

ecoSurvey

Management Information system

A DATABASE OF THE ECOLOGICAL AND SOCIO-ECONOMIC BASELINE OF THE SIX CENTRAL FOREST RESERVES IN THE MABIRA FOREST ECOSYSTEM:

Database Technical Report

By

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Submitted to:

Ministry of Water and Environment, Plot 22/28 Port Bell Road, Luzira, Kampala, Uganda Under the Project titled:
Updating the Ecological Baseline and the Socio-economic Data for Six Central Forest Reserves (Mabira,
Namakupa, Nandagi, Kalagala Falls, Namawanyi and Namananga) and Updating the Management Plan for Mabira
Central Forest Reserve (Project ID NO. P123204).

AUGUST 2017

1. Over view

The report is a technical documentation of the **ecoSurvey** Management Information System a tool design to automate the social economic, ecological and water survey for Ministry of water and the various agencies that interface with it. It allows the user capture results of the survey. The system can be hosted on an online environment/ webserver so that authorised users of the system can access if from anywhere as long as they have the rights to log into the system

Situation analysis

Requirements gathering and stakeholders mapping involving reviewing various information systems in the environmental sector, especially in Uganda and meeting various stakeholders. Several information systems were found or reported to exist in MWE and housed in different places such as National Forestry Authority, National Environment Management Authority and Directorate of Water Resources Management among others. Attempts that are underway to develop a Water Information System (WIS) which is supposed to be a distributed system allowing access to various databases and or information systems to which stakeholders have higher control were also discovered. WIS is supposed to facilitate data sharing and is envisaged to be a web-based system. Although WIS is a good initiative, many challenges need to be overcome for it to become a reality. There are many existing databases and information systems with varying design and implementation approaches rendering integration adhoc. Some of the databases and information systems are not web-based. Additionally, there are currently no data /information sharing agreements amongst the owners of the various databases/information systems that are envisaged to be accessible through WIS, including the one developed in this project.

In line with the review and consultations with various stakeholders, it was agreed that a database that is web-based be developed as it offers the possibility of integration into WIS. The new system has data exchange interfaces that allow users import data from other systems. However, as recommended by WIS that the owners of the data have more control over it even if it is shared through WIS, it is proposed that mandate over the developed database will be with MWE or National Forestry Authority. The system should be able to keep both the ecological and socio-economic data being collected under the current assignment, with the possibility of being periodically updated (through keeping instances of the data collected at different times), and with the ability to allow data entry and retrieval of data for further processing. Therefore, the data incorporated in this database includes the Ecological Survey, Socio-economic Survey and Water Survey.

Our Recommendation

It is very important that the system is hosted online either by National Forestry Authority or the Directorate of Environmental affairs. This will help in ensuring that the system is online all the time. Users can also access it even when they are out in the field if they have the required credentials. The system will be administered by the party that shall host it.

As the business environment changes, there may be a need to capture more attributes and as such there shall be need to make changes on the system; The team that will manage the data base may contact the consulting firm to make changes at an agreed cost.

Document Control

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Revision History			
Version	Revision Date	Description of/Reason for change	List of contributors
1	10 th Jan 2017	Draft 1	Dr. Waiswa Daniel
1.1	25 April 2017	First report draft	Kiyingi Simon Peter (ICT Technical member)
1.2	1 st May 2017	Final report incorporating design changes and review from ministry of water	Kiyingi Simon Peter Dr. Waiswa Daniel Muddu George Richard Kyambadde Joseph Bahati Inception work Participants
1.3	1 st August 2017	Final report incorporating changes and review from the validation workshop	Kiyingi Simon Peter Dr. Waiswa Daniel Muddu George Richard Kyambadde Joseph Bahati Inception work Participants Validation workshop Participants

Approval History				
Version Reviewed	Approver Name	Title	Signature	Date Approved

General Document Information	
Version:	1.3
Version status:	FINAL VERSION
Version date:	1 st June 2017
Document ref number:	N/A
Purpose:	This report details the technical documentation of the automated Database management system that captures the findings of the ecological, social economic and water survey of the Mabira Forest Ecosystem covering six CFRs.

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Approval History				
Version Reviewed	Approver Name	Title	Signature	Date Approved

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2. Purpose and Scope

2.1. Document purpose

This report details the technical documentation of the automated Database management system that captures the findings of the ecological, social economic and water survey.

