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GEOGRAPHICAL INFORMATION SYSTEMS (GIS) DATABASE FOR RUMA WOMEN DEVELOPMENT GROUP

By

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A project report submitted to the Department of Geospatial and Space Technology in partial fulfilment of the requirements for the award of the degree of:

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Abstract

Geographical Information systems (GIS) are becoming a powerful tool for use in the management of resources within the Community Based Organizations (CBO's). Ruma Women Development Group (RWDG) is a CBO which manages its resources using the manual methods of filing and storing reports in cabinets.

The purpose of this project is to develop a database for RWDG with an aim of replacing the analogue methods used in managing the resources available for service delivery in the organization with the GIS based technology which is more user friendly. The project entails the production of digital maps of the study area and the development of a GIS database right from data capture through data manipulation to data output. It also outlines possible analyses samples in tabular and graphical format.

Spatial information was obtained from existing topographical maps, satellite images and field survey using a handheld GPS. Non-spatial data was obtained from the CBO's centre of operation. Both datasets were compiled and used to create a GIS database to be implemented by the group. The soft-wares used for creating the database were ArcGIS, ArcView for spatial data input, and Access and Excel software for attribute input.

The results and data analysis samples obtained from the database demonstrates that if the CBO implements the GIS database developed, it will have an easy task in managing the available resources in terms of time management within the organization and the practical visualization of spatial distribution of the CBO's activities.

Declaration

Development of a GIS Database System

FOR

Ruma Women Development Group

I declare that this is my original work and has not been submitted to any other University for academic credit.

Sign..... Date.....15/6/2009.....

Supervisor

Gordon Wayumba

Sign..... Date.....16/06/2009.....

Dedication

This project is dedicated to my family members for bearing with my absence during the research and preparation period of this document

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Acknowledgement

This project is based on a research for creating and implementing a GIS database for RWGD, a Community Based Organization in Madiany Division. The database is to be used to enhance the management of the CBO's Resources. The tasks undertaken were quite challenging and made a lot of impact in the understanding of the capability of a GIS database using the ArcMAP software. With respect to the challenges that came about during the research and design of the database, I am grateful to my supervisor Mr. Gordon Wayumba for the time he dedicated to ensure that the project was taking course in the right direction and the advice and help he granted that led to the improvement of the final report. I also wish to acknowledge the course coordinator Dr. John B.K. Kiema for the support offered in the construction of project proposals and Mr. Albert Kenyani for the advice given on project management during his lectures.

I wish to acknowledge the financial support extended to me by the Kenya Polytechnic University College and especially extend my appreciation to the Principal Mr. Gabriel M. Muthwale for facilitating the funding in good time making it possible for data to be collected as was scheduled.

I wish to appreciate my colleagues who were always willing to assist with the project at any time of the day, especially Mr. Patrick Kimeu and Mr. Dismas Lusichi who worked with me up to late hours of the evenings, and Mr. Mishael Motuka who kept on encouraging me when I was in -stressful situations.

Last but not least, I am grateful to the RWDG, for readily availing the information and data required for the generation of the database.

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List of Abbreviations

ARV	Antiretroviral
ASRH	Adolescents Sexual Reproductive Health
ATM	Automated Teller Machine
BIC	Basic Inventory Control
CBO	Community Based Organization
E-R	Entity Relationship
FBAOSP	Family Based AIDS Orphan Support Programme
GIS	Geographic Information Systems
GPS	Global Positioning Systems
HBC	Home Based Care
JICA	Japanese International Cooperation Agency
PARMS	Program and Resource Management Systems
PLWH/A	People Living With HIV/AIDS
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute
PPGIS	Public Participation Geographical Information Systems
RCMRD	Regional Centre for Mapping and Resource Development
RWDG	Ruma Women development Group
SQL	Standard Query Language
UNEP	United Nations Environmental Programme
URA	User Requirement Analysis
UTM	Universal Transverse Mercater
VCT	Voluntary Counselling & Testing

CHAPTER ONE

1.1 Introduction

In Organizational studies, Resource Management is the efficient and effective deployment of an organization's resources when needed. Such resources may include financial resources, inventory, human resources, production resources or Information Technology (IT) (PMBOK[1], 2004)

To manage resources effectively, two sets of resource activities need to be considered:

(i) **Information resources** - which focus on the establishment of processes and systems to gather, organize, summarize and package information.

(ii) **Knowledge resources** – which focus on processes and people involved in creating, sharing and leveraging knowledge among scientists, communities and policy makers.

Resource Management is a key element to activity resource estimation and projecting human resource management. Both are essential components of a comprehensive project management plan to execute and monitor a project successfully. Resource allocation is the assignment of available resources in an economic way and part of resource management.

Traditionally, resources have been managed with manual methods which are tedious especially when dealing with enormous amount of data. With the advent of computer technology, the Geographical Information Systems (GIS) is gradually becoming the standard tool for planning, monitoring and analyses of resources within the formal and informal organizations. GIS is a powerful tool for capturing, storing, checking, integrating, manipulating, analyzing and displaying data about geo-referenced objects. It consists of several integrated sub-systems that help convert geographic data into useful information which are important to planners and decision makers in various disciplines.

[1] PMBOK; Project Management Body of Knowledge

The use of GIS in resource management vary from simple map analysis such as measuring distances and calculating areas, to a more sophisticated modelling procedures that seek to stimulate natural processes. In addition, GIS can make a huge variety of data available in understandable form to non-experts in decision making and most important, for information exchange among many institutions working with spatial datasets. Mapping, monitoring, spatial analysis and decision support are the main fields where GIS is used at a wide range of scales and location. Spatial features are stored in a geo-referenced coordinate system (latitude/longitude, state plane, UTM, etc.), which references a particular place on the earth. Descriptive attributes in tabular form are associated with spatial features. Spatial data and associated attributes in the same coordinate system can then be layered together for mapping and analysis.

GIS data, once digitized and edited, are stored in a database to be used for scientific investigations, resource management, and development planning. A database is a pool of integrated and structured data, which is a model of reality, and from which relevant facts may be retrieved and processed to provide information for users.

GIS has been used as a management tool for various projects encompassing such disciplines as Watershed Management, Wetlands Management, Facilities Management, and Asset Management amongst others. For example, in Wetlands Management, GIS has been used in wasteland and wetland inventory (Karanjit, 1998). In facilities management, GIS has been used in conjunction with remote sensing to build inventory of existing urban features, settlements, railway and road traffic, amongst others (Sebastian, et al., 2000) while in utility management, Austin Energy of Austin, Texas has used GIS applications to offer what may be the most comprehensive residential and commercial energy-efficiency program that serves 360,000 customers and a population of more than 800,000 within the city of Austin and surrounding countries. (Sipes, 2006)

GIS has also been used to map locations of different types non profit organisations and resources (CBO's) within charter schools, their clusters and their neighbourhoods. In

addition it has been used to identify vibrant non-profit neighbourhoods for new charter schools (Charisse, 2006).

GIS has also been used in Public Participation Geographic Information Systems (PPGIS) to bring the academic practices of GIS and mapping to the local level in order to promote knowledge production and facilitate empowerment and inclusion of marginalized populations, who have little voice in the public arena, through geographic technology education and participation (Craig et al., 2002)

1.2 History of Ruma Women Development Group

1.2.1 Background

Ruma Women Development Group (RWDG) is a community based Organization operating in Madiany Division, Rarieda District, Nyanza Province; dealing with various types of resources allocations

The group was formed in 1992 with the aim of improving household income level of women in the community. Soon afterwards, the initiators realized that most of the women the group was trying to uplift were widowed from HIV/AIDS related diseases. This fact was hindering the achievements of the group's objectives, hence the fight against HIV/AIDS programmes were incorporated within their development activities. These programmes became economically over-burdening, creating a need to seek for assistance from the outside world.

The first support came from the German Development Service in 1994 addressed the Family Based AIDS Orphan Support Programme (FBAOSP). This programme was later boosted by the Terre-des-homes from The Netherlands who joined the German donor support in the year 2000 with the aim of improving social welfare of the orphans in Madiany Division by facilitating wholesome integration in the community.

In addition to orphan support programme the RWDG project is supporting needy guardians to the orphaned children for the purpose of increasing their morale when taking care of orphans. The project is also capable of supporting other People Living with HIV/AIDS (PLWH/A) with less strain. The extension of support to needy guardians led to the creation of the Home Based Care programme (HBC).

The HBC started in 1996 by visitation to a few homes which had patients with full blown HIV symptoms, but currently the organization is over seeing over a hundred clients by providing HBC services and nutritious food supplements. The clients are also supplied with HBC kits including drugs for opportunistic diseases and other health facilities as may be necessary. The HBC group also attend group therapy at the RWDG centre twice a month to uplift their spirits and to be trained on light domestic activities that would alleviate their livelihood. Only registered clients are attended to in full.

In addressing the food security, among the PLWH/A, the HBC clients are issued with high quality seeds for higher agricultural yields and also trained on local poultry keeping for domestic and commercial purposes.

In 2000, RWDG started the Adolescents' Sexual Reproductive Health (ASRH) programme to address the high prevalence of sexually transmitted diseases, including HIV/AIDS and early pregnancies among the youth in Madiany Division. This undertaking was initiated by increasing the knowledge and awareness of the youth's sexual development so as to reduce the risk behaviour. The programme is conducted through youth clubs. A number of youths have been trained and are now conducting peer learning. The youth clubs are also involved in income generating activities such as tree nursery, fishing, typesetting and printing for their sustainability.

In 2006, a youth friendly Voluntary Counselling and Testing (VCT) was established at the centre with the assistance of the Ministry of Health and The Netherlands Terre-des-homes, in providing the facilities to be used, and economic assistance as well. Numerous outreaches are being conducted at market centres and at social gatherings. Through the

awareness creation, a substantial number of people are willing to know their status, thus visit the VCT centre. Those who test positive go through further counselling on how to live positively with HIV/AIDS, and are provided with the antiretroviral (ARV) drugs so as to increase their immunity level. At the moment over a hundred people visit the VCT centre every month.

1.2.2 Education Programmes

In promoting education to all, the group through the JICA[2], has supported the reconstruction of Ruma Primary School, Rarieda Mixed Secondary School and Migowa Mixed Secondary. These schools are within walking distance from the project centre, and from many homes in the surrounding. The project is facilitating education to the orphans by supporting them with school fees and other required necessities up to form IV level. Students who have dropped out of school at the standard eight levels are absorbed into the vocational training schools and supported financially to complete their courses within a maximum period of four years. Successful vocational trainees are given a start-up capital to start enterprise business.

An informal training wing has been established at the RWGD centre for carpentry, tailoring and dressmaking, to reduce the high expenditure used when the students are taken to outside training institutes. Other orphans are also supported in various youth polytechnics within the province.

1.2.3 Feeding Programme

To motivate the school going orphaned children to improve their interest in schooling, a feeding programme under the FBAOSP is in place to cater for lunches to needy children during school days, while breakfast and lunches are provided to all registered children at the project centre over the holidays. Needy guardians are also motivated to take care of

[2] JICA is an acronym for Japanese International Cooperation Agency

the orphans by supporting the guardians with food supplements, cooking fat, sugar, tea leaves and soap.

The broad objective of RWDG is to empower women to take charge of their own future through active participation in decision making and implementation of programmes that would uplift their socio-economic lives. The group has a wide spectrum of activities with different categories of resources. These resources include finance, human (personnel), natural resources, production; inventory etc. dependence on traditional approaches for management of recourses is expensive and cumbersome. GIS has been proposed as an alternative tool of management and in this study, it is intended to introduce GIS to RWDG as an ideal tool for the planning, monitoring and analyzing the results and to make sure that their project is running within schedule.

1.3 Problem statement

From the RWDG background, it is evident that there are various types of resources managed by the group. The group has been using analogue methods to manage these heterogeneous resources with complex relationship whereby too much time is used to accomplish the requirements. The work and cabinet filing requires more time and space for data manipulation and storage respectively.

The programmes in the project centre include:-

i. Family Based AIDS Orphan Support Programme (FBAOSP)
ii. Home Based Care (HBC)
iii. Adolescents Sexual Reproductive Health (ASRH)
iv. Youth Friendly – Voluntary Counselling and Testing (VCT)

These projects are interrelated and run concurrently with quite substantial amount of financial resources allocated to each project. It is a challenging task to account for all the finances and other assets associated with the project if the datasets are not well

documented. Other resources to be taken into account are the assets owned by the CBO in terms of physical facilities and utilities. These are recorded and filed haphazardly causing delays in retrieval when needed.

The human resources of different categories are present at the centre, with most of their details kept in files without proper back-up, and can be destroyed easily in-case of tragedy or can be lost during theft or fire breakout. In order to overcome these problems, a proper management system with all the datasets in one common place is a necessity, hence the need of a GIS database system for the group.

The problem however, is that, currently there is no integrated methodology that can handle all these assets holistically. As a consequence, most of the data are scattered and kept in places which are not cross-referenced. This occasionally ends in loss of vital data. For this reason, an effective and up-to-date GIS database needs to be developed.

Common problems usually experienced by CBOs to manage their projects include the following factors:

- Datasets are haphazardly stored, most of it being incomplete and outdated.
- A process of data maintenance is slow, cumbersome and complex.
- Thousands of paperwork within the organizations.
- Complaints by clients/ stakeholders on the delays of report delivery and other performance.

In order to achieve success in developing the database, RWDG should document all the resources within their jurisdiction; i.e.

- The categories of all resources available
- The locations of the spatially distributed resources.
- The budget allocation for specific resources
- The time frame for the completion of specific project unit
- The level of skilled resources required.

- The resources/ services that need to be outsourced from outside.

1.4 Objectives

1.4.1 General objectives

The broad objective of this project is to design an integrated geospatial database for Ruma Women Development Group that would be used as a management tool for the project's resources.

1.4.2 The Specific Objectives are:-

i. To produce an up-to-date digital map of the division highlighting all the points of activities.
ii. Generate a GIS database for the management of the RWDG activities.
iii. Train the Administrators of the organization on how to edit and update the database continuously.

1.5 Justification

The new technological developments have come up with efficient methods of managing resources by using various types of GIS databases. For RWDG to move at the same pace with other CBO's, they have to in-corporate the new technology in their organization. Strategies have to be developed and implemented to provide products that better satisfy user demands and supply. This would be possible through research, for the developing of the organizational policies within organizational administration; and through operational capacity, a requirement for the implementation of the system in the institutional settings.

1.6 Limitations and Scope of the Study

This study deals primarily with an individual CBO (Ruma Women Development Group) servicing Madiany Division in Rarieda District. Most of the non-spatial data is available, therefore will be documented and captured into the database. The spatially distributed

data will be presented in the form of a map for visualization appreciation, and will be stored in the database.

The information to be included covers all the activities being managed by the organization since its inception. The plan for 2009, in which the funds have been allocated will also be included as part of the projection.

The existing human resource department of the group don't have competent personnel who can appreciate the initiation of the new technology and may end up giving inadequate information. The group's resources are not stored in a systematic manner. This may cause difficulties in retrieving information within a shot period.

1.7 Organisation of the report

Chapter one has introduced the study, the rationale, objectives and the scope. Chapter two covers the literature review that formed the basis for justification of the research. Chapter three shows the methods used to execute the project, whilst the discussion of the results is highlighted in chapter four. The conclusions and recommendations of the study are outlined in chapter five. The Appendix and the References forms the last part of the study.

CHAPTER TWO

2. Literature review

2.1 Introduction

Resource management is the effective and efficient deployment of an organizational resources' when needed. A resource is any physical or virtual entity of limited availability. (Mc Donald et al., 1999)

The resources to be managed vary from organization to organization depending on the type of the resources available and the human resources required. In the realm of the project management, processes, techniques and philosophies as to the best approach for allocating resources have been developed. These include discussions on functional vs. cross-functional resources and allocations, as well as processes expounded by organization Project Management Institution (PMI) through their Project Management Body Of Knowledge (PMBOK) methodology of project management. (Duncan, 1996)

Resource Management is a key element to *activities resources estimating* and *human resource management*. Both are essential components of a comprehensive project management plan to execute and monitor a project successfully.

One of the resource management techniques is resource levelling. Its aim is to smooth resource requirements by shifting slack jobs beyond periods of peak requirements. Some of the methods essentially replicate what human scheduler would do if he had time. Others make use of unusual devices or procedures designed especially for computers. The main goal is to achieve 100% utilization of resources allocation, which is very unlikely when weighted by important metrics and subject to constraints.

In essence, resource management is the discipline of planning, organizing, and managing resources to bring about the successful completion of specific project goals and objectives. A project has specific start and completion dates undertaken to create a unique product or service which brings about beneficial changes or added values to stakeholders (PMBOK, 2004)

The primary challenge of resource management is to achieve all the organizational goals and objectives while adhering to classic project constraints. The main constraints being the scope, quality service, time availability and the budget.

