatial analysis, data visualization and map making. See www.qgis.org/
form in the mobile device before mapping, while the third focuses on downloading the form and beginning the mapping task proper. This training manual however skips the first two steps but focuses on the third.

This step involves downloading and installing the GeoODK application on the mobile device of choice. Usually, the default options for the installation if preferred. The use of mobile data is advised if Wifi services are unavailable at the time of downloading the application.

This step involves the creation of the online form to aid the collection of attribute information accompanying the mapping activity itself.

Developing a form demands critical thoughts on the content of the form and additional relevant to capture the state of the art or issues under investigation.

Once step 1 and 2 are completed, the follow-up step is to download the form unto the mobile device and set it up for the main mapping activity.

This requires internet connectivity to aid the deployment of the form from the server (see Fig. 5).

The following procedures, guided by screenshots of descriptive text from the GeoODK platform itself systematically takes the user through different steps we employed to modify the tools functionality for the Far Dwuma Nkodo Project.
6. Setup

6.1. GeoODK Setup

On the main page, six icons are displayed.

**Collect data** leads you to the downloaded survey forms to fill.

**Edit data** enables editing of completed forms.

**Delete data** allows deletion of completed and blank forms.

**Send Data** allows user to send filled forms to the server.

**Map Data** allows the user to visualize collected geospatial data on a map.

To set up the app for data collection, the server and login details have to be set up.

Tap **Settings** from the main page, select **General Settings**, and complete the setup as follows;

**Platform: other**

**Configure platform settings:**

- **url:** kc.humanitarianresponse.info/henmpoano
- **User:** henmpoano
- **Password:** henmpoano2017
6.2. Downloading Survey Forms from Server

On the Settings (Fig. 8) page, Select Form management, allow app to get form list from the server and then check only the HM EJF Landing Site Mapping Form v5 as shown in Figure 9.

Tap Get Selected to download the form

A Download Result (Fig. 10) tab would pop up indicating whether form download was successful or not.
6.3. Filling The Survey Form

Go back to the main page, tap Collect Data and select the form which was downloaded (Fig. 12) in the previous step.

The form is navigated by swiping right to the next question or swiping left to the previous question (Fig. 13).

Fill the information as required.

NB> The form will not move to the next question until the question has been answered

Special definitions

LUT: land use type (LUT) is what the land is being used for.

Competing Land Use: any activity or land use that interferes or could potentially interfere with the use of the beach as a landing site for fishing and fish related activities. Examples could be drinking bars, residential apartments, hotels, beach resorts etc.

6.4. Mapping Component

The GPS mapping component of the GeoODK allows a user to either record a point, select a point on a map, draw coordinates on the map or walk the boundaries of objects or areas in geographic space. Two approaches were followed for the purpose of the landing site mapping (see Table 2).
Table 2: Approaches adopted for mapping fish landing sites.

<table>
<thead>
<tr>
<th>What to map?</th>
<th>GeoODK option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Map boundaries of landing site</td>
<td>Walk the boundaries</td>
</tr>
<tr>
<td>Map competing land use</td>
<td>Record GPS point</td>
</tr>
</tbody>
</table>

A full disclosure of these key approaches are presented below.

6.4.1. Mapping boundaries of landing site

Select **Walk the boundaries** (Fig. 14).

Tap on the **Record GeoTrace** (Fig. 15) button.

If the phone’s GPS is turned off, the app would notify you to enable the phone’s GPS (Fig. 16).

After getting access to the phone’s GPS, allow the app to connect and acquire GPS signal (about 30 seconds) then tap the **red play-like button** (Fig. 17) at the top left part of the screen.

In the Geo-trace Instruction pop up (Fig. 18), select **automatic mode** and select **5** and **Seconds** in the next pop up (Fig. 19).
Select **Walk the boundaries** (Fig. 14).

Tap on the **Record GeoTrace** (Fig. 15) button.

If the phone’s GPS is turned off, the app would notify you to enable the phone’s GPS (Fig. 16).

After getting access to the phone’s GPS, allow the app to connect to acquire GPS signal (about 30 seconds waiting time) then tap the **red play-like button** (Fig. 17) at the top left part of the screen.

In the Geo-trace Instruction pop up (Fig. 18), select **automatic mode** and select **5 and Seconds** in the next pop up (Fig. 19). This allows the tool to drop a coordinate every 5 secs.

Wait for the first point to be indicated, then walk around the landing site. Keep the phone screen on to avoid errors during recording.
6.4.2. Competing Land Use

As described earlier, competing land uses and uses that tend to interfere with fishing and fish processing activities at the landing site.

The pause button that replaces the play-like button at the upper left screen (Fig. 20) can be used to pause recording if there is the need to avoid and obstacle that could affect the output.

After walking around the boundaries, stop recording by taping the Pause button, the tap the Save (diskette-like icon).