2.2. Scope of this document

This document aims to:

- Detail the system design
- Enable end administrator users walk through the administration of the system
- Enable end users understand the functionality of the system

2.3. Document audience

This document is intended for the Ministry of Water as a deliverable for the consultancy of the ecological, social economic and water survey carried out.

2.4. Key benefits

The following are some of the key benefits among others

1. Centralised storage of data captured
2. Ease of analysis of data captured
3. Reports and Dashboards to guide the decision makers based on data collected.
4. Single view of a site visited across the different studies undertaken at the same site.
5. Security of the data captured.

2.5. Key System features

The following are some of the functionalities among others

1. Allowing an authenticated User to capture the survey details online.
2. The system admin can from time to time create users and assign the different roles on the system
3. The system provides for reports.
4. User can create their own reports based on a desired decision from time to time.
5. System allows the user to carry out surveys in the same site in case there is need to analyze the change in the various parameters.
6. System can interface other systems through pre-defined interfaces and excel uploads
7. The system is fully integrated with the Water Information Management System

3. Overview of the Database System

M/S Joseph Bahati and Associates was awarded a contract by Uganda's Ministry of Water and Environment to execute a project titled "Updating the Ecological Baseline and the Socio-economic Data for Six Central Forest Reserves (Mabira, Namakupa, Nandagi, Kalagala Falls, Namawanyi and Namananga) and Updating the Management Plan for Mabira Central Forest Reserve". Under this project, Objective 2 was to "Establish and operationalize a digital database based on Microsoft Windows, consolidating all the data and information collected for the six central reserves". was to "develop and operationalize a digital database for the six Central Forest Reserves in the Mabira Forest Ecosystem, namely Mabira, Namakupa, Nandagi, Kalagala Falls, Namawanyi and Namananga. As per our inception report, this objective was interpreted to mean that we develop a database that includes the ecological as well as socioeconomic information. Our aim was to develop an easy to use data base that is compatible with relevant existing databases and most importantly ensure that it is operational.

In order to accomplish objective 2, methods were developed and it consisted of a series of phases as indicated below:

- (i) Requirements Gathering + Stakeholder mapping
- (ii) System Modelling and Design
- (iii) System Development and Testing
- (iv) User Acceptance training
- (v) Maintenance

2.1 Requirements Gathering and Stakeholder Mapping

Requirements gathering and stakeholders mapping involving reviewing various information systems in the environmental sector, especially in Uganda and meeting various stakeholders. Several information systems were found or reported to exist in MWE and housed in different places such as National Forestry Authority, National Environment Management Authority and Directorate of Water Resources Management among others. Attempts that are underway to develop a Water Information System (WIS) which is supposed to be a distributed system allowing access to various databases and information systems to which stakeholders have higher control were also discovered. WIS is supposed to facilitate data sharing and is envisaged to be a web-based system. Although WIS is a good initiative, many challenges need to be overcome in order for it to become a reality. There are many existing databases and information systems with varying design and implementation approaches rendering integration a difficult task. Some of the databases and information systems are not web-based. Additionally, there are currently no data /information sharing agreements amongst the owners of the various databases/information systems that are envisaged to be accessible through WIS, including the one developed in this project.

In line with the review and consultations with various stakeholders, it was agreed that a database that is web-based be developed as it offers the possibility of integration into WIS. However, as recommended by WIS that the owners of the data have more control over it even if it is shared through WIS, it is proposed that mandate over the developed database

will be with MWE or National Forestry Authority. The system should be able to keep both the ecological and socio-economic data being collected under the current assignment, with the possibility of being periodically updated (through keeping instances of the data collected at different times), and with the ability to allow data entry and retrieval of data for further processing. Therefore, the data incorporated in this database includes the Ecological Survey, Socio-economic Survey and Water Survey.

