PURDUE UNIVERSITY

CAPSTONE/SENIOR DESIGN EXPERIENCE 2017

Master Plan Demonstration Farm
Lake Bosomtwe, Ghana

Agricultural & Biological ENGINEERING

Grace Baldwin, (ENRE)

Statement of the Problem & Background

- The Lake Bosomtwe district has been subjected to overfishing and environmental degradation.
- The improper application of fertilizers and overfishing has led to the depletion of fish in the Lake.
- Residents of the area have transitioned to farming as their main vocation because fishing is no longer an option.
- 97.6% of the people living in Lake Bosomtwe are involved in rural crop farming.
- These farmers have little to no experience in areas such as crop rotation, fertilizer use, and erosion control.
- The Average household income is $100
- An extension demonstration farm is needed to demonstrate improved agricultural practices to farmers that works alongside local extension.

Objective

- To develop a master plan demonstration farm document, which will be used to create an extension demonstration farm.
- The farm will serve as a demonstration to the Lake Bosomtwe community of improved agricultural methods.
- Local agriculture extension officers will participate in the use of the farm.
- The Amakom Methodist Clinic currently manages the farm land and will continue to oversee the management of it.
- Proceeds produced from the farm will go back to further expand the activities of the Clinic.

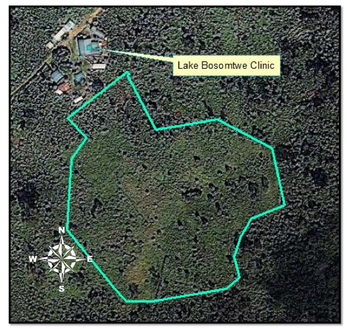
Global/Societal Impact

Lake Bosomtwe Community

- Visual example of improved methods
- Increase yield potential
- Improve house hold incomes
- Increase Food Security

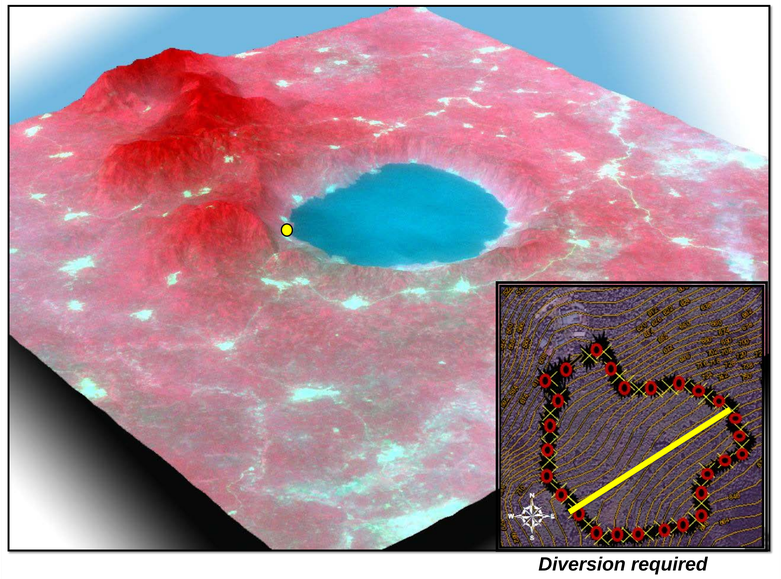
Amakom Methodist Clinic

- Provide an additional source of income
- Increase the number of patients assisted
- Partnership development



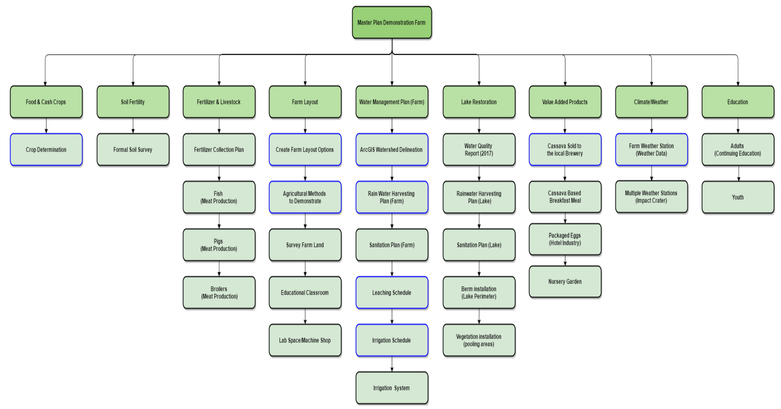
Design Constraints

- Salt Tolerant Crops
- Plant optimization
- Low Cost
- Culturally Appropriate
- Value Added
- Water quality
- Access/Season
- Land Ownership



Diversion required

Alternative Solutions



Crop Criteria

- EC (1-8 ds/m or higher)
- Wide Temperature Range
- pH (3.3-9.5)
- Crop Water Requirement
- Local Variety
- Value Added
- Creative

Methods Criteria

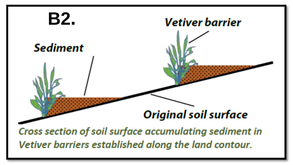
- Decrease runoff
- Increase infiltration
- Increase O.M.
- Promoted by local Extension
- Practice adapted to varying climates
- Tolerant of extreme soil conditions
- Slope protection

Final Solution

Vetiver, sisal, and yucca fence and trench for goat and pig exclusion, C.A.R.

A. Living Hedge

- Vetiver
- Yucca



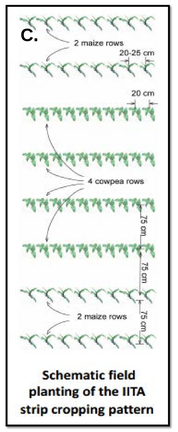
Cross section of soil surface accumulating sediment in Vetiver barriers established along the land contour.

B. Terracing

- 10 year, 24 hour event 3.3 in
- Planting along natural contour
- Maximum vertical width 23.7 ft
- Maximum horizontal length 89.4 ft

C. Spacing/Crop Rotation

- Maize, bean, cassava cropping pattern
- 2:4:2 Planting along natural contour



Schematic field planting of the IITA strip cropping pattern

Project Budget

Largest Costs were seed at $54 per acre and the weather station at approximately $500

Item	Cost
Ambient Weather WS-1200 Observer	247.99
Shipping (Weather Station)	27.14
Charge controller	24.99
Shovels	100
Program Fees	365
Baggage cost	195
Seed (8 acres worth of seed @$54 per bag per acre)	540
Total (USD):	1,500

Moving Forward

- First Phase completed
- Travel to Ghana to conduct soil survey, establish baseline, and plant seed.
- Continuation of the project for Graduate school at Purdue University in Agricultural & Biological Engineering

Sponsor:
The Methodist Church Ghana, Kumasi Diocese

Global Resource Connections

Resources:
Dr. Richard Stroshine
Dr. Richard Grant
Mr. Larry Theller
Dr. Cam Gongwer M.D.
Mr. Hilton Terry Kesse P.A.

Sources:
1. UNESCO
2. Dr. Carlos Roberto de Souza Filho
3. ECHO
4. USDA-NRCS
5. Ghana Statistical Serve

Technical Advisor:
Dr. Margaret Gitau
Prof. Stan Harlow

Instructors:
Dr. Bob Stwalley
Dr. Bernie Engel

PURDUE AGRICULTURE
PURDUE UNIVERSITY

PURDUE ENGINEERING
Think impact.