2.2 Database and resource management

In order to overcome the project constraints within an organization it is important to create a database which will contain the activities within the organization. A database manage system is a collection of programmes that enable you to store, modify and extract information from a database.

A database is a collection of information organized in such a way that a computer programme can quickly select desired pieces of data from it, while a programme is an organized list of instructions that when executed causes the computer to behave in a predetermined manner; without programmes, computers are useless.

There are different types of database, ranging from small systems that run on personal computers, to huge systems that run on mainframes. Some examples of database applications are:-

- Flight reservation systems.
- Computerized Parts Inventory Systems.
- Automated Teller Machines (ATM) in banking.
- Supermarket.

Resource managers use GIS database when dealing with data which are spatially distributed. The conservation and preservation of natural resources is an overwhelming

task because the resource areas include tens or hundreds of thousands of acres, and the issues that need to be addressed are very complex. Resource managers need to understand the effects development will have on the lands and properties they oversee. These effects may be obvious, such as urban sprawl, or more subtle such as spread of diseases due to environmental disturbance.

GIS resource manager can ask critical what-if questions, for example:-

- How we can minimize the effects of HIV/AIDS within the community.
- Where should we increase/limit development due to the impact of AIDS?
- What are the migration patterns in some particular area?

Resource managers use GIS applications to manage utilities infrastructure, financial management, inventory monitoring, potential evaluation, land-use planning, risk assessment, hazard mapping amongst others.

In infrastructure, for example, in India, GIS has been used to map communication systems involving transportation, road and rail network (Miller, 2001). Resource managers with the US forest service are concerned with how to achieve an economically viable level of timber harvesting while still maintaining a balanced and healthy environment. Most federal land management agencies including Forest Service have used some form of GIS since the early 80's. In the years before GIS, these agencies relied on a combination of institutional memory and educated guesses to determine when, where and how much timber to harvest (Kane, 1999).

GIS can also be used for participatory mapping that allows a community to get involved with land-use decisions. This ability is important because many times resource managers are trying to meet human needs while also protecting natural resources.

GIS has also been used to monitor agricultural activities and help to understand the effect agricultural land on water quality. The programme would use such variables as

soil type, land cover, management practices, slopes and surrounding land-uses to help determine this impact (Karangit, 1999).

Utility companies have some of the most demanding customers around. They expect to be able to turn on the lights, watch television, log onto internet, cook on their gas stores and call all of their friends and neighbours. When power goes off, they want it fixed immediately. To meet the demands of their customers, utilities are using GIS technologies now more than ever. Within the utility companies, GIS has become the de-facto tool of choice for creating, organizing and managing geospatial information (Sipes, 2007).

In implementing GIS system, utility companies have very little room for error. They can't afford to take chances; if the software crashes or is inadequate for addressing the diverse demands of a particular company, the results can be disastrous. For example, an entire power grid could go down simply because of a software glitch.

Utility projects don't have the luxury of implementing GIS systems that take years to deploy, either. Customers are very demanding and they expect electricity, gas and other utilities to be available on demand and at affordable price. When a system is installed, utility companies can't afford failure. They need to install an enterprise GIS solution that only meets their immediate needs but is scalable and flexible enough to meet future needs as well. Predicting future needs can be extremely difficult, though, because the utility industry is dynamic (Meehan, 2007).

The way utility companies' use GIS has changed significantly in recent years. There has been a shift from departmental solutions in which three or four people use the software, to enterprise solutions where data is accessible by thousands of people (Subash et al., 2005).

In the financial sector, e.g. in banking, GIS database is used to monitor customers transactions. Financial solutions can save the organizations time and money by driving greater efficiency in organizational financial processes, monitoring, sharing and tracking financial information throughout the organization. Integration with other projects applications help to maintain complete audit trails for all business entities, providing timely insight through reporting features about the organizations financial status (Keyes, 1998).

The aim is to promote procedures and business practices which make best use of technology to provide quality support to operational project by providing products and services that:-

- Focus on the stakeholder
- Are best suited for their purposes
- Provide value for money
- Take into account the wider impact on society by
  - using resources wisely and minimising wastage
  - Using responsible suppliers
  - Ensuring the employees/stakeholders are aware of issues relating to the resources usage

In inventory resources management, a GIS database is capable of accounting for all the items within an organization. For example, the Basic Inventory Control (BIC) tracks the orders, receipts, shrinkage, allocation, and shipment of products. BIC displays physical units in stock, allocated units, available units in stock, and units on order. It produces reports such as current inventory, out of stock products, and inventory transactions for the criteria you specify (Hamilton, 2007).

The Design and Implementation of an HIV Prevention Resources Inventory Database, a service of the U. S. National Institute of Health (Lebovitz, 2003), has been set up to consolidate information relating to the activities of all agencies and funders directly

involved in the HIV prevention efforts. The City of Houston Department of Health and Human Services commissioned the development and implementation of a Microsoft Access Database that would be used to consolidate resources available for HIV prevention among all agencies in the greater Houston Area.

Using on-line analytical Processing Tools embedded into Microsoft Access and SQL server, the Houston HIV resource inventory allows data to be "sliced" by CBO, Funding Agency, Targeted Population, Type of Intervention, Site of Intervention and Effective Dates of funding for each programme.

Inventory of assets is another avenue where GIS database can be utilized to take stock of what is available and where they are located within the organization. In asset inventory it is possible to reduce cost and improve operational efficiency and peace of mind by increasing the productivity of key groups and assuring that your organization has an accurate asst inventory.

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2.3 Resources of RWDG project

RWDG has resources that have to be managed within stipulated time and budget. The group must plan strategically on how to allocate resources available within the organization in order to achieve its future goals. Resource allocation which is in two parts, allocates the available resources among the various project units strategically as follows:

i. **The basic allocation decision** which is the choice of what items to fund and at what level, since some resources are not allocated to all items. For example, in feeding programmes, funds are allocated to food stuffs only. The people who prepare the food are volunteers, mostly widowed, whose children are registered with the RWDG. These volunteers are only allocated space and time.

ii. **Contingency mechanisms** - a priority ranking of items included in the plan showing the items to be sacrificed if the total funding is to be reduced and/or the items to be excluded from the plan, showing the items to be funded should more resources become available.

2.4 Resources to be allocated

2.4.1 Financial resources

All activities directly related to monetary funds within the organization e.g. salaries, utilities, loans, bank accounts, insurances etc.

2.4.2 Inventory resources

These are basically the natural, cultural and economic resources found within any CBO e.g.

- Review of existing documents and facilities
- Assemble maps and information (spatially distributed activities)
- Document draft reports.
- Soliciting and publication of information

2.4.3 Human Resource Management

This is the science of allocating human resources among various project units, maximizing the utilization of available personnel resources to achieve the organizational goals.

The maintenance of the workforce would be accomplished through identification of staffing requirements, planning an oversight of payroll and benefits, education and professional development, and administering work-life needs of the staff.

All the units/departments within the RWDG organization need specialized personnel in one way or another. The reason being the stakeholders have to be handled with care since they are either bereaved or are in poor health due to the opportunistic diseases associated with HIV/AIDS symptoms.

The type of expertise staff required are:-

- Administrator
- Social workers

- Medical assistants
- Accountants
- Cooks
- sub-ordinate staff
- Etc.

Human skills are the strategic and coherent approach to the management of an organization. Most valued assets are the working staff in an organization who collectively contributes to the achievements of the objectives of the organization.

2.4.4 Natural resources

The resources that are directly related to land i.e. the spatiality of natural resources describes the development of landscape as it currently exists, as well as the potential pathways of change. The Ruma Community is located along the shores of Lake Victoria, hence a potential natural resource for their livelihood. It provides the water for domestic and agricultural use. The fishing activities, one of the youths programmes for sustainability and occupation takes place in this lake. Other members of the community practice subsistence farming along the lakeside, using the water from the lake for irrigation. Most lucrative is the production of horticultural crops for commercial purposes, which in return produces income for self sustainability within the community.

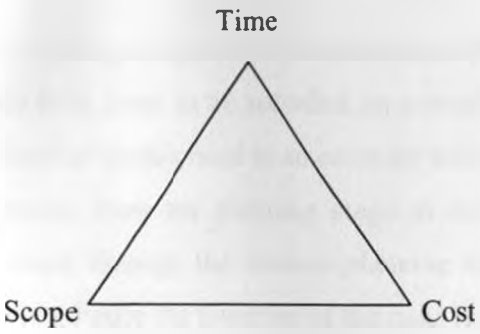
2.4.5 Production resources

The process of setting events in motion by trying to deliver quality services on time and within the budget.

Resource managers need to understand the effects development have on the activities they oversee. These effects may seem to be obvious but in real sense are very complex. In whatever field of resource management, a successful project manager must be able to envision the entire project from start to finish and to have the ability to ensure that this vision is realized.

2.5 Time, Scope and Cost in Resource Management

The traditional triple constrains in project management have been listed as scope, time and cost (Haughey, 2008). These constraints also referred to as the Project triangle (Fig.2.5) are inter- dependent. Each side of a triangle represents a constraint, and one side cannot be changed without impacting the others. The time constraint refers to the amount of time available to complete a project, the cost is the budget allocation and the scope is what has to be done to produce the project's end result.



Increased scope = increased time
Increased time = increased cost
Increased cost = increased scope

Fig. 2.5

To manage resources effectively, strict control system has to be implemented. Control systems are important in such areas as cost, risk, quality, time, change, procurement, communication and human resources. In addition, auditors should review the development process and procedures on how the project units are implemented.

A manager of a CBO is accountable for delivery of approved programmes within its annual budget appropriations. To achieve this, the manager must ensure that individual projects within the programmes are delivered in accordance with their original agreed scope and project completion date, and that any variations in the cost of individual projects are managed within the overall programme budgets (Anderson, 2003). Project scope covers physical extent of the project performance requirements and all aspects of the project that may have an impact on achieving the desired outcomes. The detail included into the project scope is described within the project development section of these guidelines.

In time management, a programme should be created to show the expected duration for project activities through planning, pre-construction and construction, and should highlight the interdependence of any critical path activities. The level of details in the programme depends on the size and complexity of the project and as a minimum should be adequate to determine the expected completion date. A risk adjustment to time can significantly improve chances of assuring that project commencement duration and completion dates are as accurate a possible, appropriate to the level of risk at that moment.

When costing, adoption of a consistent structure for estimates and tender schedules will enable final costs to be recorded on a consistent basis to assist with future estimating. The level of details used in an estimate will be refined progressively as the overall scope progresses from the planning stage to maturity development stage. As the estimate progresses through the various planning stages, the level of details about the project improves, hence the lowering of the risks level.

The Corporate Quality Procedure, 'Project and Programme Monitoring' should be used as the basis for maintaining and updating PARMS with the current project scope, cost and time details. The approved project scope, cost and time should not be varied at a later date unless there are compelling reasons to do so.

2.6 GIS and Management

The above mentioned resources are various and interrelated. To deal with all this information within the resource management circle effectively and qualitatively, remote sensing and GIS would be the way forward for the manipulation of the information.

World wide, databases, especially for natural resources have been established by agencies such as UNEP, (whose GRID programme makes data available to a wide range of users in GIS format). The use of GIS has become more popular in documenting the

sustainability of resources and land areas for a variety of uses and is a commendable tool for monitoring the activities of each stage of an organization's functions.

In modern societies, decisions should be made quickly, using reliable data, even though there may be differing view points to consider and a large amount of information to process. Information must therefore be readily available to decision makers. The majority of such information is likely to be geographical in nature and will be handled adequately using GIS.

Traditionally, geographical data are presented on maps using symbols explained in the map legend. The map acts both as an effective medium for presentation and a bank for storing the geographical data. The information is stored and presented in a particular way, usually for a particular purpose thus a limitation to some extent. Compared to maps, GIS has the inherent advantage that data storage and data presentations are separate (Fig 2.6.1). As a result, data may be presented and viewed in different ways and on request. (Bernhardsen, 1999).

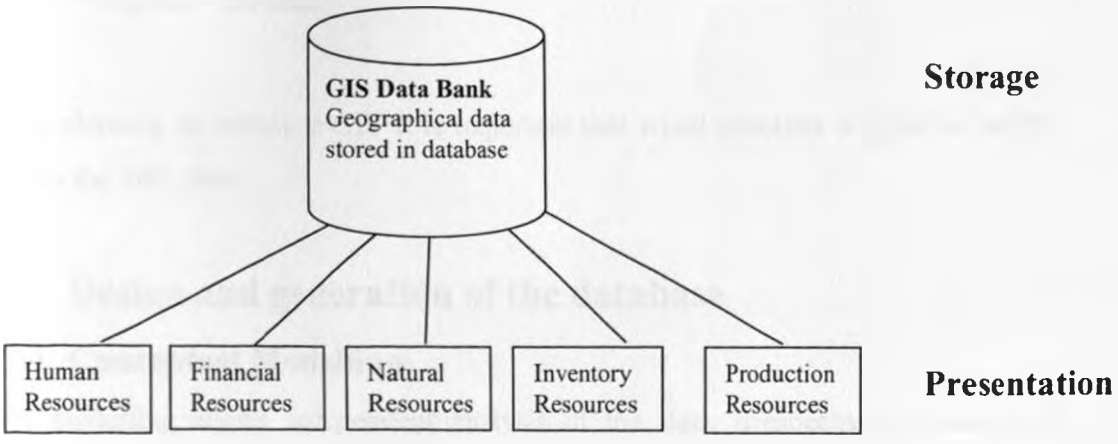


Fig 2.6.1

GIS offers its users the ability to process quantities of data for beyond the capacities of manual systems. Data in GIS are stored in structured manner as opposed to manual systems in which data are stored in archives and files, file cards, maps or in long reports. Data may be retrieved from GIS databases and manipulated far more rapidly and reliably than data in manual systems. In addition data is quickly compiled into documents using techniques that include automated map making and direct report print out.

A GIS system cannot be bought off the shelf; it has to be built in accordance to an organization's settings. Procurement of the computer hardware and software is vital but straight forward. Important is to understand the organization's problems and the expertise required so that the data can be compiled and modelled to suit the application.

The four links in the GIS would be the organization, expertise, structured data and the hardware and software, forming the GIS chain (Fig 2.6.2).

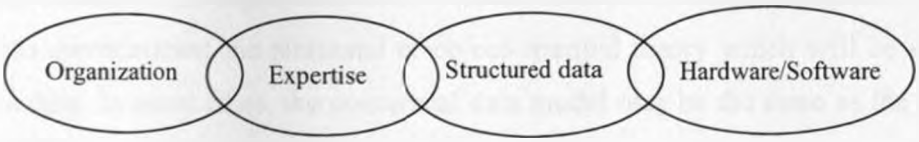


Fig 2.6.2 GIS Chain

When planning to introduce GIS it is important that equal attention is given to all the links in the GIS chain.

2.7 Design and generation of the database

2.7.1 Conceptual Modelling

Data modelling allows independent analysis of the data, irrespective of how it is physically stored and represented. Because of this distancing of the data model from the physical storage system after structuring, data models can be applied to any platform.

Entity-relationship modeling is a relational schema database modeling method used to produce a type of conceptual data model of a system, often a relational database, and its requirements in a top-down fashion. Diagrams created using this process are called *entity-relationship diagrams*, or *ER diagrams*. (Doberkat et al., 2003). If the conceptual model is not correctly build, the likely outcome will be an inefficient database structure with unnecessary data redundancy that will be a poor match for the analysts.

2.7.2 Logical Modelling

Logical database design has the aim of creating a data model that is completely independent from any particular DBMS or software/hardware platform. On large systems with different user views, a conceptual model is typically needed before the logical model is constructed, but when the system is of a single database like in the case of RWDG the logical model is capable of catering for the database design by adding extra entities / relations to enable the information and relationships to be stored in a relational database. The logical model is different from the conceptual model in that it takes into consideration the relational or object-oriented theory which will be used to store the data. In some cases, the conceptual data model may be the same as the logical data model.

Database design is the process of identifying the data that will go into the GIS database and how it will be presented. The database forms the foundation of all activities that will be performed using GIS. Creating a database is time consuming therefore should be undertaken with care to conform to the user requirements. A good database should contain all the necessary data that would accommodate different user views and to support data sharing with efficient data structures and retrieval mechanics. The data should be easily updated and maintained.

2.7.3 Physical database design

The physical design of the database specifies the physical configuration of the database on the storage media. This includes detailed specification of data elements, data types, indexing options, and other parameters residing in the DBMS data dictionary. (Lightstone, 2007). Database users and application developers can benefit from an authoritative data dictionary document that catalogs an organization's contents and conventions of one or more databases. This typically includes the names and descriptions of various tables and fields of a database, plus additional details, like the type and length of each data element. There is no universal standard as to the level of detail in such a document, but it is primarily a distillation of metadata about database structure, not the data itself.