2.2 System Modelling and Design

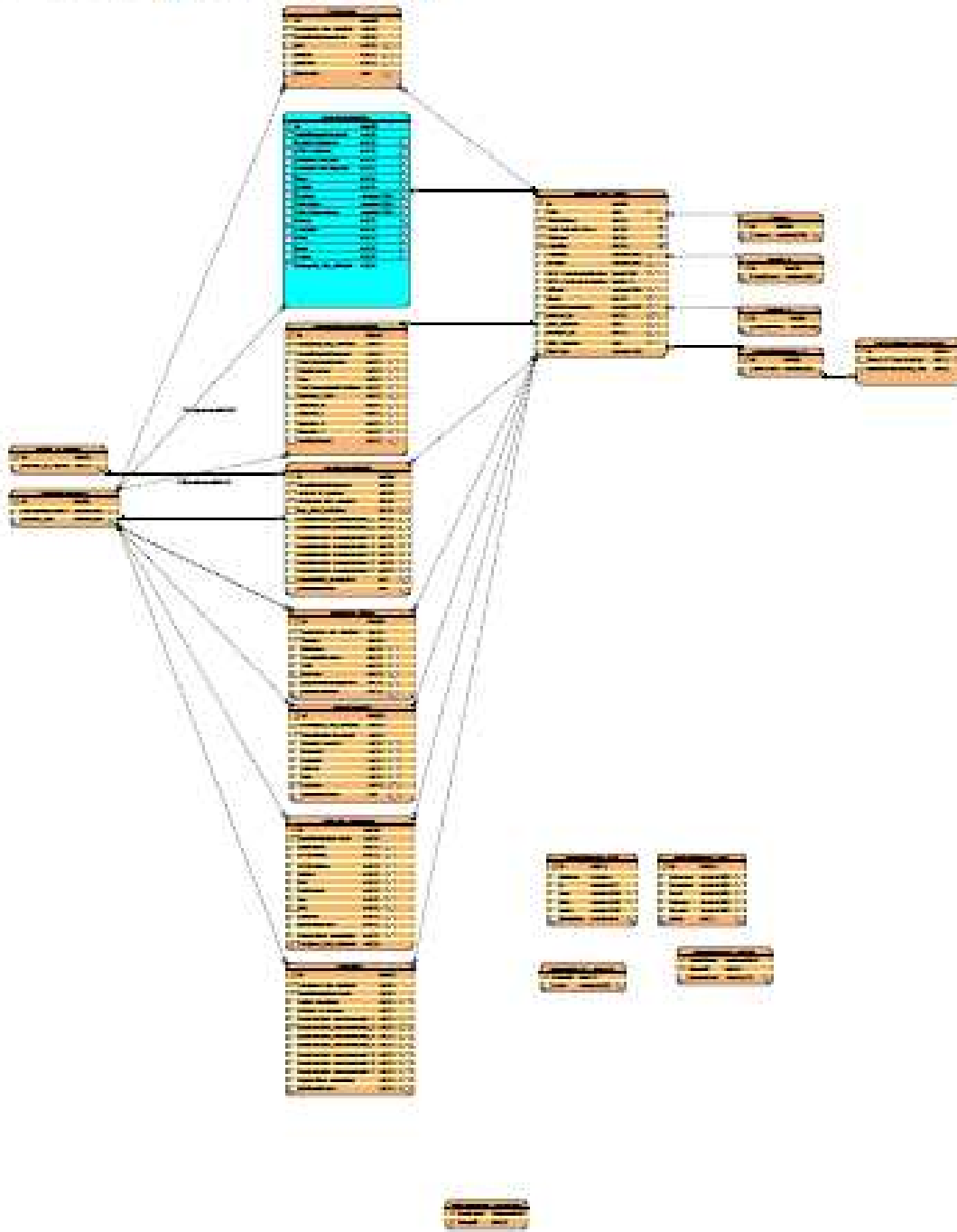
The survey questionnaires (Ecological Survey, Socio-economic Survey and Water Survey) were used in modelling and



documentation.pdf

designing the database (see design model) culminating into the development of Entity Relationship Diagrams such as the one below:

Entity Relationship Diagram EcologicalSurvey



2.3 System Development and testing

2.3.1 System development

This involved:

- Implementation of the physical database design in MYSQL which resulted into a running database hoped to contain data from the Ecological base line and socio-economic survey of the six forest reserves in the Mabira ecosystem and their surrounding communities. The system is able to allow entry of the data, update of data in addition to import and export of data for further management.
- Entry of sample ecological baseline and socio-economic data as a way of testing the functionality of the system
- Demonstration runs of the system so that it can be improved. This will be done by exposing the system to various stakeholders.

2.3.2. User Acceptance training

Users of the system will be trained in its uses, including availing them with the User Manual.

2.4 Maintenance

Users of the system, especially System Administrators, will be introduced to aspects on maintenance of the system.