In the select polygon/polyline pop-up that appears next, select Save as polygon to finish at Fig. 23.

Swipe right to the next screen.

In the next screen (Fig. 24), give a list of all probable competing land uses given by the community assistant.

Tap Picture in the Photo of landmark section (Fig. 25) to take a picture of the landing site that tries to give a wholistic view of the activities taking place at the landing site.
Tap Picture in the Photo of landmark section (Fig. 25) to take a picture of the landing site that tries to give a wholistic view of the activities taking place at the landing site.

It launches the native camera app on the phone. Based on the phone's specification take a clear picture. Tap the ‘x’ (or ‘cancel’ depending on the phone) button to discard photo if it was not taken well otherwise tap the ok or correct button to proceed (Fig. 26).

After swiping right to go to the next screen, tap **Add group** (Fig. 27) to start recording individual competing land uses.
6.4.3. Recording Individual Competing Land Uses

As discussed earlier, individual competing land uses would be recorded using the Record Location feature.

After tapping **Add group** (Fig. 27), tap **Record Location** button (Fig. 28).

Wait for the recording location pop up dialogue box to disappear, tap the blue button at the top left corner of the screen and then tap the save button at the top right corner to reach Fig. 30.

Swipe left and input the name of the competing land use (Fig. 31).

After completing the entry, swipe left and chose **Add group** to repeat the steps for another competing use or tap **Do not Add** (Fig. 32) to complete entry.

Swipe to the final screen and name the form.

Mark as finalized and tap save Form and Exit button to finish entry for the landing site (Fig. 33).
6.5. Editing and Submitting Saved Forms

It may become necessary to edit saved entries before submitting to the online server. It is important to name forms in an easily identifiable way.

**Editing Saved Forms**
- On the main page, Select Edit data.
- Select the form.
- Navigate to section that requires editing.
- Swipe till the last page of the form and Save.

**Submitting Saved Forms**
- On the main Page (Fig. 34), select Send Data.
- Check all the forms to be submitted and tap selected.
- A pop up will show progress and completion of process.
7. **Status of Work Done**

The main mapping activity was carried out in multiple phases. The first phase was conducted in the KEEA, Cape Coast and AAK districts between October, 31\textsuperscript{st} and November, 3\textsuperscript{rd} 2017. The second phase of the mapping was conducted in the Effutu Municipality from 7\textsuperscript{th} to 9\textsuperscript{th} November, 2017. The last phase of the mapping was conducted in the Ekumfi District from 20\textsuperscript{th} to 24\textsuperscript{th} November, 2017.

\footnote{All images used in this descriptive text were obtained from the official GeoODK software window. The modification of the tool aided our practical implementation of the tool for our project.}
Table 3: Work Progress on Landing Site Mapping Activity

<table>
<thead>
<tr>
<th>PHASE</th>
<th>DATE</th>
<th>DISTRICT</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31st October to 3rd November, 2017</td>
<td>i. Komenda, Edina, Eguafo, Abrem (KEEA) Municipal&lt;br&gt;ii. Cape Coast Metropolitan&lt;br&gt;iii. Abura/Asebu/Kwamankese</td>
<td>Completed</td>
</tr>
<tr>
<td>2</td>
<td>7th to 9th November, 2017</td>
<td>Effutu Municipal</td>
<td>Completed</td>
</tr>
<tr>
<td>3</td>
<td>20th to 24th November, 2017</td>
<td>Ekumfi</td>
<td>Completed</td>
</tr>
<tr>
<td>4</td>
<td>18th to 20th December, 2017</td>
<td>i. Gomoa West&lt;br&gt;ii. Awutu Senya</td>
<td>Completed</td>
</tr>
<tr>
<td>5</td>
<td>29th to 31st December 2017</td>
<td>Gomoa East</td>
<td>Completed</td>
</tr>
</tbody>
</table>

Figure 38: A classic example of work output exported as *.kml format for visualization in GoogleEarth Pro. Mapped landing site boundaries are represented with different colour shades.
8. Conclusion

This concludes this GeoODK fish landing site mapping training manual. If the user worked his or way through all relevant topics presented in this manual, you have indeed witnessed one of the few largescale application of the GeoODK mobile mapping approach in sub-saharan Africa. The idea was not to test the capabilities of the tool, but the applicability of the tool for a large scale mapping activity as this. For further information about the technical details adapted to this approach to facilitate our work, the user is welcomed to seek for additional support from the GIS specialist for the Far Dwuma Nkodu Project. For specific assistance on GeoODK itself, users are invited to visit the Help Menu of the application, or visit the main page of the tool (see http://geoodk.com/index.html). All comments on this training manual could be submitted to gishm2017@gmail.com, justinkoom@yahoo.com, or sbogobley@hempoano.org for responses and further assistance.