A data dictionary document also may include further information describing how data elements are encoded. One of the advantages of well-designed data dictionary documentation is that it helps to establish consistency throughout a complex database, or across a large collection of federated databases. (Matsu'ura, et. al., 2002). Physical modelling is both hardware and software specific, and requires consideration of how files will be structured for access from the disk.

CHAPTER THREE

3.0 Methodology

3.1 Introduction

The chapter discusses the methods used to generate a GIS database for RWDG. The sites visited to realize the objectives of the study and the procedure followed to arrive to the final results are also included. The various data sets captured and methods of data capture relevant to the study have also been outlined

The tasks involved to achieve the final outcome were:-

i) Information about the Area of Study

ii) Documentation of all the resources and assets/facilities under the jurisdiction of RWDG.

iii) Collection and assembly of the geo-spatial data and the related non-spatial data.

iv) Design and generate the database

v) Test the suitability of the database.

3.2 Areas of Study

The project area is in Madiany Division, Rarieda District, located in Nyanza Province, North East of Lake Victoria. The Division lies between 34°14′ to 34°24′ East longitudes and 0°10′ to 0°24′ South latitudes. The population as at 1999 was approximately 60,000 (CBS[3], 1999) in an area covering about 200 km^2. Inhabitants' main occupation is subsistence farming and fishing. Culturally, extended families generally reside in compounds in groups of two or more houses. Polygamy is common and the co-wives generally inhabit different houses within the same compound.

[3] Central Bureau of Statistics

Malaria is the predominant cause of illness especially for children under six years of age. Reported HIV prevalence rates in pregnant women living in rural and peri-urban areas was about 21%-37% (AIDS Control Unit, 2001), and the estimated infant mortality rate between 1992 and 1996 was 176 per 1000 live births (Mc Elroy et al 2001). The government hospital, located in Kisumu and In Siaya are within 80 km from the centre of the study area.

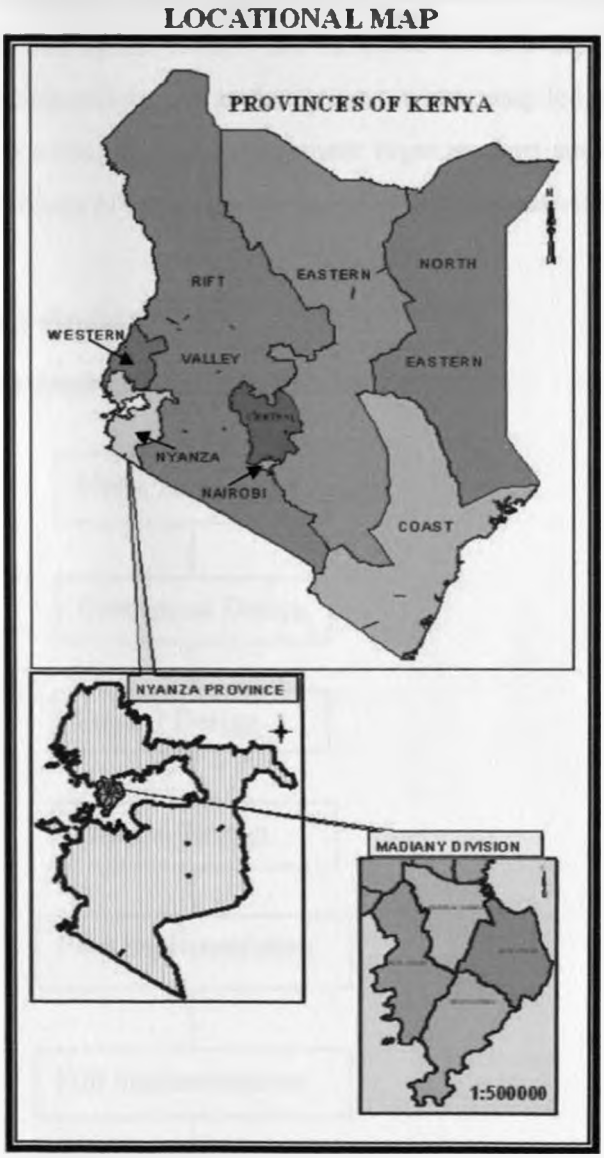


Fig 3.2: Madiany Division (Area of Study)

3.3 Documentation of the resources and assets.

The project site was visited and documentation and an inventory of the resources and the facilities were carried out in order to asses the user requirement analysis (URA). The URA also aided in determining the manner in which resources are managed at RWDG centre and the corresponding shortcomings of the existing methods and procedures.

The resources were identified on the ground and the nature of all the activities and their functions recorded. The casual factors that influence the delivery of the resources, e.g. demographic data, climatology, infrastructures etc. were compiled and documented. This secondary data was obtained from government organizations and other public sectors. The Topographical Maps of the area were useful in locating activities' sites.

3.4 Database design

The design of a GIS database entails the following process

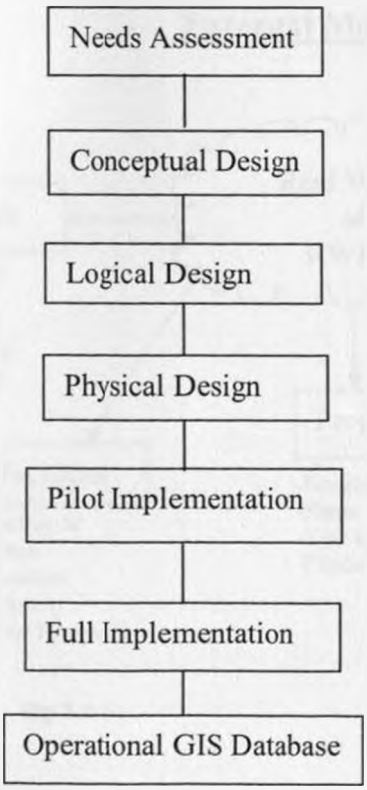


Fig 3.4 Process of database design

3.4.1 Needs Assessment

The needs assessment for RWDG was carried out to understand their requirements and to identify the limitations and shortcomings within the CBO. The main purpose was to find out:-

i) What the existing system was doing

ii) The type of improvements that can be incorporated in the existing system

iii) If a new system would be the solution to address the shortcomings of the existing system

In order to succeed in researching on the needs assessment, the external modelling was designed to clarify the types of information required to be part of the database. The objective of external modelling was to ensure a common understanding between the designer and the CBO interest in the set up of the database

External Modelling

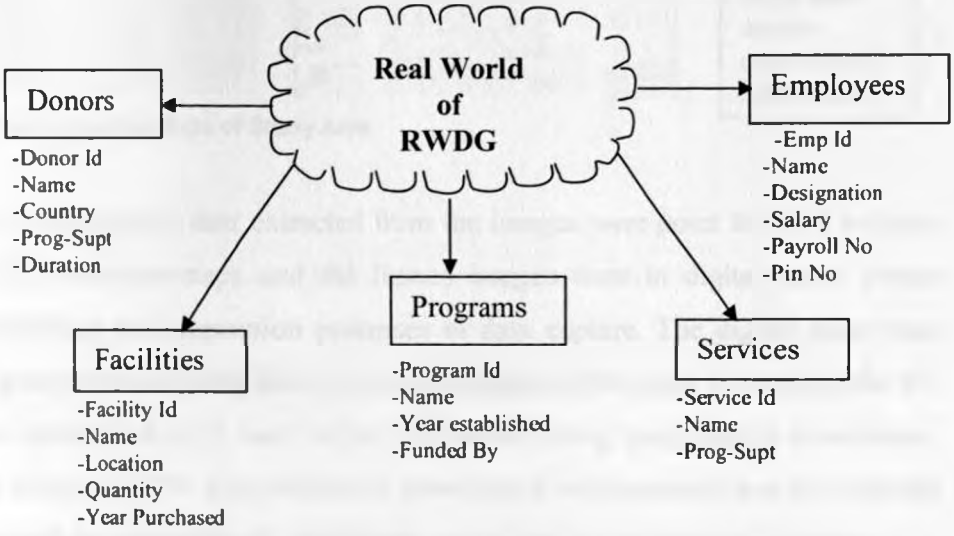


Fig 3.4.1

3.4.2 Data Collection

Most of the non-spatial data was available at RWDG centre except that the methods of retrieving the data were tedious, time involving and cumbersome.

The spatial data was obtained from Ikonos images of one metre spatial resolution purchased from Regional Centre for Mapping and Resources for Development (RCMRD), and topographical maps of scale 1:50,000 from Survey of Kenya. The topographical maps sheets 115/2 and 115/4 (Fig 3.4.2a) were used as base maps for the area of study, while the Ikonos Images aided with the revision of geo-data.

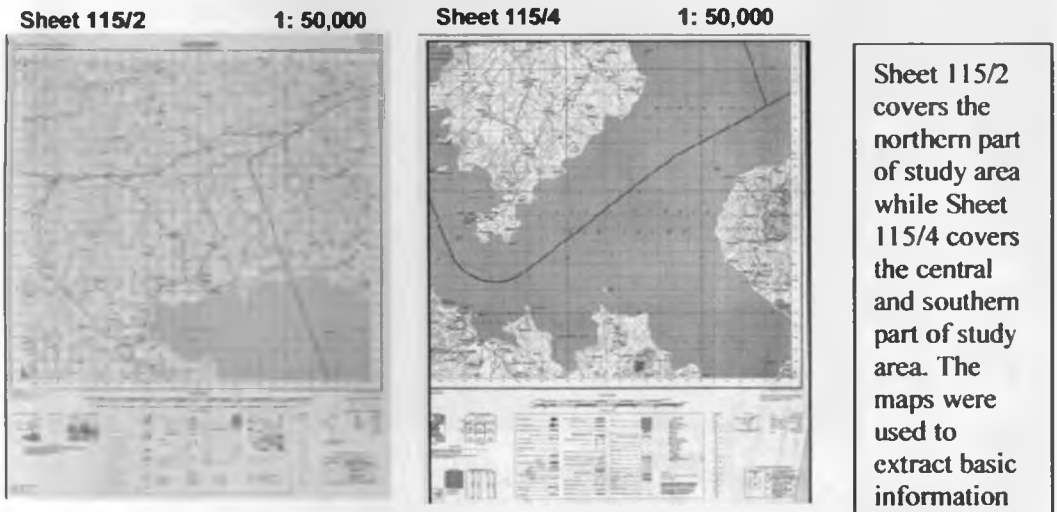


Fig 3.4.2a Topographical Maps of Study Area

The types of geographical data extracted from the images were point line and polygon data sets. Both the topo-maps and the Ikonos images were in digital raster format thereby minimizing the preparation processes of data capture. The digital raster topo maps were geo-referenced using four corner coordinates of the maps by entering the Tic Coordinates corresponding to each of the four points using geographical coordinates. The Ikonos image in UTM geo-referenced coordinates was imported into the ArcMap and transformed to geographical coordinates using the geo-referenced topomap as a backdrop. The combined maps and the image map (Fig 3.4.2b) were used for onscreen digitizing to extract the different layers

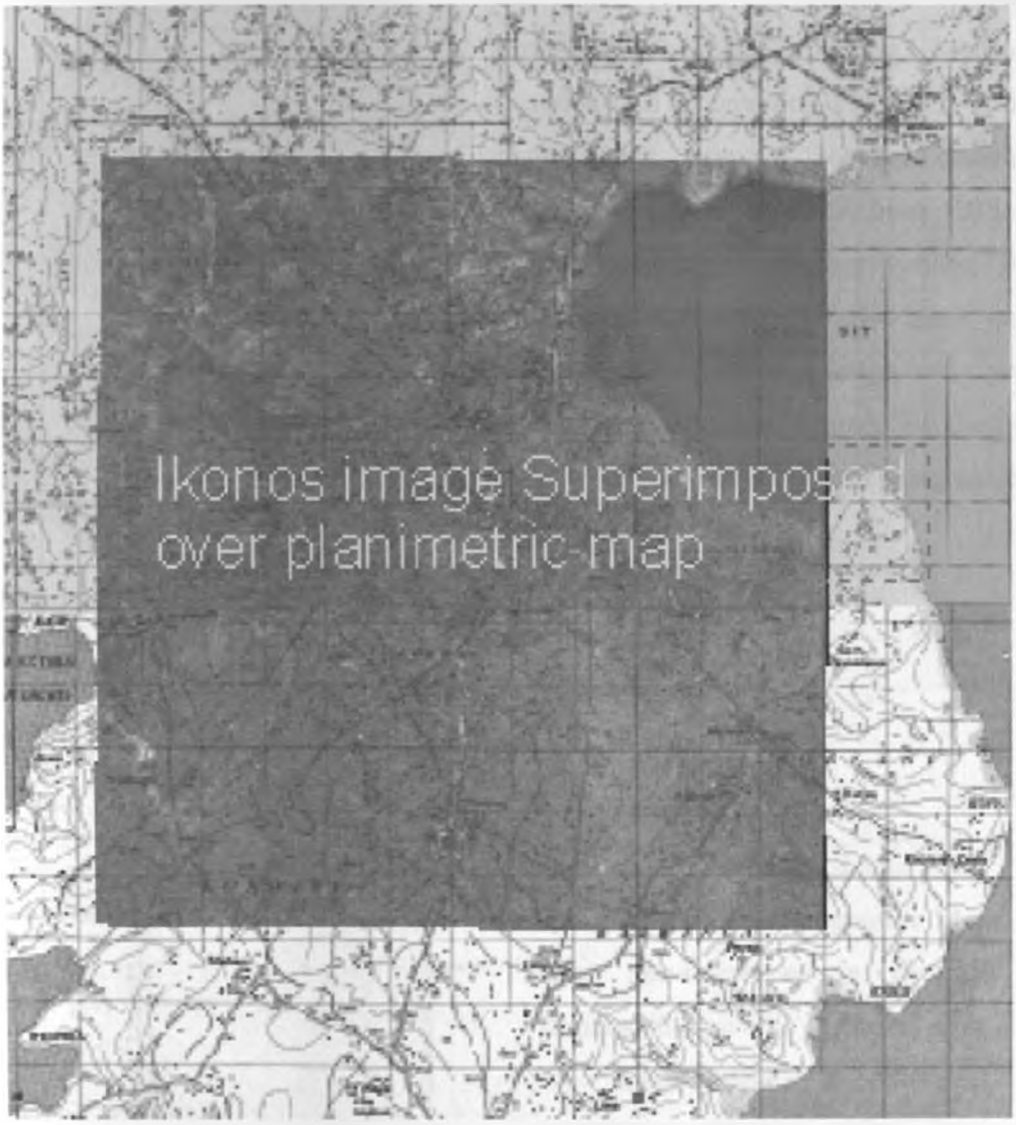


Fig 3.4.2b Topographical map and Ikonos image in geographic coordinates overlaid in transparent format to be used for onscreen digitizing

The map of Kenya demographic statistics (1999) up to sub-location level was obtained from Bureau of Statistics already in geographical coordinates, from which locations and sub-locations in Madiany division, and the nearby locations served by the RWDG CBO were extracted.

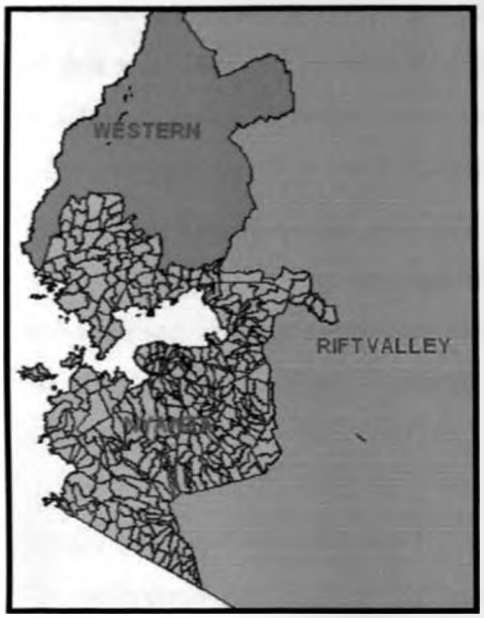
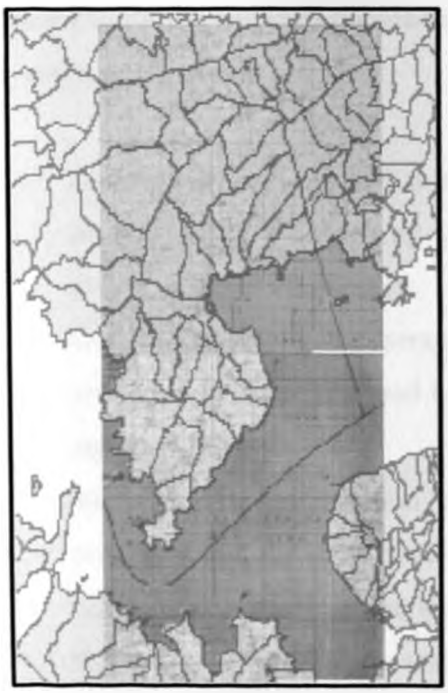


Fig 3.4.2b (115/2 and 115/4) is 1:50,000 topographical maps covering Madiany Division and its environs. Fig 3.4.2c is the demographic map of Nyanza covering Madiany Division acquired from CBS in decimal degrees referencing system. The referencing systems for the two maps were different hence; the topo maps were geo-referencing in decimal degrees for the two maps to be superimposed their geographical positions.

