



**UC Davis Horticulture Collaborative Research Support Program
Exploratory Projects
Final Performance Report**

Title of Project *Geographic information accessibility for improving horticultural-based income generation in the Mzimba district of Malawi*

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Part I - Performance Indicators – see attached

Part II - Monitoring and Evaluation Plan Matrix

Objective #1: GIS base mapping and database development				
Activities	Outcomes	Measure of success	Documentation and impacts of success	Progress to date
<ul style="list-style-type: none"> Acquisition of satellite imagery for study area – approximately 50 km² region of Embangweni Acquisition of pre-existing GIS data layers from private and public sources New GIS spatial and attribute data development using on-screen digitizing and satellite imagery, GPS field data collection integration, and with collaborative communication between BSC and WRM partners about features to map and attribute information for those features 	<ul style="list-style-type: none"> Satellite imagery acquired Data layers acquired GIS and GPS data developed 	<ul style="list-style-type: none"> GIS base mapping and database developed 	<ul style="list-style-type: none"> Monthly reports 	<ul style="list-style-type: none"> Monthly reports <ul style="list-style-type: none"> MzimbaReport2011_Jan.pdf MzimbaReport2011_Feb.pdf MzimbaReport2011_Mar.pdf MzimbaReport2011_Apr.pdf MzimbaReport2011_May.pdf MzimbaReport2011_Jun.pdf Acquisition of topographic maps and satellite imagery – imagery datasets are highlighted in MzimbaReport2011_Mar.pdf <ul style="list-style-type: none"> IKONOS (50 km²) ALOS (full area) TM (full area) Acquisition of pre-existing data layers from Malawian Survey Office. Development of a soil texture map and shapefile in collaboration w H. Kaunda. These layers are highlighted in MzimbaReport2011_Jan.pdf GPS data points collected and new GIS spatial data developed. These new data sets are highlighted in MzimbaReport2011_Mar.pdf Survey to collect farmer data completed with IRB approval <ul style="list-style-type: none"> Survey.doc, Malawi IRB_Application.doc, IRBapproval.pdf Monthly anemometer readings are being collected (anemometer_data file)
Objective #2: GIS/GPS skill training				

Activities	Outcomes	Measure of success	Documentation of success	Progress to date
<ul style="list-style-type: none"> Develop training materials specific to WRM horticulture programs and goals for the Embangweni region Conduction of two training sessions (January and June 2011) for WRM staff focused on GIS database development (January) and GIS data analysis (June) Ongoing collaborative communication between BSC and WRM partners before, during and after training sessions 	<ul style="list-style-type: none"> Training materials developed Staff trained WRM partners and BSC staff jointly working 	<ul style="list-style-type: none"> WRM staff trained in GIS/GPS skills 	<ul style="list-style-type: none"> Monthly reports 	<ul style="list-style-type: none"> Monthly reports <ul style="list-style-type: none"> MzimbaReport2011_Jan.pdf MzimbaReport2011_Feb.pdf MzimbaReport2011_Mar.pdf MzimbaReport2011_Apr.pdf MzimbaReport2011_May.pdf MzimbaReport2011_Jun.pdf January training <ul style="list-style-type: none"> Geographic information systems demonstration (ZAINÉ) GPS overview (GPS.ppt) Anemometer download (anemometer_tutorial.doc) July training – GIS training manual Collaborative communication between BSU and WR partners about features to map, and information for those features. A documented example of this communication can be seen in gpspoints_questions.ppt
Objective #3: Integration of geographic data and analyses in current WRM horticulture projects and future CRSP proposal				
Activities	Outcomes	Measure of success	Documentation of success	Progress to date
<ul style="list-style-type: none"> Preliminary GIS data analyses and reporting Continued analyses of GIS datasets will be proposed in a CRSP Pilot Project (fall 2011) that will continue to integrate GIS with horticultural decision-making and activities with continued focus on farmers'/WRM input of and farmers'/WRM data dissemination in determining best locations for future WRM horticultural programming in the areas of crop production, irrigation farming and agribusiness 	<ul style="list-style-type: none"> GIS data analyzed and reported 	<ul style="list-style-type: none"> GIS/GPS data analysis integrated in WRM current horticulture projects and future CRSP 	<ul style="list-style-type: none"> Monthly reports 	<ul style="list-style-type: none"> Monthly reports <ul style="list-style-type: none"> MzimbaReport2011_Jan.pdf MzimbaReport2011_Feb.pdf MzimbaReport2011_Mar.pdf MzimbaReport2011_Apr.pdf MzimbaReport2011_May.pdf MzimbaReport2011_Jun.pdf Irrigable area analysis (overview in MzimbaReport2011_Mar.pdf)

Part III. Narrative

Work during the first quarter was focused on: 1) contractual activities, 2) preliminary data collection, and 3) trip preparation and equipment acquisition (trip for January 2011).