Users can in future create customised reports to sui changing business requirements

4. System Operational Requirements

3.1 Hardware

Processor family: Intel® Celeron®, Intel® Pentium®, Intel® Xeon® E3-1200v2

Product family: Intel® Core™ i3

Number of processors: 1

Processor cache: 2MB L3, 3MB L3

Processor speed: 2.5GHz

Power supply type: (1) 1 built-in power supply Multi-output, Expansion slots

Memory, maximum: 16GB, DDR3 UDIMM

Network controller: 1Gb 332i Ethernet Adapter 2 Ports per controller

Storage controller: Smart Array B120i, 300TB, Hot Swappable

3.2 Software

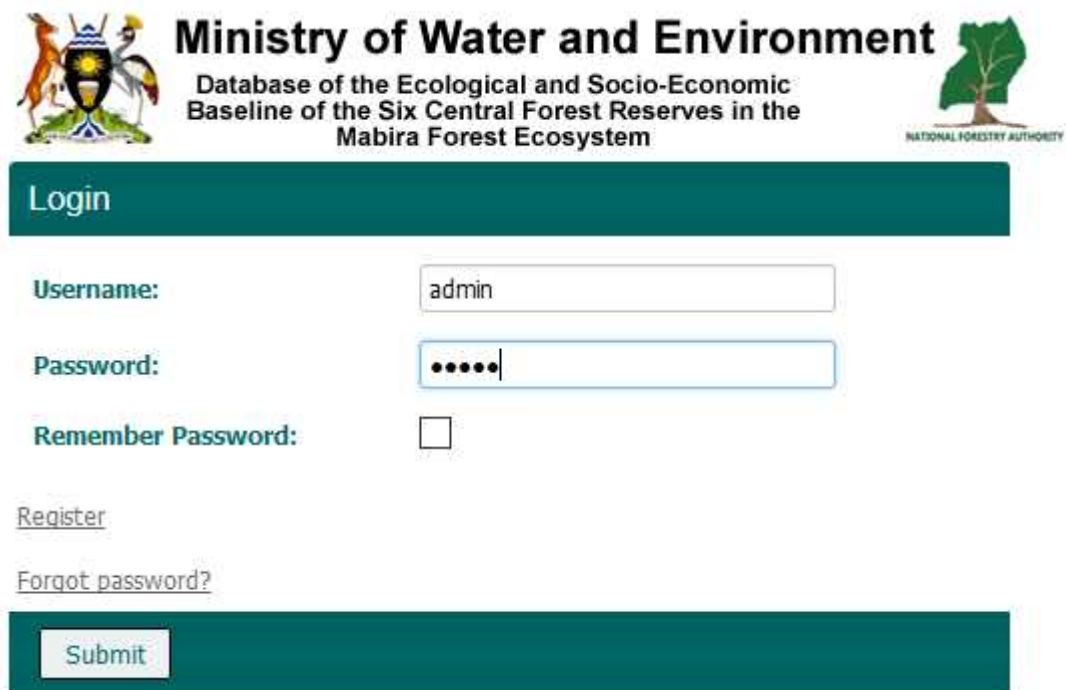
The system is platform independent and can run locally or online. The computer needs to be installed with a web browser since the system is web-based. The system server should be running Apache, MY-SQL and PHP.

5. Database System User Manual

Based on the fact that a digital database consolidating all the data and information collected for the six central reserves was established and operationalized, this user manual is aimed at easing the use of the database through step by step guides, aided with the help of screenshots (graphics).

5.1. Database System Log In

- a) User enters the registered username and password



The screenshot shows the login interface for the 'Ministry of Water and Environment'. The page header includes the national coat of arms of Kenya on the left, the text 'Ministry of Water and Environment' in the center, and the 'NATIONAL FORESTRY AUTHORITY' logo on the right. Below the header, the text reads 'Database of the Ecological and Socio-Economic Baseline of the Six Central Forest Reserves in the Mabira Forest Ecosystem'. The main content area is titled 'Login' and contains the following fields: 'Username:' with the value 'admin', 'Password:' with five dots, and 'Remember Password:' with an unchecked checkbox. There are links for 'Register' and 'Forgot password?'. A 'Submit' button is located at the bottom of the form.