Fig 3.4.2c Demographic map (Nyanza Province)



1: 50,000 Topo-Maps sheets 115/2 & 115/4 and the Demographic Map were geo-referenced in decimal degrees in Arc-GIS software since the maps were in different coordinate systems. After geo-referencing the maps were automatically overlaid in their geographical positions as can be seen in Fig 3.4.2d

Fig 3.4.2d Maps superimposed after geo-referencing

Other spatial features that were not on the maps and images, but would facilitate analysis of data were captured by hand-held GPS (GARMIN Etrex Legend). The hand held GPS which usually has by default coordinates referred to WGS84 had to be initialized Clarke 1880 spheroid and (Arc 1960) datum, to conform to the coordinate systems of the other map layers. The instrument was held over the identified points and once the coordinates appeared on the screen, it was captured by using "MARK" command then saved for later downloading into the computer. The photographs of physical features on the ground were taken by a digital camera and downloaded to the computer for father manipulations.

3.4.2.1 Need to Geo-reference

Geo-referencing an object is the process of defining its existence in physical space that is, establishing a relation between *raster* or *vector* images to map projections or coordinate systems. This procedure is thus imperative to data modeling in the field of geographic information systems (GIS) and other cartographic methods. When data from different sources need to be combined and then used in a GIS application, it becomes essential to have a common referencing system. This is brought about by using various geo-referencing techniques.

- Geo-referencing is crucial to making aerial and satellite imagery, usually raster images, useful for mapping as it points out how other data, such as the GPS points, relate to the imagery.
- Geo-referencing is the process of "pasting" the digital data to a geodetic reference frame represented by the local ellipsoid, the UTM projection and the Arc 1960 datum.
- Very essential information may be contained in data or images that were produced at a different point of time. It may be desired either to combine or compare this data with that currently available. The latter can be used to analyze the changes in the features under study over a period of time.

- Different maps may use different projection systems and ellipsoids. Geo-referencing tools contain methods to combine and overlay these maps with minimum distortion.

There are various GIS tools available that can transform image data to some geographic control framework. Some of the tools are ArcMap, R2V, and ERDAS Imagine amongst others. It is possible to geo-reference a set of points, lines, polygons, images, or 3D structures. For instance, a GPS device will record latitude and longitude coordinates for a given point of interest, effectively geo-referencing this point. A geo-reference must be a unique identifier. In other words, there must be only one location for which a geo-reference acts as the reference (Linda, 2006).

The geo-spatial data extracted from the maps during data capture included

- The road networks including the foot paths
- Buildings including households, schools, market centres & social centres.
- Project sites not situated within the centre
- Photographs of significant sites and activities that would be used during analysis were captured to assist with the explanation of finer details of the project

The datasets that were not available in the maps were picked on the ground using a handheld GPS receiver with an accuracy of between 5-10 meters. The GPS was initialised to "Arc 1960 Datum and UTM projection" since these were the systems used to geo-reference the topo-maps. *TOPO* software was used to download the waypoints and saved as text file in the computer. This is because the *TOPO* programme does not work directly with Ms Excel programmes. The text file was then imported to Ms Excel and edited to remove the information that was not compatible with the digitized data, for example the date and time. The new dataset were saved as dbf format for it to be used in ArcGIS. The points were then added to the view as event themes and later converted to shape files. The GPS waypoints and the digitized points were combined as one theme by merging and harmonized with the required attributes for further manipulations.

3.4.3 Conceptual Design

In the design conceptual model

i. Entities and relationships between them were identified.
ii. The information and entities to be stored in the database integrated.
iii. Integrity constraints or enterprise rules established
iv. Database schema in form of an ER diagram developed.

The relationship between entities, the information and entities to be stored in the database, and the database schema is shown in the *E-R Diagram for* RWDG (Fig 3.4.3a) The construction of an *E-R diagram* for the RWDG database was vital for the purpose of translating the over-roll view of the happenings at the CBO's centre. The relationships between the entities could be visualized clearly to make sure that no activity is left out during database creation. At this juncture, the type of information that needed to be stored in the database was defined in terms of their relationships.

E-R Diagram for RWDG database

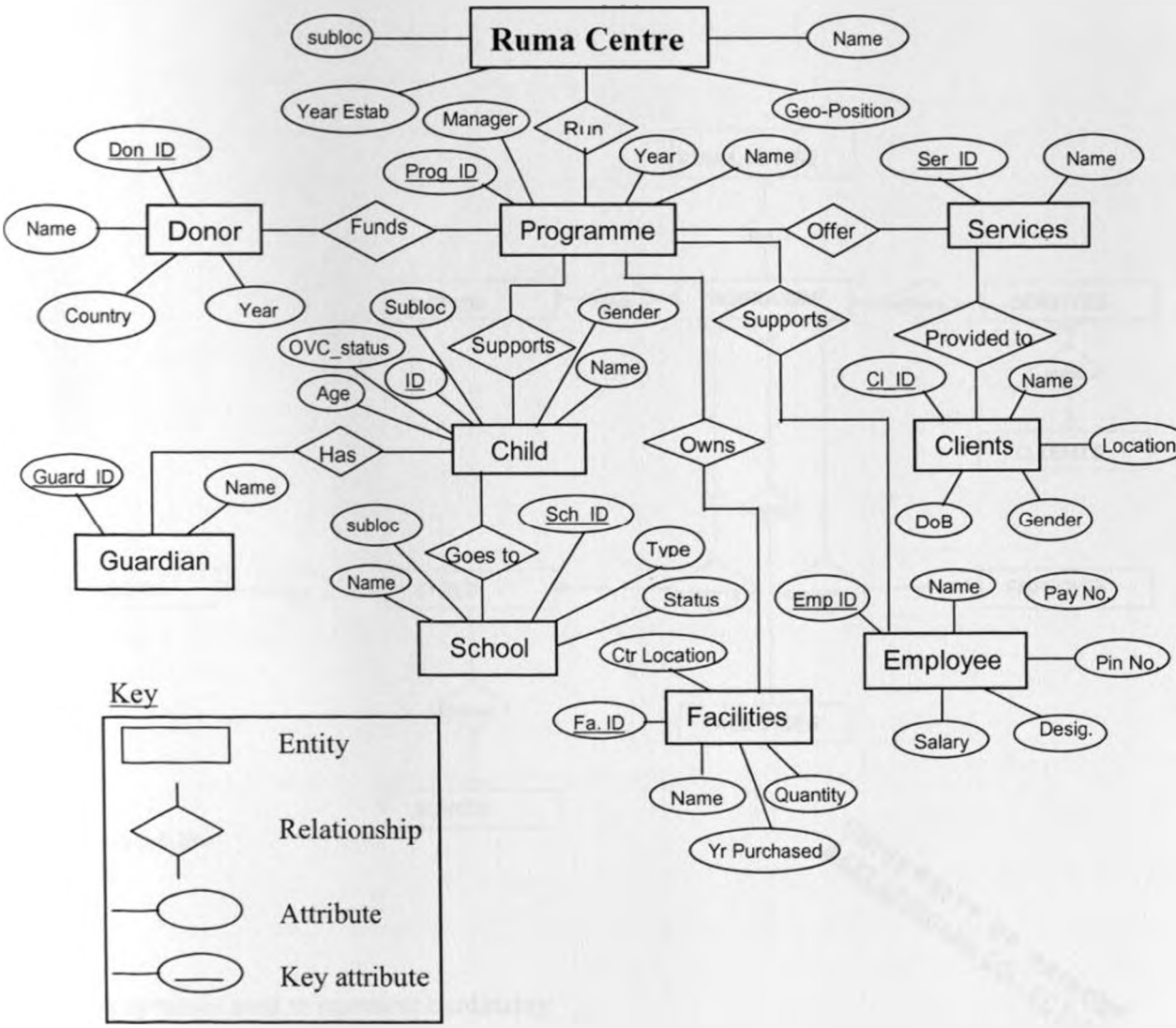


Fig 3.4.3a

LOGICAL E-R DIAGRAM FOR RWDG DATABASE

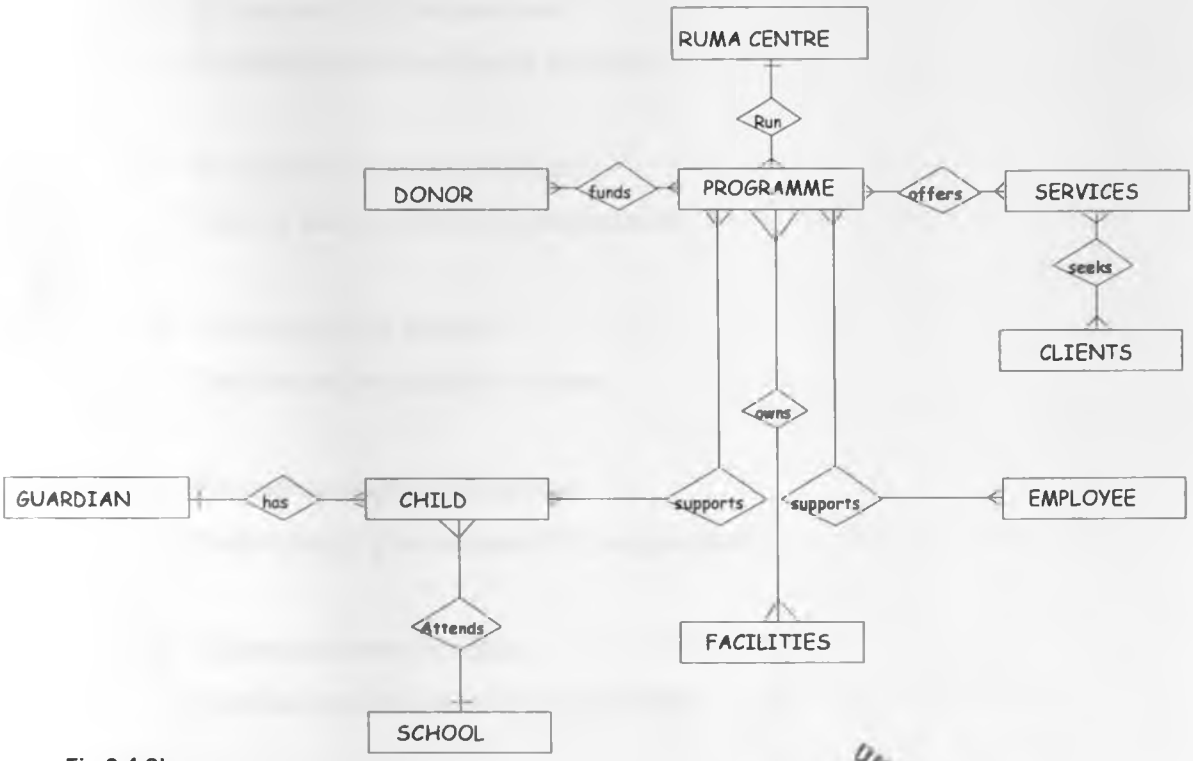


Fig 3.4.3b

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Three symbols used to represent cardinality:

- the *ring* represents "zero"
- the *dash* represents "one"

The *crow's foot* represents "more" or "many"

3.4.4 ENTERPRISE RULES

1. Ruma centre runs many programmes
   Many programmes may be run by Ruma centre

2. Donors may fund programmes
   Programmes must be funded by donors

3. Programmes may offer services
   Services may be offered by programmes

4. Clients may seek services
   Services may be sought by clients

5. Programmes support employees
   Employees may be supported by programmes

6. Programmes own facilities
   Facilities must be owned by programmes

7. Programmes support children
   Children are may be supported by programs

8. A child attends school
   School may be attended by a child

9. A child has a guardian
   Guardian must have a child

From the ER diagram for the RWDG database design, which entails the activities taking place at the project centre, physical modelling was carried out to describe the specification and types of data elements for each table as shown in the following examples:-

Ruma Centre (CtrName, GeoLocation, SubLoc, YearEstablished)
Programmes (ProgID, Name, Year established)
Employee (EmpID, Name, Designation, Salary, PayrollNo, PinNo)
Donor (DonID, Name, Country, Year, Duration, ProgID)
Child (ChildID, Name, DoB, School, OVC status, SubLoc, Gender)
Guardian (GuardID, Name, DOB, ChildID)
Clients (ClientID, Name, SubLoc, DoB, ServID)
Service (ServID, Name, ProgID)
Facilities (FacilityID, Name, Qty, YearPurchased)

The tuples with the same attributes from different tables creates a relationship. Since the tuples are not arranged in any specific order, the attributes are also not in a specific order. During analysis, applications will access data by specifying queries which use operations such as ***select*** to identify tuples, ***project*** to identify attributes and ***join*** to combine relations. Relations can be modified using the *insert, delete,* and *update* operators. New tuples can supply explicit values or be derived from a query. Similarly, queries identify tuples for updating or deleting.
The feature type for each table was specified and the attribute tables created by inserting the information from the physical model design. The attribute values were entered into a Microsoft Excel spread sheet with specified domain and imported to the RWDG database using access files because ArcView is not compatible with Ms Excel files.

The domain describes the set of possible values for a given attribute. Attaching a domain to an attribute means that all values for the attribute must be an element of the specified set.

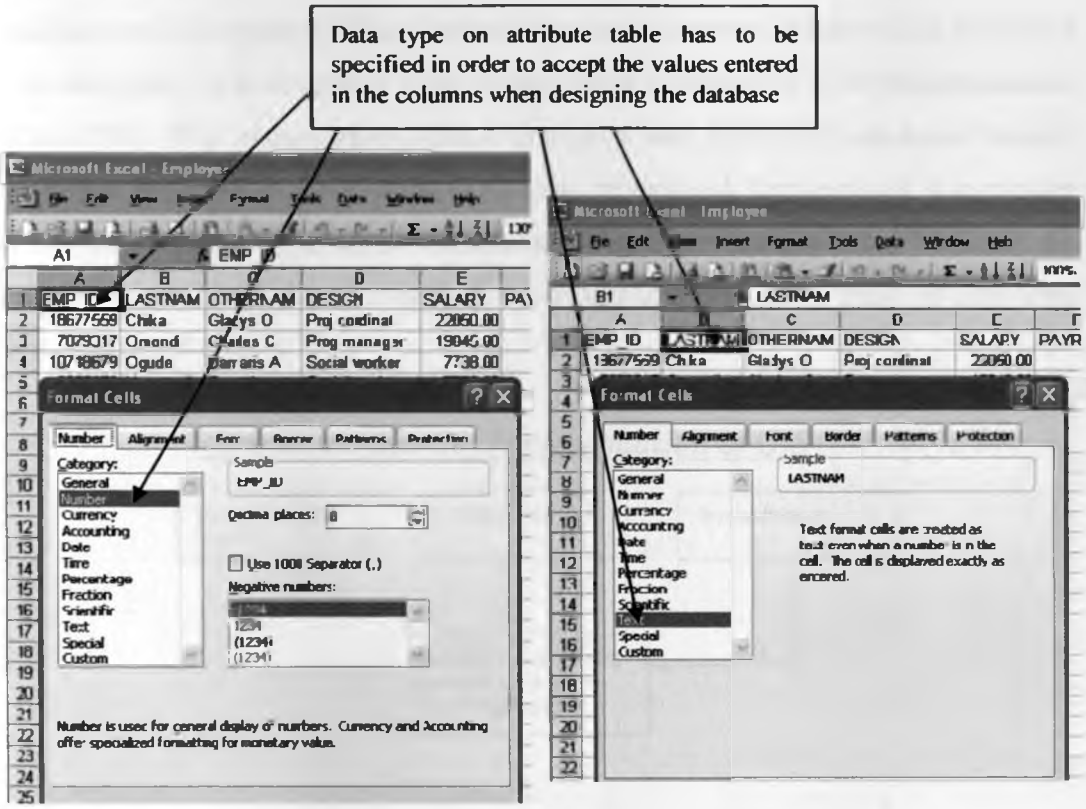

Fig 3.4.4 illustrates the format for designing attribute tables

At this level, all the data is described in details, without any regard as to how they will physically be implemented in the database. All the attributes of each entity are specified. Once all the data has been correctly captured and edited for any errors, it is physically stored in the GIS database. This is where the data actually resides on the disc and also how the data may be efficiently accessed. The Database Management Systems (DBMS) itself mostly handles this process which is known as the physical modelling process. At this level, it is specified how the logical data model is realized in the database schema.