Second quarter activities included the first trip in January which included:

- District trip
- Area specialist visits
- Training and demonstrations
- Field data collection protocol and survey design
- Anemometer installation

- Soil texture map

We were also given IRB approval for our survey (IRB #2011090) on February 11. The second quarter work also included:

- First anemometer reading data downloaded
- World Relief meetings with EPA
- Malawi Survey Office shape files input into the GIS
- UMass Amherst Wind Energy Center input on calculation of wind speed efficiency
- Imagery acquisition
- ASTER DEM and irrigation viewshed mapping

During the third quarter, we developed our first GIS analyses with the data collected including

- Village locations using a location-allocation approach.
- **Maximize coverage** places facilities so that as many demand points as possible are allocated to solution facilities within the impedance cutoff. In this case an impedance cutoff of 10 km was used.
- **Minimize facilities** was used so that as many demand points as possible were allocated to solution facilities within the 10 km. In addition, the number of facilities required to cover the village points is minimized. Finally, **maximize attendance** shows a solution such that as much demand weight as possible is allocated to facilities.

Both the PI and Bridgewater State University student attended the annual Association of American Geographers to present preliminary work in a session at the Association of American Geographers meeting in April.

Other highlights from the third quarter included:

- Attendance at the Hort CRSP Spring 2011 workshop
- First survey data - We received the first 100 farmer surveys from the field in April. The data will be used in development of training materials for the June trip to Mzimba.
- Survey data - By mid-May, the total number of farmer surveys collected was 330. The data reveal information on household type, income, landuse, and agricultural support services used and needed by the Mzimba farmers. The data were collected from villages in the eastern portion of Mzukuzuku TA
- New GIS data layers - Kabwandire market GPS locations
- Survey database building - The data from the farmer surveys were coded and organized into 13 relational tables which can be joined to their spatial location using a common item called "Survey_ID". The tables were stored as Excel files and also as .dbf files for joining in Quantum GIS. Metadata attribute tables were written that allow users to look up attribute definition and value codes.
- Training manual development - A training manual for using Quantum GIS and the survey database was developed for training World Relief staff in June. The manual exercises are geared to both introduce the user to GIS and to help understand the relationship and utility of the survey data in planning. Each exercise culminated in a finished-product map (images to the left) that was exported to a pdf format.
- Specifications for the solar irrigation pump demonstrated during the April Hort CRSP workshop were acquired from Michael Reid. The parts for assembling 2 of the pumps were purchased to test in Mzimba during the June trip.
- Blogspot creation <http://www.sustainingmalawi.blogspot.com/>

- June trip
 - Solar irrigation pump installation
 - The first irrigation pump was presented to farmers who were collectively working on an irrigation scheme along a stretch of the Kakoma River.
 - Collaboration meetings
 - During the June trip, the BSU and WR team met with potential collaborators including:
 - Mr. P. Chikapa, the Assistant District Agriculture Development Officer in Mzimba
 - Mr. Mkinda, the Mbawa Extension Planning Area (EPA) Team Leader
 - Dr. Benesi, Government Plant Breeder at the Chitedze Agricultural Research Station in Lilongwe
 - The technical assistants of Dr. Chipungu at the Bvumbwe Agricultural Research Station in Bvumbwe
 - Melody McNeil – Agricultural Officer at USAID Malawi Mission
 - Faculty from Bunda College of Agriculture:
 - Dr. Eric Chilembwe, Department of Horticulture and Forestry
 - Dr. Joseph Dzanja, Agribusiness Management
 - Dr. Kingsley Masamba, Food Science
 - GIS training
 - World Relief Staff were trained during the June trip in how to use GIS. The training manuals led participants through the process of using their survey data to answer questions about the location of special demographic groups (i.e. women-headed households with orphans) and to answer questions about spatial relationships between natural and man-made features of interest (i.e. road buffers, proximity to irrigation water, proximity to storage facilities, etc.). After completion of the three-day course, participants were given a certificate of completion.
 - Weather station
 - A HOBO relative humidity/temperature and a precipitation gauge were added to the World Relief Office weather station.