- b) After Database System Log In

Once logged in, the screen below appears:



It provides the following functionality:

- (i) Log out : when you need to exit from the database
- (ii) Admin Area



Admin Area provides options for:

- (a) Assigning users to groups

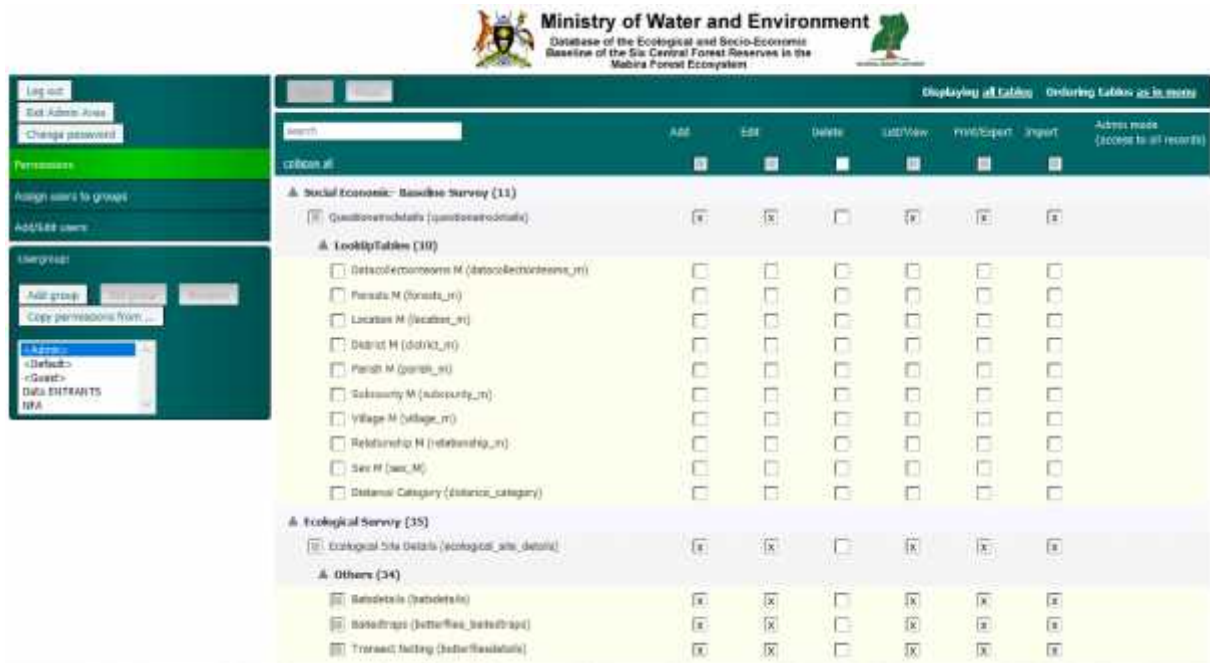


- (b) Add/Edit Users

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(c) Assigning users rights to the database system

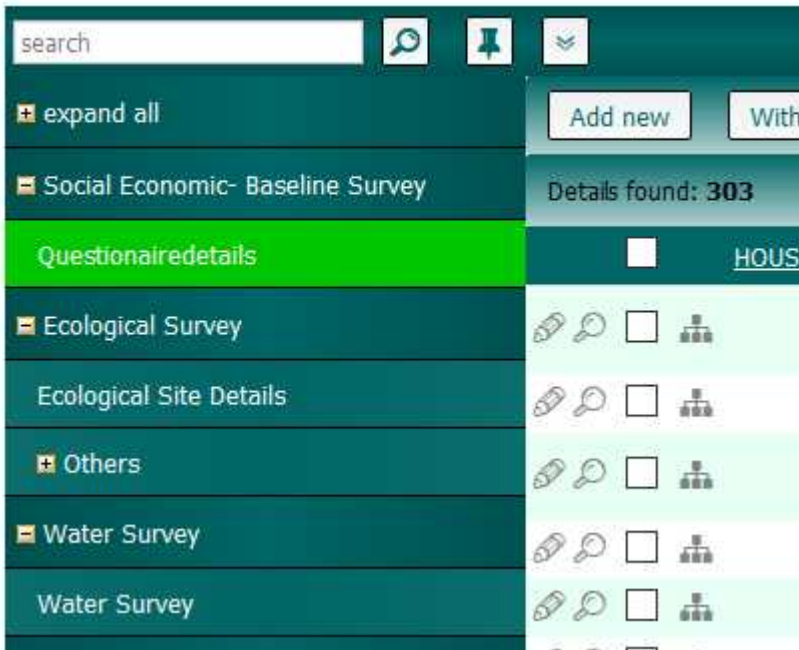


This menu provides options for adding, deleting or renaming user groups and assigning them roles with regard to access and modification of records in the database system. You can assign Add, Edit, Delete, List/View, Print/Export and Import roles to any of the user groups as deemed necessary. This can be done for the entire surveys (tables) or for selected records within the surveys after clicking the Expand All/Collapse all toggle menu.