3.4.4 Data Capture

Data capture is the entering of conventional data in a computer, or converting data into a form compatible with computers. Data capture forms a major cost in the implementation of most GIS. Most organizations need to convert a vast archive of map-based records into digital form before the benefits of GIS can be enjoyed. Conventional data capture techniques based on digitizing tablet technology are slow and expensive but currently forms the practical method of capturing this foreground data in the required structured form.(Worboys 1994)

Flow chart showing Implementation of GIS

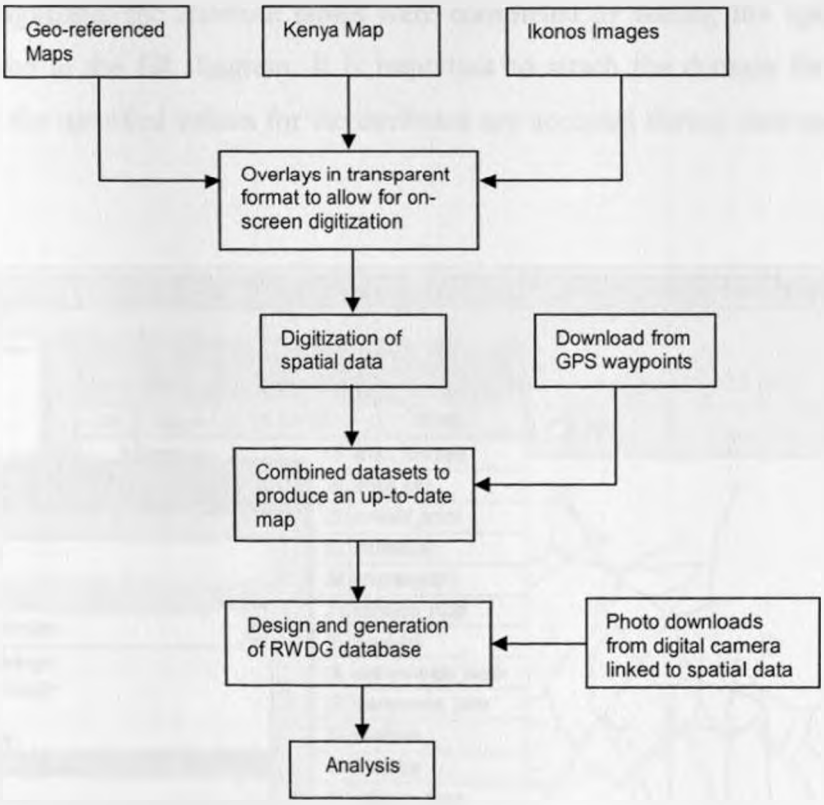

Fig 3.4.5a

Before capturing the spatial data, the Geo-database for RWDG was created and specifications on the format of features datasets and feature class to be incorporated in the database made. The feature datasets included points, lines and polygons which form

the framework of the graphical representation of the objects in real world. The point feature class included schools attended by the orphaned children, centres where the youth activities take place, VCT centres, amongst others. Roads and rivers formed the line feature class while the area covered by the lake formed the polygon. The administrative units which are also in polygon format were obtained already digitized with a demographic attributes. The data was used to extract the required information of the study area and inserted in the RWDG database.

During digitization, the tables for spatial data were created by default with a provision for editing the tables to insert the non spatial attributes as required. Onscreen digitization was performed from the geo-referenced overlays in different layers in ArcMap (Fig 3.4.5b). After digitizing, the attribute tables were completed by adding the specified fields as indicated in the ER diagram. It is important to attach the domain for each attribute so that the specified values for the attributes are accepted during data entry in the tables.

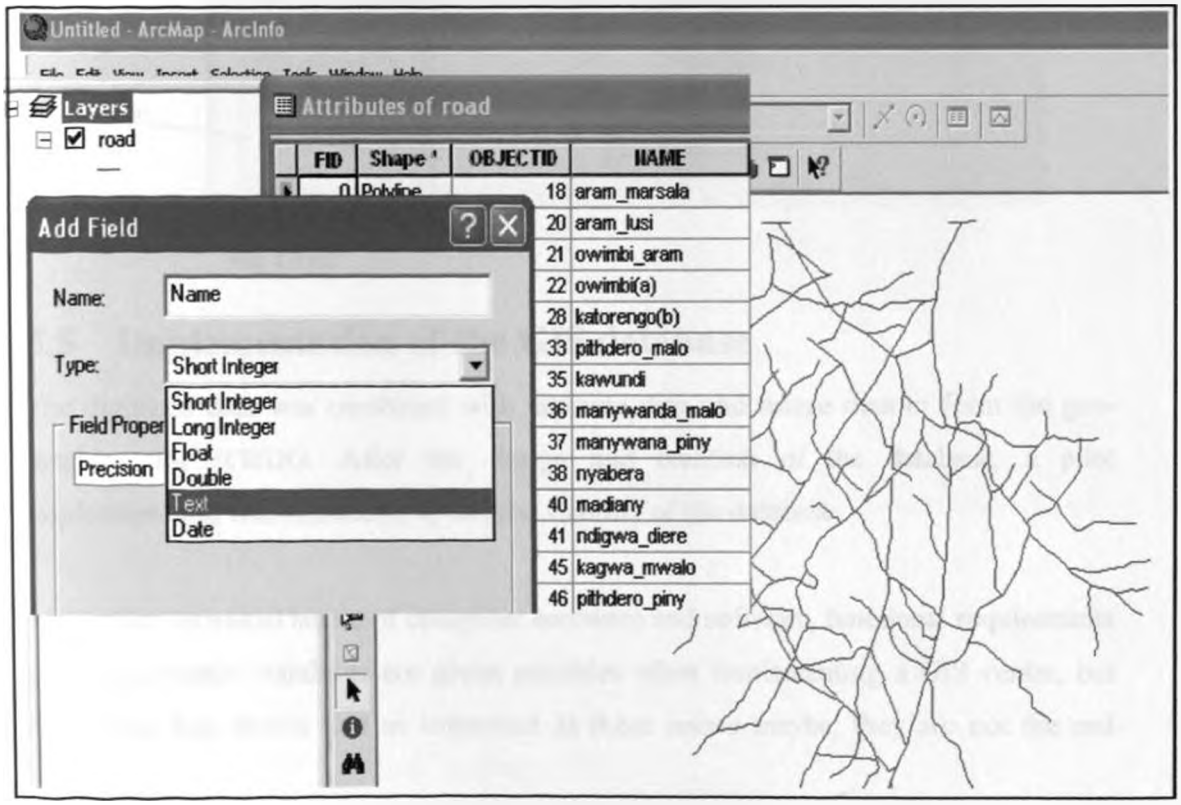

Fig 3.4.5b Digitized road layer with attribute table

Up-to-date Map from combined datasets

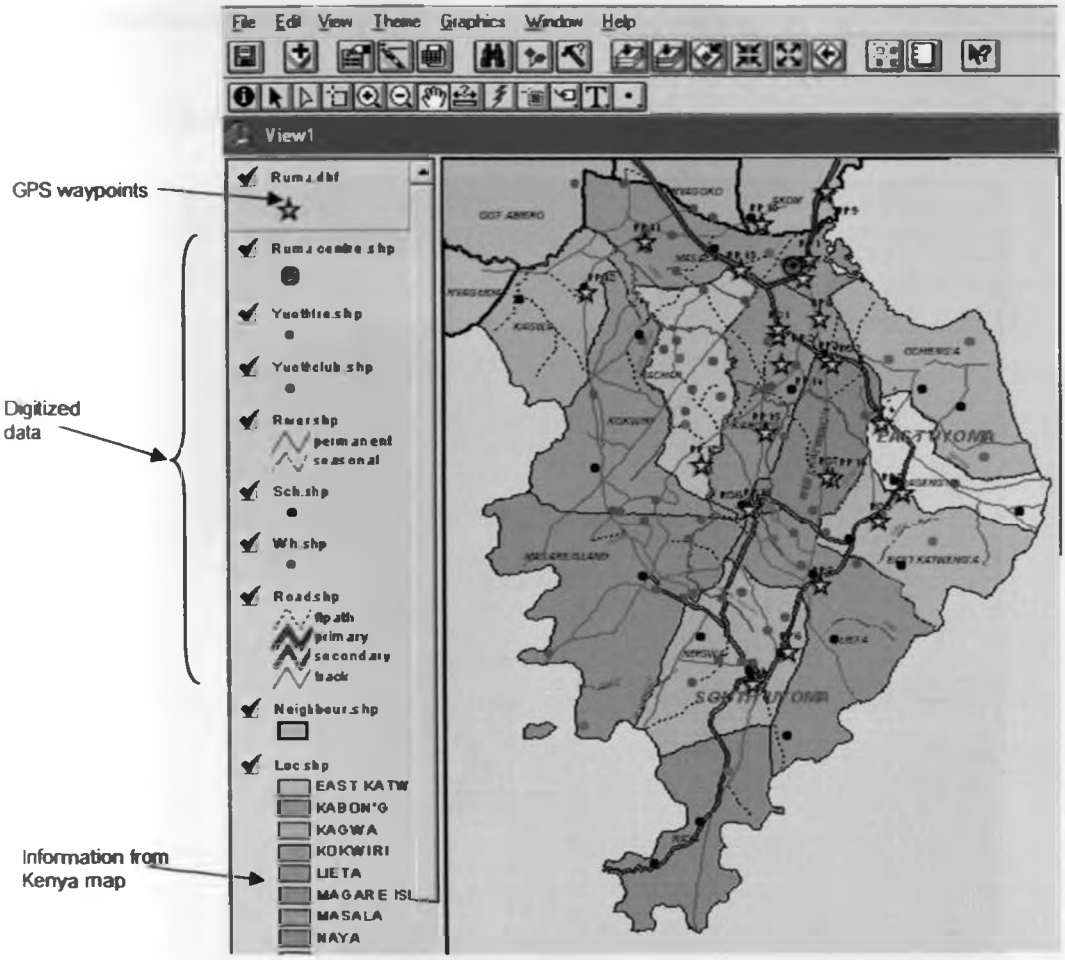

Fig 3.4.5c

3.5 Implementation of the GIS database

The digitized data was combined with attribute data and image data to form the geo-database for RWDG. After the design and creation of the database, a pilot implementation was conducted to test the viability of the database.

Most often technical issues of computer hardware and software, functional requirements and performance standards are given priorities when implementing a GIS centre, but experience has shown that as important as these issues maybe, they are not the end

determinant for a successful GIS implementation. A properly structured and systematic implementation plan is required for a successful operation.

Photographs linked to actual ground position using Hot Link in ArcView

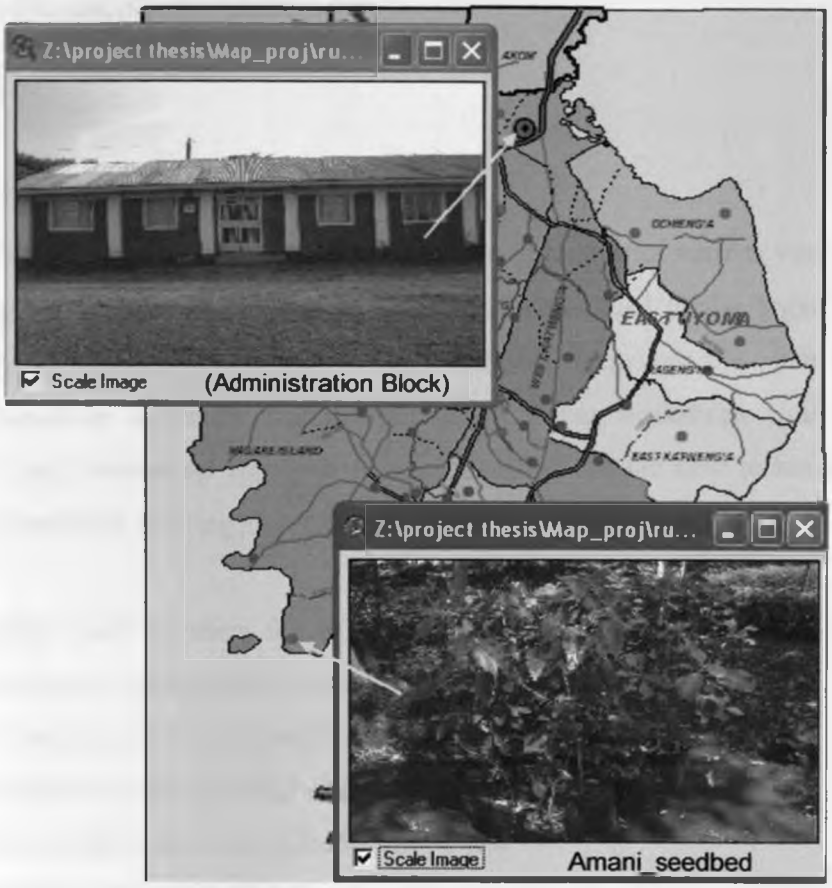

Fig 3.5 shows photographs hot linked to spatial data

Generally a GIS implementation must address the following technical, financial and institutional consideration

- Systems acquisition tactics.
- Data requirements.
- Database designs.
- Initial data loading requirements.

- System installation tactics timetable.
- Day-to-day operating procedures.
- Staffing requirements.
- User training.
- Application developments.
- Costs of all the implementation stages.

3.6 Creating Awareness

GIS need to be sold within an organization. The education of staff is very important. Depending on the way GIS technology is being introduced to the organization, the process for creating awareness may differ. Technical workshops are often appropriate when a ***top-down*** approach exists, while management workshops would be more relevant when ***bottoms-up*** approach exists. Education on the new technology should focus on identifying existing problems within an organization.

The technical staff members for RWDG were taken through a two days induction programme on the management of the database which included:-

- Recording and storing spatial data in standardized format.
- Maintenance and updating of the database.
- Data retrieval and manipulation capabilities.
- Defining data in consistent manner.
- Data sharing between departments within the organization.

3.7 Data Analysis procedure

When the database has been proven functional, analysis will take place by creating queries. Spatial analysis in GIS involves three types of operations; attribute queries, spatial queries and generation of new data. The scope of spatial analysis ranges from a simple query about the spatial phenomenon to complicated combinations of attribute queries, spatial queries and alterations of original data.

3.7.1 Attribute queries

Attribute queries require the processing of attribute data exclusive of spatial information. For example from the RWDG dbase an attribute query may require to get the number of orphans who are HIV positive. In such a situation the spatial information is not required to answer the query.

An attribute query will be carried out using SQL. The syntax is
SELECT FROM
WHERE

3.7.2 Spatial queries

Spatial queries require processing of spatial information. For example, a query may be raised about the sites of the HBC families within a given radius from the RWDG centre. The query will be carried out by creating a buffer of a certain radius from RWDG centre and use a query builder to list the sites. The same syntax underlies the query.

3.7.3 Generation of new data

This is the generation of new data from the original data set. For example, HBC sites located at specific distance from the main road and from the water distribution point. More complicated querying can be done by using combined concepts of overlaying and Boolean logic.

CHAPTER FOUR

4. Results and Analysis

4.1 Introduction

This chapter highlights a sample of results and analysis that were extracted from the study. The features presented include activities carried out by RWDG that are spatially placed within Madiany Division and non Spatial Data within the CBO's centre in attribute table format. The spatial data is presented in the form of maps in different layers as would be necessary for analysis, in order to ease the management system of the CBO. Depending on the type in information required, different types of virtual maps can be produced for use, and where necessary a hard copy printed.

It is possible to conduct three types of analysis namely, spatial analysis to generate various generic data from the RWDG database, querying attribute data using SQL, and statistical analysis using various tools of analysis. For example, the percentage of funds received from various donors has also been outlined in form of percentages and presented in graphs. An outline of age groups funded in percentages from various sub-locations is also outlined. According to Mogenda and Mogenda (1999), percentages are extremely important especially if there is a need to compare groups.

4.2 Map Layers

Different layers can be extracted from the database to form maps showing distribution of particular features as specified.

4.2.1 Madiany Division

The map of Madiany Division which were updated from Ikonos Satellite Imagery and data captured by handheld GPS from the field have been produced (Map 4.2.1) and printed at the scale of 1:100.000 (See Appendix II). The features shown on this map are

Locations, Sub-locations, Infrastructure, and Schools amongst other features. The position of the CBO is also included to aid in the analysis of some non-spatial data. From the map, it can be observed that the CBO is situated closer to the boundary of the neighbouring Rarieda Division; hence it assists some children from the area.

