

DRAFT  
Final Report  
Fundamentals of GIS and Remote Sensing Training Course  
September 26 - October 7, 1996  
Bunda College

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Introduction

The first of a series of geographic information systems trainings was conducted at Bunda College, Malawi from September 26 to October 7, 1996. This introductory two week training focused on the fundamentals of GIS and image processing primarily through the use of the IDRISI software. An intermediate and advanced training to be held in January and March 1997 respectively will build from this course.

The training combined theoretical knowledge with practical hands-on computer work, emphasizing Malawi specific applications (see appendix 1 for syllabus). Future trainings will further develop GIS applications especially for the purpose of environmental monitoring. This training was the first in a series that intends to build GIS teaching capacity within Malawi universities and ministries.

A total of fifteen participants from a number of different Ministries and universities attended the entire training. The participants included:

1. Steven Elias Taulo - University of Malawi, Polytechnic
2. Joseph B. Jonazi - University of Malawi, Bunda College
3. Mesheck Kapila - Department of Land Resources and Conservation, Land husbandry Training Centre, Zomba
4. Benson Phiri - USAID, Lilongwe
5. Patrick Machika - Ministry of Agriculture, Lilongwe
6. Muwuso Kennedy Chawinga - Department of Surveys, Blantyre
7. James Wanyakhondowe B. Chimphamba - ADD, Blantyre
8. Jackson James Nakutepa - Department of Surveys, Blantyre
9. John James Mussa - Land Resources and Conservation Branch, ADD, Shire Valley
10. McArd Joseph Mlotha - Forestry Planning and Mapping Unit, Lilongwe
11. Nicholas Dennis Mwafulirwa - Meteorological Department, Lumbadzi
12. Symon Mkwinda - Land Resources and Conservation Branch, ADD, Kasungu
13. Samuel Mathew Chilombe - Meteorological Department, Chileka
14. Nicholas Stans Shawa - University of Malawi, Bunda College
15. Zachari M. Kasomekera - University of Malawi, Bunda College

### Duties of the technical advisors

Two technical advisors facilitated the training: Nicholas Haan and Mathilde Snel. Their duties prior and during the training were as follows:

1. To prepare data (i.e. training documents, exercises, and relevant training materials) for the training to be left in-country as part of the training process.
2. To facilitated the two week introductory training in GIS and image processing.

In addition Mathilde Snel will conduct a number of follow up activities to facilitate the use of GIS in the respective departments.

These functions have been outlined in detail in the scope of work of both technical advisors (Appendix 2).

### Accomplishments of the Technical Advisors

Prior to the training both technical advisors prepared a training syllabus, training documents, exercises, and other relevant training materials. The ten day training course syllabus was formulated such that participants would receive an introduction to the basics on GIS and image processing. While future trainings (i.e. the intermediate an advanced trainings scheduled for next year) will concentrate more specifically on customized exercises, the goal of this training was to introduce participants to the basics of GIS and image processing and the software routines required to facilitate GIS use. While IDRISI was the major GIS platform used, other GIS software such as ArcView was demonstrated. A majority of the labs prepared for the training consisted of Malawi imagery or other relevant data. A training workbook was prepared for participants consisting of handouts on GIS, image processing, import and export routines, and a glossary. Furthermore, class notes, review exercises, and take home exercises for labs were prepared and copies were left with each participant.

During the training the technical advisors taught the labs and lectures as indicated in the course syllabus. At the beginning of the training participants were given a training workbook. At the end of each day, participants were given that day's lab notes and encouraged to review these in the evening. Furthermore, review exercises for the day's course content were distributed. Time during some morning sessions was allocated for review exercises.

At the end of the training participants were given a number of exercises to be conducted in their respective offices. Participants who have the necessary hardware and software have been asked to complete these exercises and send them to the technical advisors prior to the intermediate training (e.g. this includes participants at the Forestry Department, MET, Department of Surveys, and University of Malawi, Bunda College). Participants who do not have the required hardware and software have been encouraged, though not required, to complete their exercises (University

of Malawi, Polytechnic, USAID, Kasungu ADD, Shire Valley ADD, Blantyre ADD, Ministry of Agriculture Lilongwe, and Land Husbandry Training Centre, Zomba). At the end of the training participants were also asked to evaluate the training course (Appendix 3) and were given a certificate of completion for the first part of three courses in GIS and image processing (Appendix 4).

Arrangements were made with participants to transfer the training dataset and discuss hardware and software issues at the Surveys department, MET, and Forestry Department. Similar arrangements will need to be made with the University of Malawi, Polytechnic, USAID, Kasungu ADD, Shire Valley ADD, Blatyre ADD, Ministry of Agriculture Lilongwe, and Land Husbandry Training Centre, Zomba once they have hardware and software.