In September, during the final quarter, Gibson Nkanaunena met the new Head of Horticulture Department at Mzimba District Agricultural Development Office, Mr Harvey Horrea. He replaced Mr Cosmas Chikapa, whom we met in June and has moved to another district. Their discussion included the current exploratory project, and the fact that it is winding down end September 2011. When asked about plans that DADO Mzimba, Harvey highlighted the following:

- Current trend is harmonized demonstrations in specific areas that should at least combine technologies from all DADO departments (land resource, horticulture, legumes, field crops, livestock)
- Stakeholders including NGOs, must indicate their plans for the year that must be taken into account in DADO plans. Stakeholders can provide supplies in case DADO does not have funds
- Demonstrations shall be done on-farm and at EPA offices
- Agriculture Sector-Wide Approach (ASWAP) has demonstrations that will be mounted across the district. This program is in its 3rd year and is research-led, with main plot of 7 trials on the Lead-farmers farm, and Baby plots on Follower-farmers' farms
- There is formation of Farmer Clusters (Associations) for those growing the same crops together

- Ministry of Education is collaborating with Ministry of Agriculture on a School Health and Nutrition program. This will include orchards and gardens at Primary schools (fruits, vegetables)
- Field Days are a must and NGOs can also sponsor some of these. Normally there are three Field Days (at vegetative stage, fruiting stage and maturity)
- There is need for strong collaboration with MoA frontline staff, although others demand sitting/facilitation allowances from NGOs (this leads to them being sidelined)

Gibson Nkanaunena also met with World Relief Malawi Staff at Mzimba office (Embangweni)

- Data collection is progressing right now 590 questionnaires done.
- Field office can do 140 more by end September.
- Weather station doing ok. Only problem is batteries, need rechargeable ones since the ones being used run out in 2 weeks
- We discussed Mzoma station, thinking we should go and remove the tower from there

The field promoters who were collecting survey data, Lauren and Raymon, will officially complete duties on 30th September 2011.

Part IV - Training

1. Did you bring trainees to the United States?

- No

2. Did you bring trainees from their country of residence to another country (not the United States) for training (i.e. you brought trainees from Mexico to Costa Rica for a workshop)?

- No

3. Did you train people in their own country of residence?

- Yes

Program Name	GIS training
Start Date	June 21, 2011
End Date	June 23, 2011
Method of Training (Traditional Learning or Distance Learning)	Traditional
Training Type ¹ (select one from list at bottom of table (please note that some are not applicable to our projects))	Technical Program - On-the-job Training
Short Description of Activity	Basic GIS training with focus on how to use survey data in Quantum GIS
Short Description of Objective	Train WR staff on how to use GIS in planning
Training Provider (typically your university)	Bridgewater State University
Total Cost of Instruction (room, books, equipment, registration fees, handouts, etc.)	--
Total Participant Expenses (per diem meals, hotel, etc.)	--
Total Travel Expenses (airfare, taxis, etc.)	Part of overall June trip costs
Did this project have non-USAID funding sources? If yes, indicate how much and who provided funding.	No
Describe trainee selection process	World Relief Country and District employees (field

	promoters) and their supervisors including project Co-Investigator (H. Kaunda) and Damaseko Nyirongo
Number of Males Trained	6
Number of Females Trained	0

Part V - Post Evaluation Questionnaire

1. If your project was visited 12 months from the end of the project, what would you want to see as the residual of your project?

- evidence of the GIS data and software by World Relief staff
- evidence how spatial relationships (between villages, existing schemes, water resources, markets, etc.) are a factor in decision-making for projects and work prioritization in the Mzimba District by World Relief staff
- expanded use of the solar irrigation pumps

2. Please leave any comments for the Horticulture CRSP team that you want. Feedback anything including project management/administration, financial management, or horticultural development is welcome.

3. Please list the publications that have been generated as a part of this project effort (include those in process).

None as of yet