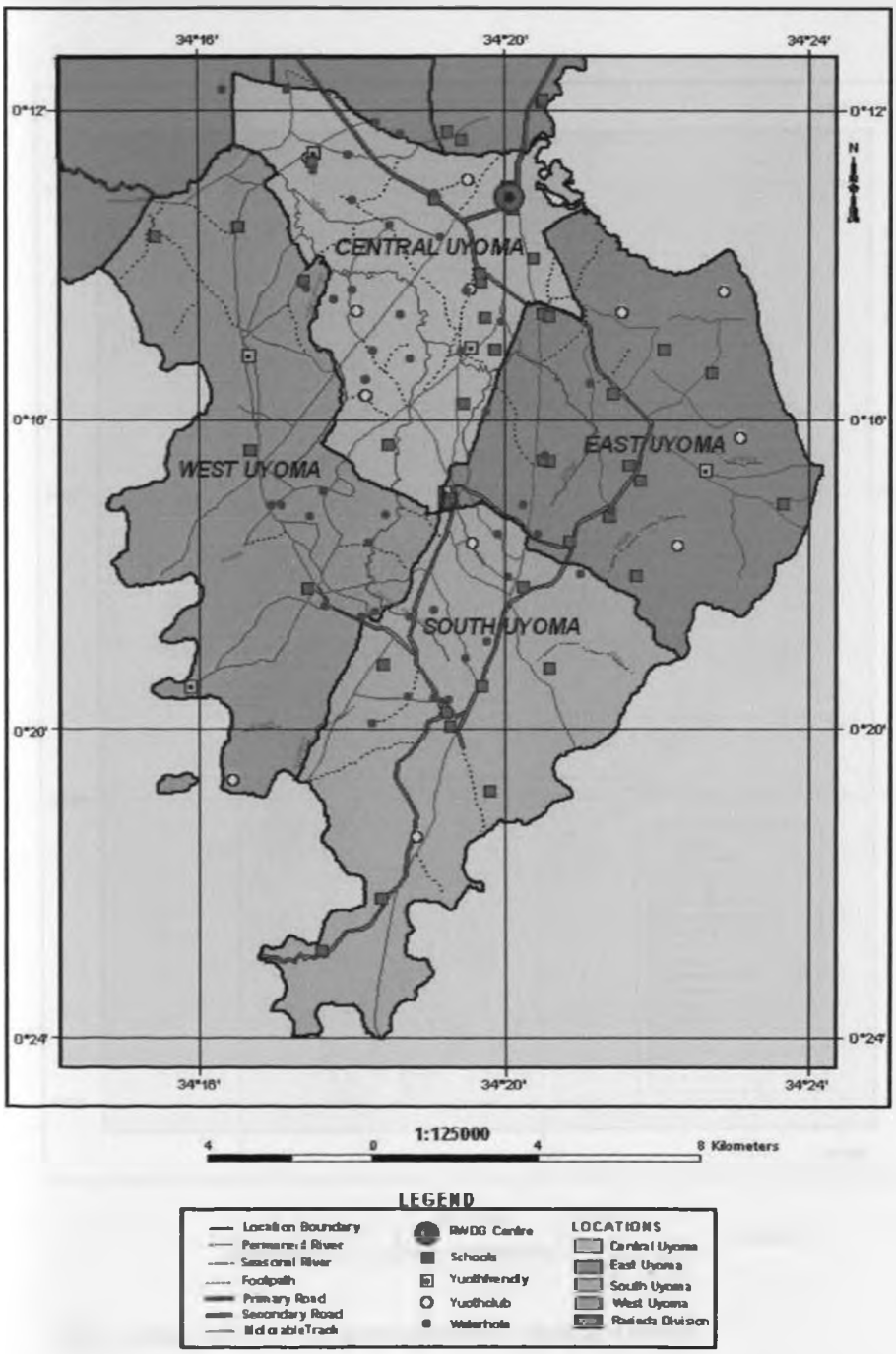

Fig 4.2.1 Map showing Digitized Features in the Study Area

4.2.2 Madiany Sub-Location

A map of sub-locations can also be extracted depending on the level of information required for analysis. Map 4.2.2 shows the administrative units of Madiany at sub-locations level with an overlay of schools in the division. At a glance the distribution of schools can be viewed for a quick analysis

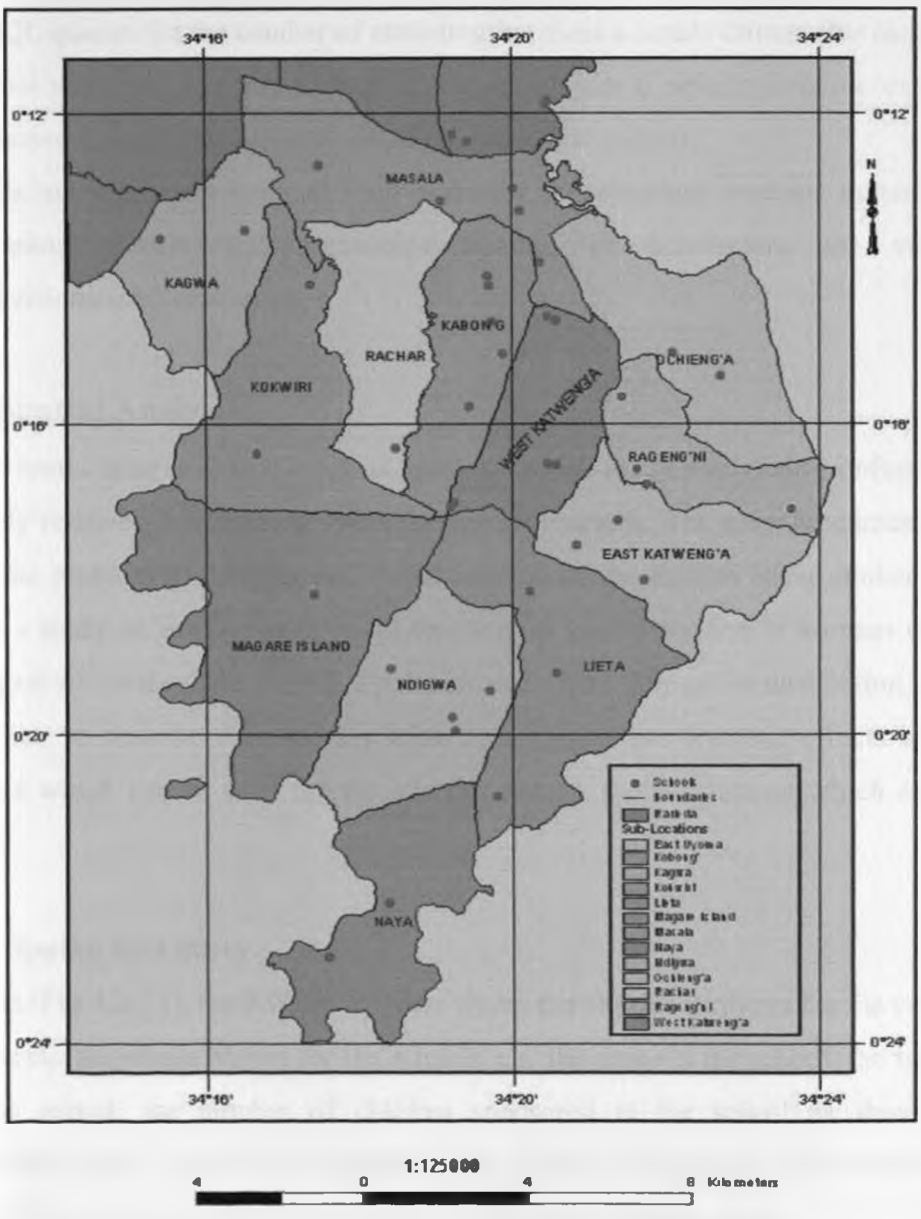

Fig 4.2.2 Map showing the sub-locations in Madiany Divition

4.3 RWDG database

The implementation of the RWDG database will facilitate various data output products. Some generic output products that can be obtained in almost real time include amongst others

a) Attribute field data entered for each entity *(for instance if school, then school_id, name, type, location, division, sub-division and number of children)*

b) SQL queries list the number of attributes that meet a certain criteria *(for instance, how many children below a certain age, or from a certain division, or have received assistance within a certain year amongst others)*

c) Statistical analysis looks at such examples as percentage amounts donated by various donors and percentage number of benefactors for various divisions/subdivisions.

4. 3.1 Spatial Analysis

Complex issues arise in spatial analysis, many of which are neither clearly defined nor completely resolved, but form the basis for current research. The most fundamental of these is the problem of defining the spatial location of the entities being studied. For example, a study on human health could describe the spatial position of humans with a point placed where they live, or with a point located where they go for medication, or by using a line to describe their weekly trips; each choice has dramatic effects on the techniques which can be used for the analysis and on the conclusions which can be obtained.

4.3.1.1 Spatial data query

As seen in (Fig 4.3.1.1), the RWDG database shows the various attributes for the various entities as per the results shown for the schools, e.g. the name of the school, the type of school as mixed, the number of children sponsored in the school as three, the administrative units. The RWDG database is also capable of displaying attribute data for various entities which include youth-centres, youth-clubs amongst others

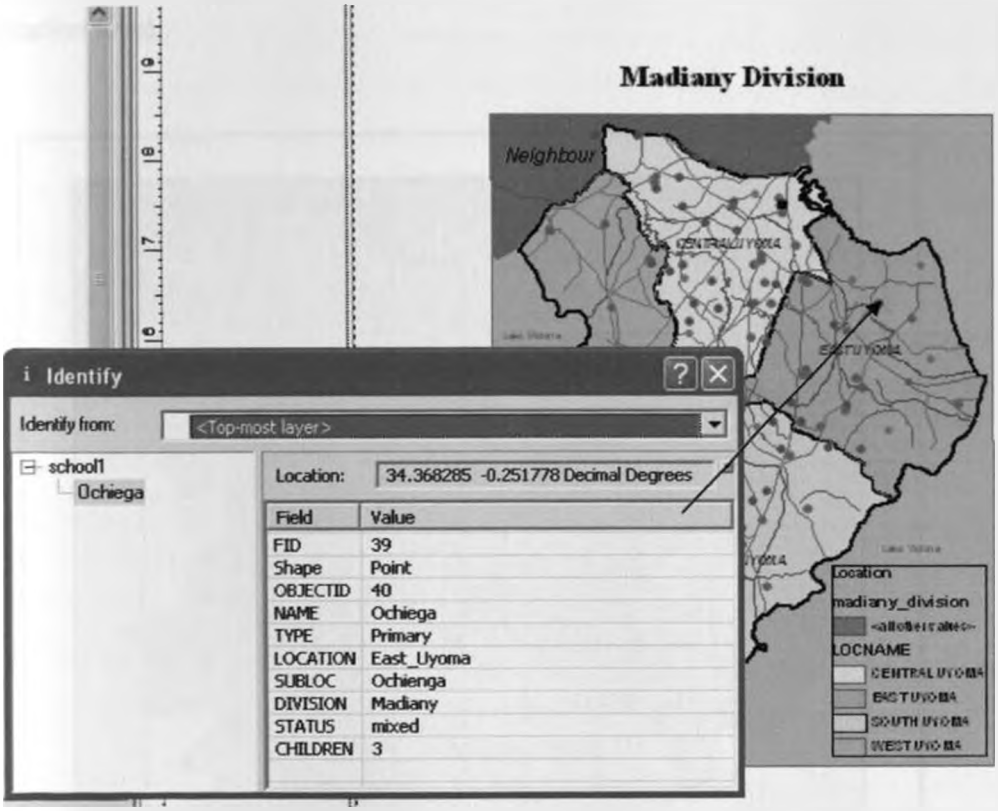

Fig 4.3.1.1 School's spatial data query

4.3.1.2 Overlaying results

By overlaying various layers on the RWDG database, it is possible to know

- The number and spatial position of schools in certain locations
- The number and spatial position of youth centres in particular locations
- The number and positions of water holes within an administrative unit
- The spatial positions of roads and road coverage per location

Map 4.3.1.2 is a combination of three overlays namely

- Location layer
- Lake layer
- School layer

From the overlays the spatial locations of the schools can be identified at location and/or sub-location level.

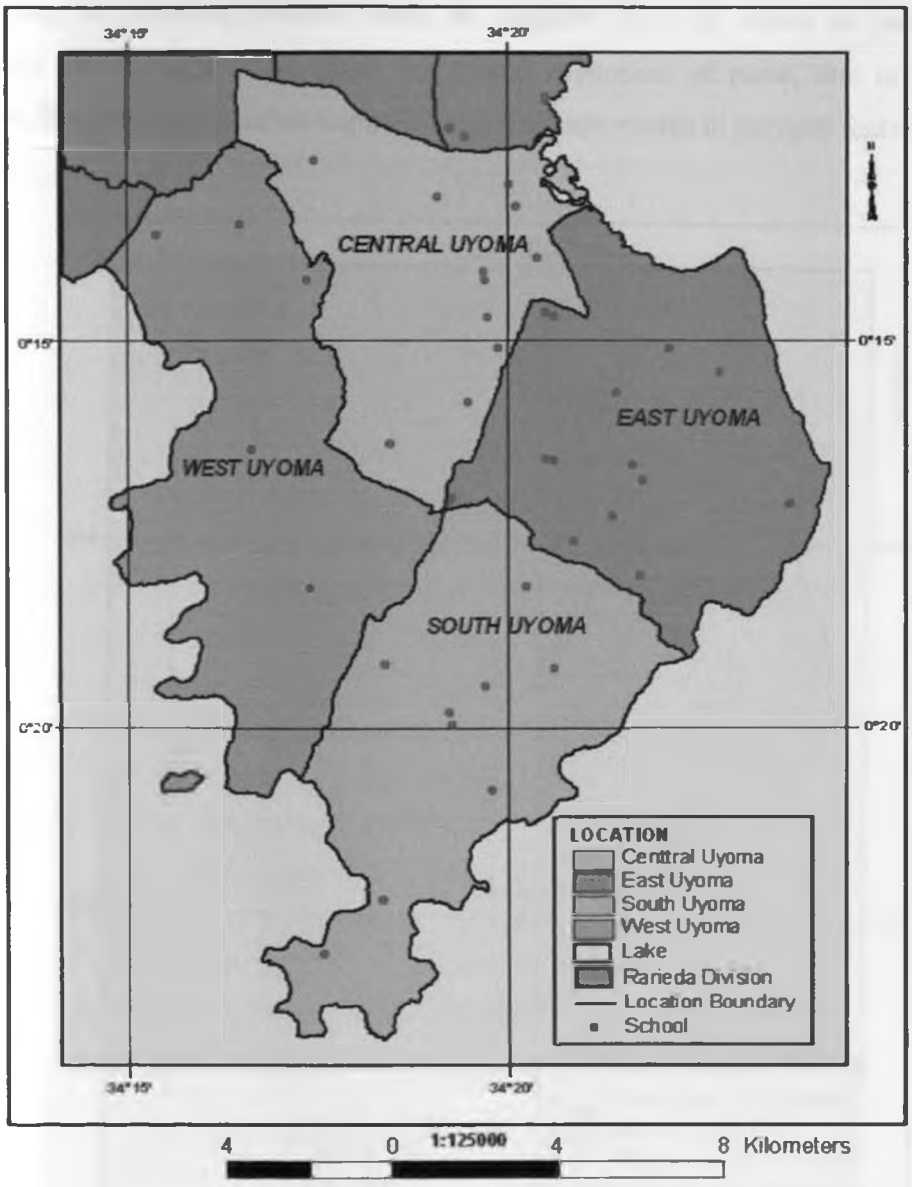

Fig. 4.3.1.2 Map showing combined overlays of schools, locations and lake

4.3.1.3 Buffering

In GIS, buffer analysis is used for identifying areas surrounding geographic features. The process involves generating a buffer around existing geographic features and then identifying or selecting features based on whether they fall inside or outside the boundary of the buffer. The zones are spatial expansion of point, line or polygon features. Because the procedure expands area, it always results in polygon features.