### Recommendations

A number of recommendations may be made based on experiences of the introductory training course. First, the two week duration of the introductory training proved to be especially appropriate. The same training has in the past been instructed during an intense one week course. It was the feeling of both technical assistants that participants gained a much clearer understanding of the course content given the slower pace. Also, it is recommended that hardware and software is transferred to those departments that do not have the necessary hardware and software to use GIS in their work. In particular the following departments are in need of hardware and software assistance: University of Malawi, Polytechnic, USAID, Kasungu ADD, Shire Valley ADD, Blatyre ADD, Ministry of Agriculture Lilongwe, and Land Husbandry Training Centre, Zomba. A significant issue not directly relating to but affecting the training was the logistic issue of per diems and accommodation (see appendix 5). Unfortunately the participants felt this was such a serious problem that they boycotted classes for one day. Two participants left the training half way through due to the logistical concerns. It is strongly recommended that participants are clearly notified prior to the training the per diem amount. Also it will be important to appropriately articulate the logic of reaching this per diem amount. While accommodation might not have been suitable for all participants, some participants expressed that the convenience of having a computer lab accessible in the evening made the moderate accommodation worthwhile. It is the feeling of both technical advisors that having participants stay at Bunda college, however modest the accommodation, did allow participants to focus on the training.

The participants completed a course evaluation (appendix 7). The participants were asked to rate the overall effectiveness of the training on a scale of 1 (very poor) to 5 (excellent). The average rating was 4.1. Participants also gave a number of recommendations in their course evaluation relating to both the introductory and future trainings. Participants expressed that they had learned a significant amount of material and felt that they had a much better understanding of GIS and how they might use it in their work. Participants recommended that in the intermediate training more labs focus on: 1) data import/export, 2) database management, and 3) project specific activities.

## Future Activities

The January intermediate training will apply introductory GIS knowledge towards specific environmental monitoring activities. Given the participants' suggestion that the training focus on more specific project activities and environmental monitoring, it is recommended that both the intermediate and advanced trainings focus more specifically on environmental monitoring activities in the Shire Catchment area. As indicated in a draft by the Ministry of Research and Environmental Affairs (MOREA) on developing an Environmental Information System (EIS) for Malawi, the use of one catchment to serve as a prototype for future environmental impact statements will begin the development of an effective environmental management and reporting capability throughout Malawi. Seven areas of priority environmental concerns have been identified by MOREA for the Shire Catchment area: 1) soil degradation, 2) deforestation, 3) water resources degradation and depletion, 4) threats to fisheries and other biological resources, 5) human habitat degradation, 6) air pollution, and 7) climate change. Both the intermediate and advanced trainings will focus on training participants on methods by which priority environmental concerns may be more effectively monitored and managed through the use of GIS.

The training activities in January will focus on developing skills for specific GIS applications. In particular, the training will focus on skills for land use mapping and explore the use of GIS for soil erosion modeling. Satellite imagery is currently available for land use mapping of the Shire Catchment area, and will be used to develop a land use map of the region by March/April. Supervised and unsupervised classification techniques, along with ground truthing and accuracy assessment activities will be strongly emphasized as part of this exercise. This activity will occur in conjunction with appropriate ministries as a follow-up activity to the January training. This land use map will provide base information to conduct further GIS applications as noted above.

During the advanced GIS training it is proposed that exercises on more advanced environmental monitoring are conducted. Again, the training will be intimately linked with the environmental monitoring of the Shire Catchment area. Monitoring land cover change over time, monitoring soil erosion degradation over time, and using NDVI data to detect climate changes in the Shire Catchment area are possible environmental monitoring exercises. In addition, the advanced training will also focus on "training of trainers". Participants will begin to develop methodologies for teaching GIS in the universities and/or ministries. The advanced training will be followed by a number of follow up activities to the participating ministries and departments such that hardware and software concerns may be addressed. A follow up activity may include a more thorough intensive field visit as similarly proposed after the intermediate training. During the follow-up activities, all persons familiar with GIS (including past training participants) will be invited to work out appropriate action plans using GIS for environmental monitoring.

## Concluding Remarks

This introductory GIS course proved to be of great need as expressed by the participants. Seeing the usefulness of GIS in his work, one participant stated, "...we should have started this two years

ago...think about where we would be now!". The trainers thoroughly enjoyed working with all the participants and look forward to future activities. In addition, we would like to thank the Ministry of Research and Environmental Affairs and the Agricultural Policy and Research Unit at Bunda College for their support.