- (iii) Change Password
- (iv) Expand All /Collapse All Menu

This menu provides the ability to view the system components (look up tables) in a compressed or expanded through toggling.

The three surveys which are incorporated in the database are then visible in compressed or expanded format. These include Socio-economic Baseline Survey, Ecological survey and Water Survey. They provide the interface for data entry and manipulation.



5.2. Data Entry

The Data Entry User is then ready to enter the survey details based on their roles on the system. Below are sample Survey Data Interfaces.

a) Ecological Survey Data entry interface

The interface below allows the user to enter the ecological survey master data. The system automatically takes the user to the rest of the screens to enter the other details of the ecological survey

Ministry of Water and Environment
Database of the Ecological and Socio-Economic Baseline of the Six Central Forest Reserves in the Mabira Forest Ecosystem

QUESTIONNAIRE ID	QUESTIONNAIRE NO	DISTRICT	SUBCOUNTY	PANISH	VILLAGE	HOUSEHOLD NAME	HOUSEHOLD ID	QUESTIONNAIRE NO
1	1	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	1
2	2	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	2
3	3	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	3
4	4	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	4
5	5	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	5
6	6	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	6
7	7	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	7
8	8	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	BUKIDDE	8

c) Socio-economic Survey Data entry interface

Ministry of Water and Environment
Database of the Ecological and Socio-Economic Baseline of the Six Central Forest Reserves in the Mabira Forest Ecosystem

Questionnaire details. Add new record

HOUSEHOLD ID:

Questionnaire No:

District:

Subcounty:

Panish:

Village:

Household Name:

Sex Hhd:

Respondent Name:

Sex Respondent:

Relationship To Hhd:

Number Of Hhd:

Name Of Reserve:

Distance Category:

GPS Easting:

GPS Northing:

Elevation:

Research Assistant:

Interviewed By:

Checked By:

Date Checked:

Entered by:

Date Entered:

Save Back to list

After saving the record the system prompts you to enter the other sections of the survey as shown below




d) Water Survey Data entry interface



e) To search for the data entered the User clicks on back to list button and can search for any particular record using the search text bot at the top right corner.


6. Data Integration

The system allows for integration with other databases. The authorised user shall browse the file to be integrated into the new system.



Ministry of Water and Environment

Database of the Ecological and Socio-Economic
Baseline of the Six Central Forest Reserves in the
Mabira Forest Ecosystem



Questionnaire details, Import

Drag and drop a comma-separated (.csv) or Excel (.xlsx) file or choose an option below.

Browse...

Copy and paste text

Back to list

The system allows the authorised User to export data to a desired file format



Below is a sample of the Output in MS Excel format

1	Date	Forest Name	Data Collection Team	Treatment	Location	Transect	Subplot	GPS Coordinates Easting	GPS Coordinates Northing	Altitude	Slope
2	02/11/2016	Makindu	Team 1	Team 1	Location A	1A	1A	11225	112		
3	02/11/2016	Budongo	Team 1	Team 1	Location B	21B	1B	12232	4245	128	2238

The system has quite a number of reports that allow the analyst do their various studies and custom analysis. However, the main output should be data exported to other formats for manipulation in ways that are deemed appropriate by specific field experts/analysts.

7. Recommendations

7.1. People Skills

1. To grow the system to support various changing business requirements and obtaining the required business intelligence

The System Admin should be trained in the following skills

- a) PHP programming.
- b) MYSQLQ Database Management.
- c) Linux server Management
- d) Web design skills

7.2. Hardware Specifications

The system shall best run with the following hardware specifications

- ▶ Processor family: Intel® Celeron®, Intel® Pentium®, Intel® Xeon® E3-1200v2
- ▶ Product family: Intel® Core™ i3
- ▶ Number of processors: 1
- ▶ Processor cache: 2MB L3, 3MB L3
- ▶ Processor speed: 2.5GHz
- ▶ Power supply type: (1) 1 built-in power supply Multi-output, Expansion slots
- ▶ Memory, maximum: 16GB, DDR3 UDIMM

Appendix

1. Recommended data collection tools

a) Social economic survey



HOUSEHOLD SURVEY
QNN_MABIRA CFR_RV

b) Ecological survey



Ecological
survey.docx

c)