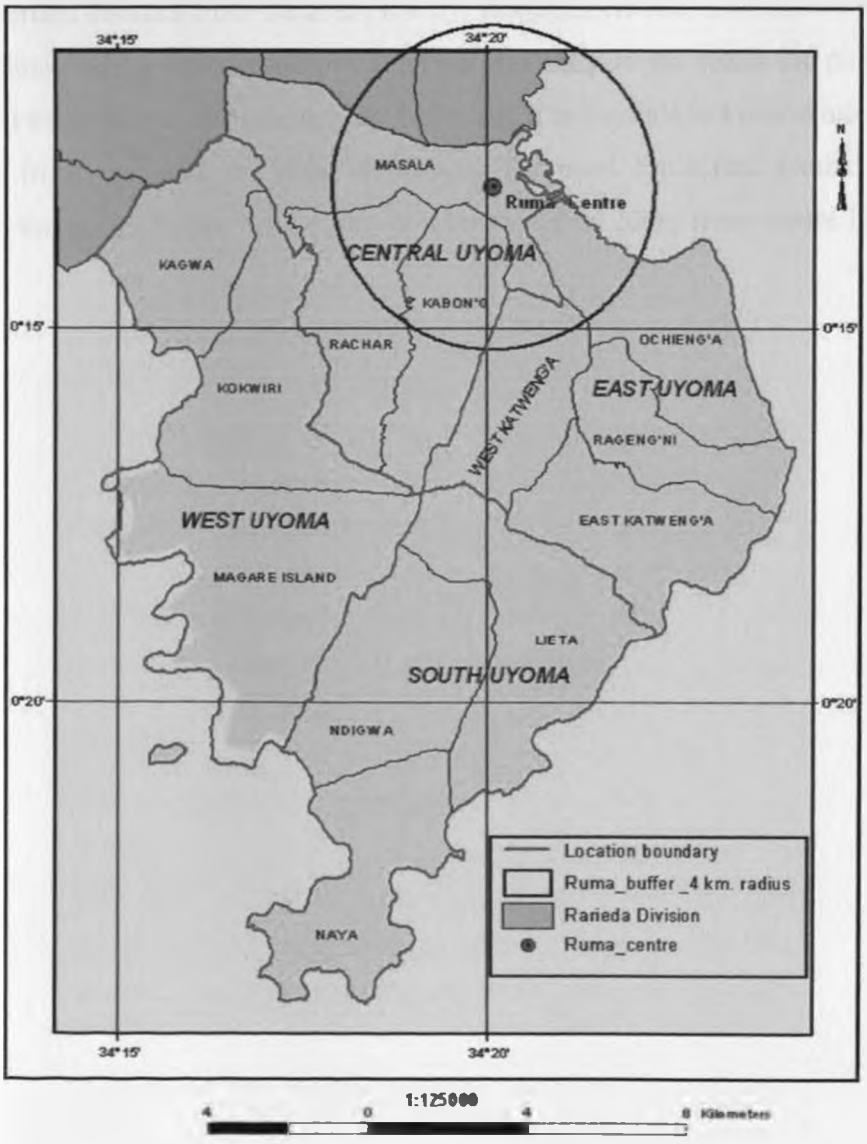

Fig 4.3.1.3 Map showing 4 km radius buffer zone initially supported area

In Fig 4.3.1.3, a 4km buffer surrounding Ruma Centre which is a point, has created an area equaling to 50,286 km^2. This was the area catered for by Ruma CBO when it started in 1994. Visualization at a glance gives a quick comparison of the previous coverage and the current coverage.

4.3.1.4 Road accessibility analysis

Buffering of roads will enable RWDG decision making managers to determine schools within a certain distance from the road. RWDG management has encountered problems of determining which schools are not in close proximity to the roads for purposes of specialized food delivery programme. By buffering, it is possible to know which schools are away from the road and thus eliminating the need for actual ground visit to determine the same. Figure 4.3.1.4 shows a buffer taken 200m from centre line of all roads.

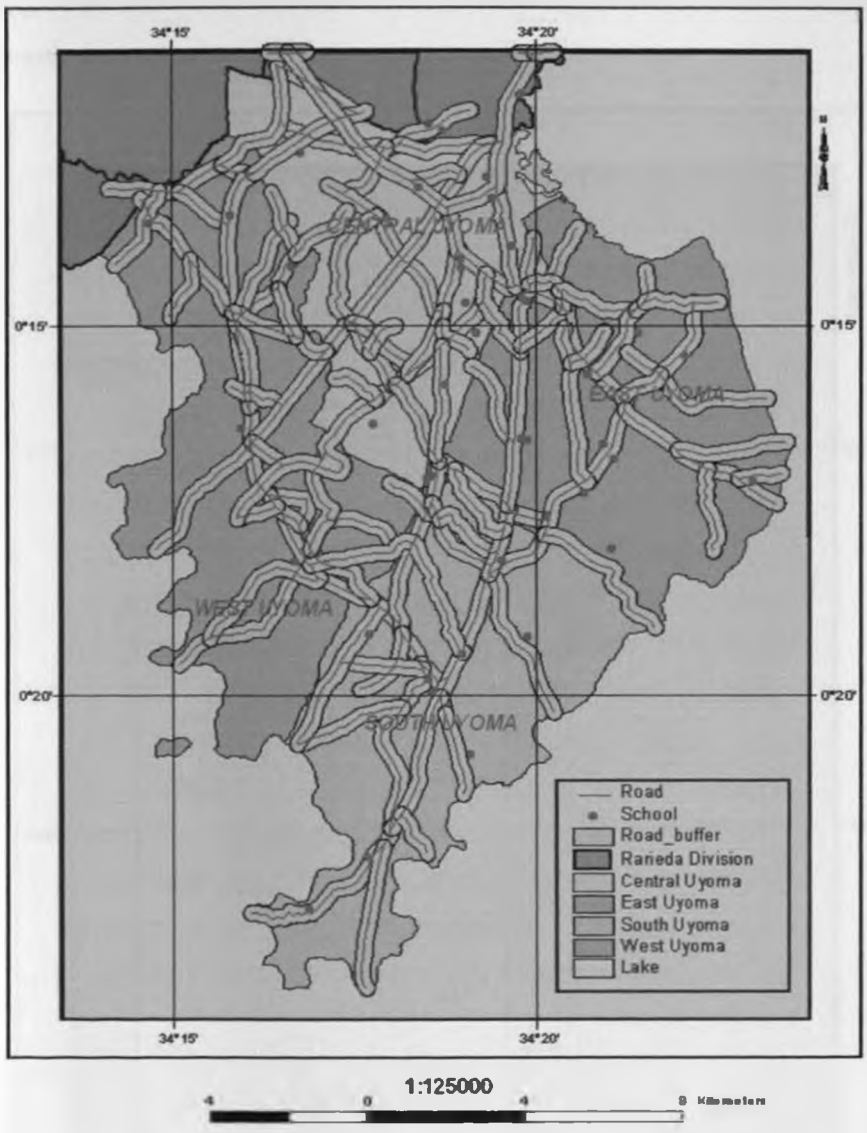

Figure 4.3.1.4 Map showing roads buffers in Madiany Division

4.3.1.5 Water accessibility analysis

By buffering 500m around all boreholes, it is possible to determine which schools have access to borehole water.

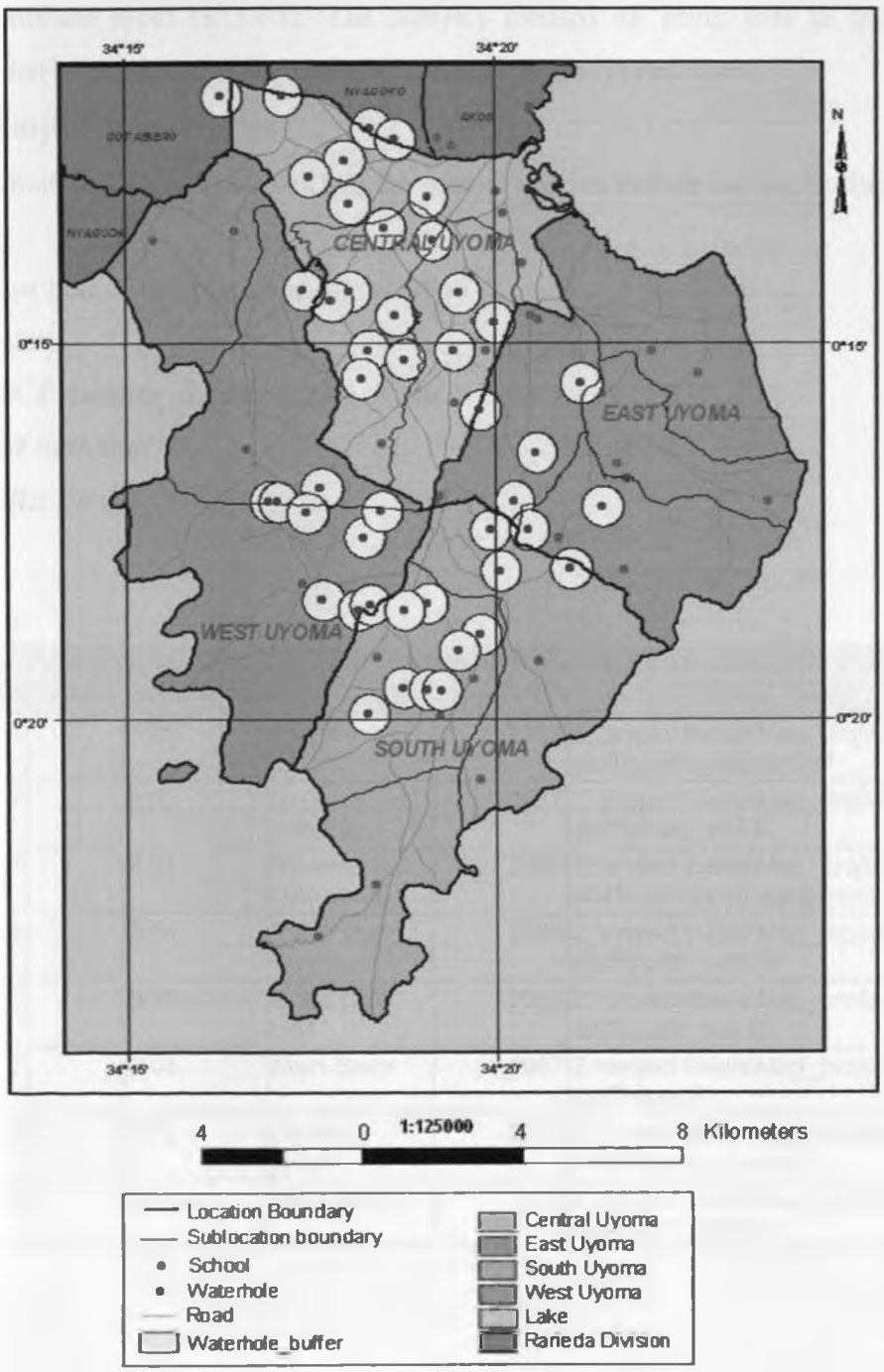

Fig 4.3.1.5 Map showing waterhole accessibility to schools

4.4 Attribute data querying

As per the Entity Relational database systems of RWDG, (see $ 3.4.3), the tables were normalized to avoid duplicate and redundant data. Skeleton tables were prepared for the various attribute types ($ 3.4.1). The analysis focused on being able to query the database and being able to retrieve non spatial data almost in real time.

4.4.1 Simple data queries

From the building table (Table 4.4.1a), the generic queries include but not limited to the following

1) How many buildings are in parcel 2966

The query

SELECT *Building_ID, Parcel_No, Name*

FROM *Buildings*

WHERE *Parcel_No=2966;*

Table 4.4.1a

Buildings					
OBJECTID	SHAPE	Building_ID	Name	Parcel_NO	Image_Files
1		B 05	Kitchen	2967	Z:\project thesis\Map_proj\ruma stuff\stoves_kitchen2.tif
2		B 02	Reuters building	2967	Z:\project thesis\Map_proj\ruma stuff\dining_hall.tif
4		B 01	Nyumba ya Ujerumani	2966	Z:\project thesis\Map_proj\ruma stuff\nyumba ya ujerumani2.tif
5		B 04	Yuoth Hall	2966	Z:\project thesis\Map_proj\ruma stuff\yuoth_hall2.tif
6		B 03	Coca Cola Hall	2965	Z:\project thesis\Map_proj\ruma stuff\yuoth_hall.tif
7		B 06	Main Store	2967	Z:\project thesis\Map_proj\ruma stuff\store.tif
8		B 07	Tailoring Room	2966	Z:\project thesis\Map_proj\ruma stuff\tailoring_room.tif
9		B 08	VCT Centre	2967	Z:\project thesis\Map_proj\ruma stuff\VCT_office.tif

The results returned is indicted in table 4.4.1b below

Table 4.4.1b

Building_ID	Parcel_No	Name
B 01	2966	Nyumba ya Ujerumani
B 04	2966	Youth Hall
B 07	2966	Tailoring Room

Considering that Ruma centre lies on three parcels, the results returned from such a query can enable the decision makers to know

1) The type of development on a specific parcel
2) The number of buildings in each parcel
3) Which property to charge if for example the objective was to acquire bank loan without over exposing the RWDG to credit risks

Similarly from the Employee table various queries can be performed

Table 4.4.1c

Employee							
ID	EMP_ID	LASTNAM	OTHERNAM	DESIGN	SALARY	PAYROLNO	PINNO
1	2578962	Ajwang	Jectone	Instructor	6000	16	A00038928L
2	2695978	Nyawanda	Rose A	Social worker	7738	6	A00038928L
3	2876258	Omedo	Janet	Cook	1500	10	A00384338K
4	3880689	Moro	Florence	Cook	1500	9	A00073746Z
5	6784437	Muga	Benter	Volunteer	1000	17	A00567277B
6	7879317	Omondi	Charles C	Prog manager	19845	2	A00309840N
7	9398007	Bwong	Eunice A	Health worker	7738	5	A00838220M
8	10718679	Ogude	Damaris A	Social worker	7738	4	A00239874J
9	12519749	Alaro	Tom M	Bookkeeper	6063	18	A00338377N
10	18677559	Chika	Gladys O	Proj coordinator	22050	1	A00309839L
11	22206211	Okwiry	Millicent	Counsellor	9000	13	A00652762V
12	22492389	Abuya	Lawrence O	Security guar	2756	7	A00387628H
13	22612629	Anyango	Felix	Counsellor	9000	12	A00257738D
14	24534032	Nyiere	Maurice	Volunteer	3000	11	A00829378L
15	24933996	Alawo	Diana	Receptionist	5000	15	A00077223X
16	52343322	Oele	Richard	Instructor	6000	14	A00073862H
17	98337999	Otieno	Paulo O	Security guar	2000	19	A00673823D

If a query is carried out on how many **Employees** earn less than five thousand Kenya shillings (5000/-), and their designations and pin numbers to be included

The query

SEL SELECT EMP_ID, SALARY, PINNO, DESIGN

FROM Employee

WHERE SALARY<5000;

The results returned is indicted in table 4.4.1d below

4.4.1d

Employee Query			
EMP_ID	SALARY	PINNO	DESIGN
2876258	1500	A00384338K	Cook
3880689	1500	A00073746Z	Cook
6784437	1000	A00567277B	Volunteer
22492389	2756	A00387628H	Security guard
24534032	3000	A00829378L	Volunteer
98337999	2000	A00673823D	Security guard

Results from employee query will indicate the employees that earn less than 5000, their job specifications and pin numbers. Decision can be made to improve salary, without having to manually search for the data. Decisions can also be made for employees who earn beyond a certain amount or within a certain range.

Other queries can also be carried out from various tables for the purpose of decision making. From the **CHILD** table it is possible to query either attribute field for instance, child name, village and guardian. It is possible to know amongst others which villages have which children that have been sponsored and determine sponsorship by village. Decision making will involve determining which village seems to be marginalized in terms of sponsorship and a decision to re-allocate more donations. From **Donor** table will enable to know donor categories and the year they started funding RWDG in addition to how much funds have been received from each donor. **Facilities** table will

aid in facilities management as a decision can be arrived at regarding the various locations of facilities. If the need to pool, re-distribute or acquire more arises then a decision can be made. Further, the status of facilities, ones due for routine maintenance and dates and also an up to date inventory of the existing facilities will have been generated by the RWDG database. The **guardian** table will enable to know no of orphans per guardian and how many other children he has for purposes of determining resource/bursary allocations.

4.4.2 Complex data queries

More complex queries can be carried out at the RWDG database involving multiple tables. For instance, if the **building** table (Table 4.2.2a) and **facilities** table (Table 4.2.2b) are linked up, it is possible to query the facilities in the library and the respective building and parcel they are in.

Table 4.4.2a

Buildings					
OBJECTID	SHAPE	Building_ID	Name	Parcel_NO	Image_Files
1		B 05	Kitchen	2967	Z:\project thesis\Map_proj\ruma stuff\stoves_kitchen2.tif
2		B 02	Reuters building	2967	Z:\project thesis\Map_proj\ruma stuff\dining_hall.tif
4		B 01	Nyumba ya Ujerumani	2966	Z:\project thesis\Map_proj\ruma stuff\nyumba ya ujerumani2.tif
5		B 04	Yuoth Hall	2966	Z:\project thesis\Map_proj\ruma stuff\yuoth_hall2.tif
6		B 03	Coca Cola Hall	2965	Z:\project thesis\Map_proj\ruma stuff\yuoth_hall.tif
7		B 06	Main Store	2967	Z:\project thesis\Map_proj\ruma stuff\store.tif
8		B 07	Tailoring Room	2966	Z:\project thesis\Map_proj\ruma stuff\tailoring_room.tif
9		B 08	VCT Centre	2967	Z:\project thesis\Map_proj\ruma stuff\VCT_office.tif

Table 4.4.2b

Facilities						
ID	ID_NO	NAME	LOCATION	QTY	YEAR	Building_ID
7	CH 001	Table Chair	Library	26	2002	B 01
8	CH 010	Table Chair	Youth Office	2	2002	B 04
9	CH 012	Table Chair	Prog. Manager	5	2002	B 01
10	CH 019	Table Chair	Pharmacy	1	2002	B 01
11	CH 020	Table Chair	Accounts Office	3	2002	B 01
12	CH 030	Table Chair	Co-or Office	12	2002	B 01
14	COMP 01	Desktop Computer	Accounts Office	1	2004	B 01
15	COMP 02	Desktop Computer	Library	1	2004	B 01
16	COMP 04	Desktop Computer	Prog. Manager	1	2004	B 01
17	COMP 05	Desktop Computer	Youth Office	1	2004	B 04
18	CTB 02	Computer Table	Accounts Office	1	2004	B 01
19	CTB 03	Computer Table	Prog. Manager	1	2004	B 01
20	CTB 04	Computer Table	Youth Office	1	2004	B 04
21	KB	Key board Yamaha	Store	1	2006	B 06
22	LP 01	Laptop Toshiba	Accounts Office	1	2005	B 01
23	LP 02	Laptop Pentium	Prog. Manager	1	2006	B 01
24	MACH 02	Metal Chair	Co-or Office	2	2004	B 03
25	MCB 01	Metal Cabinet	Co-or Office	1	2004	B 03
26	MCB 02	Metal Cabinet	Co-or Office	1	2004	B 03
27	MT 01	Motor Cycle	Store	1	2006	B 06
28	PA 02	Public Address	Store	2	2004	B 06
29	PRT 01	HP DeskJet Printer	Accounts Office	1	2001	B 01
30	PRT 02	HP DeskJet Printer	Library	1	2002	B 01
31	PRT 03	HP DeskJet Printer	Accounts Office	1	2004	B 01
32	PT 01	Pool Table	Youth Office	1	2004	B 04
33	SM 01	Sawing Machines	Tailoring Room	7	2004	B 07
34	TB 03	Office Table	Co-or Office	1	2002	B 03
35	TB 04	Office Table	Accounts Office	5	2002	B 01
36	TB 05	Office Table	Prog. Manager	2	2002	B 01
37	TB 06	Office Table	Library	2	2002	B 01
38	TB 07	Office Table	VCT Centre	3	2002	B 08
39	TEL 01	Adondo Telephone Set	Library	1	2005	B 01
40	TL 02	Television LG Set	VCT Centre	1	2006	B 08
41	TW 01	Type Writer	Pharmacy	1	1994	B 01
42	WCB 03	Wooden Cabinet	Youth Office	1	1996	B 04
43	WCB 04	Wooden Cabinet	Accounts Office	2	2002	B 01
44	WCB 06	Wooden Cabinet	Co-or Office	1	2002	B 03

The query below returns the results shown in the query table (Table 4.2.2c).

```
SELECT Buildings.Building_ID, Buildings.Parcel_NO, facilities.name,
       facilities.LOCATION, facilities.QTY
FROM   Buildings, facilities
WHERE Buildings.Building_ID='B 04'
AND    facilities.LOCATION='library';
```

Table 4.4.2c

Buildings Query

Building_ID	Parcel_NO	name	LOCATION	QTY
B 04	2966	Table Chair	Library	26
B 04	2966	Desktop Computer	Library	1
B 04	2966	HP DeskJet Printer	Library	1
B 04	2966	Office Table	Library	2
B 04	2966	Adondo Telephone Set	Library	1

The results indicate the categories of facilities in the library and the quantities of each facility are also displayed. Decision on maintenance, inventory and need to acquire and/or re-distribute the facilities can be arrived at.

4.4.3 Spatial and attribute data relationship

Spatial data can also be related to attribute data in cases of one-to-many or many-to-many association between the layers and the related data. A query is carried to generate related information. For instance, a query on facilities within a particular building can be identified by relating the buildings layer and the facilities data. From the layer menu, select buildings layer and open attribute table to be able to visualize the selected record. The selected detail will be highlighted both on the table and on the map (Fig 4.4.3a). By using the **primary key** Building_ID in Buildings table and **foreign key** Building_ID in Facilities table (Fig 4.4.3b), the two data sets are related and the records with the same Building_ID are highlighted (Fig 4.4.3c). Pointing the hyperlink icon on the highlighted building symbol, the photograph of the building will crop up.

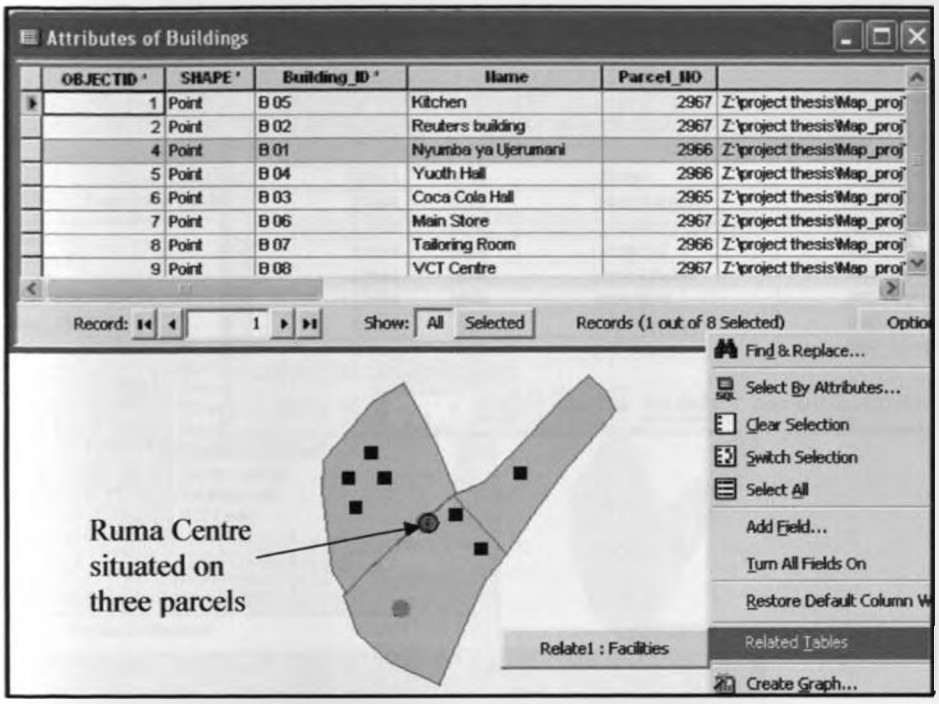

Fig 4.4.3a Spatial and Attribute data relationship

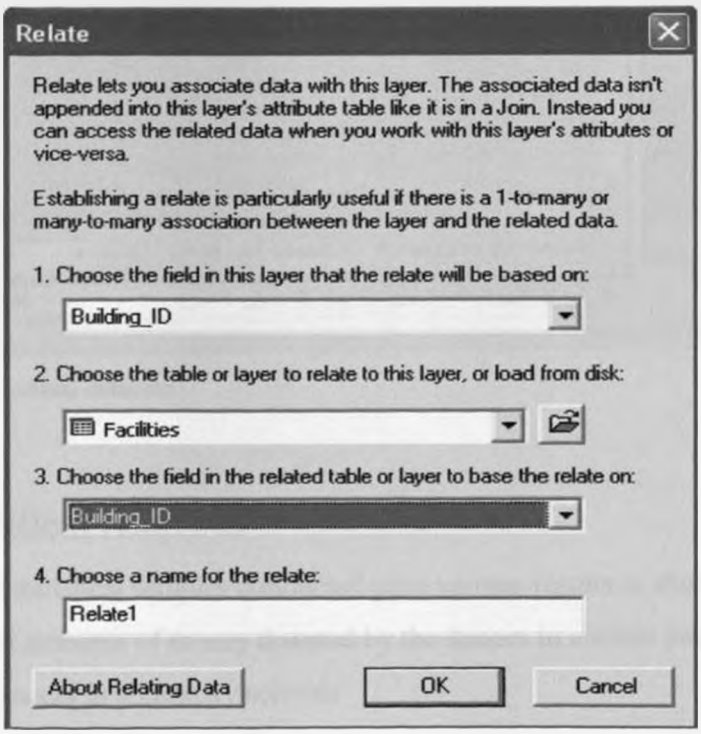

Fig 4.4.3b Procedure of relating spatial and attribute data

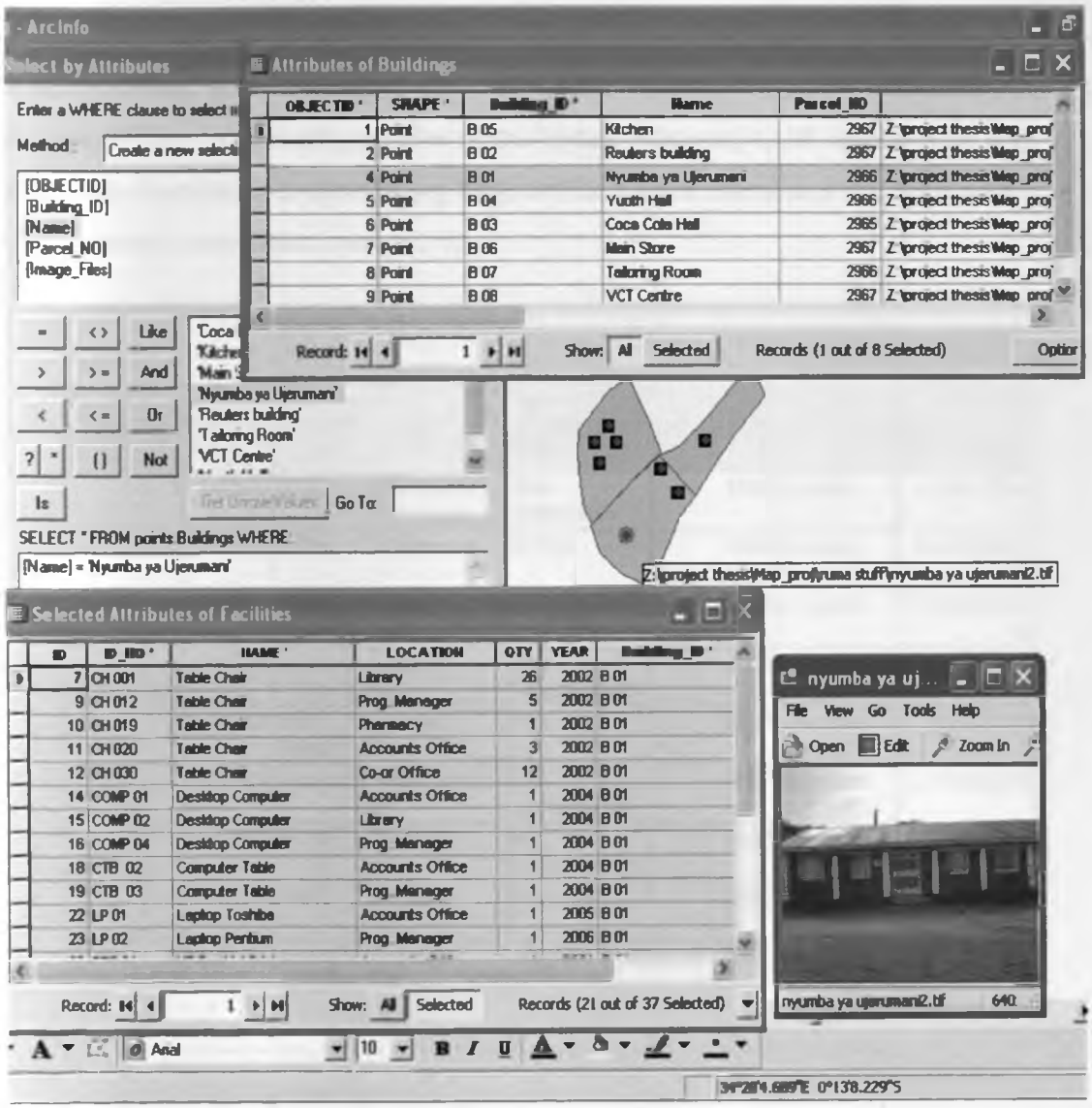

Fig 4.4.3c Related datasets

4.5 Statistical Analysis

The following statistical samples conducted gave various results as shown overleaf

- The total amounts of money donated by the donors in various years
- Fee payments in secondary schools
- Fee payments for Vocational schools

4.5.1 Donor Funding

The chart below shows the amount of money donated by various donors towards funding RWDG activities. From the Figure 4.5.1 and Table 4.5.1 shown below it is seen that Terre-Des of The Netherlands contributed the highest relatively to all other donors with a percentage contribution representing 38%. MOH, Kenya contributed the least with a total percentage contribution near to 1 %.

Table 4.5.1

Donor							
OBJECTID	DON_ID	DONNAM	COUNTRY	PROGSSUPT	START_YR	DURATION	donation
1	199401	GTZ	Germany	Aids awareness	1994	4 years	1,257,500.00
2	200002	DSW	Germany	ASRH	2000	5 years	6,456,356.00
3	200003	Terre-Des	Netherlands	FBAOSP	2000	8+ years	8,536,296.00
9	200201	JICA	Japan	Sch Development	2002	One time support	4,268,234.00
4	200601	Plan Kenya	Kenya	HBC	2006	One time support	372,604.00
7	200602	Liverpool	Netherlands	VCT Yuothfrendly	2007	One time support	250,000.00
8	200603	MOH	Kenya	VCT Yuothfrendly	2006	Continuous	120,000.00
5	200604	HACI	Kenya	FBAOSP	2006	One time support	325,000.00
6	200701	AMREF	Kenya	ASRH	2007	Continuous	175,000.00

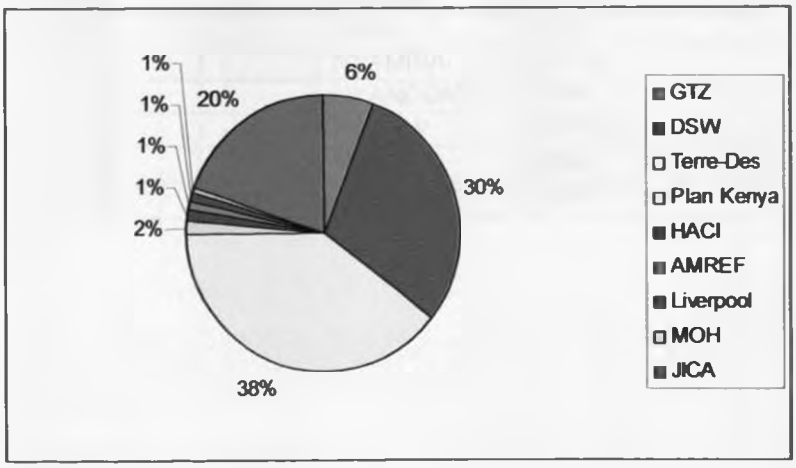

Fig 4.5.1 Donor funding in percentages

4.5.2 Secondary Schools

Donors donated to secondary schools a total of KSH 807,915 in term I and KSH 563,852 in term II in the year 2008 to a total of 82 students in 16 different schools (Table 4.5.2). This translated to an average sponsorship of KSH 9,853 per child for term I and KSH 6,876 for term II. The marked drop in sponsorship from term I to term II is attributed to the fact that the demands for the term I were higher than term II and therefore the donors gave more. Nyamira School and Raliew School received the highest percentage of donations representing 16% while Ulumbi School and Kisumu day received the lowest funding with a paltry of 1%. The statistics is extracted from secondary table (Appendix I) by summation of funds paid in a specific school. An overview of the amounts donated to each school within the year can quickly be reviewed on the chart in Fig 4.5.2 and decisions on the way forward made.

Table 4.5.2 Analysed secondary school table

NO		SCHOOL	SPONSORSHIP
1		AKOKO	58550
2		AMBIRA	23527
3		B. CHANDO	67881
4		BARDING	18584
5		CHIANDA	146565
6		KSM DAY	8500
7		MAJIWA	70681
8		MARANDA	22777
9		RAMBA	24257
10		ULUMBI	15500
11		LWAK	90908
12		NYAMIRA	200516
13		NYANGOMA	90908
14		RALIEW	200516
15		RARIEDA	90908
16		NYAMONYE	64479

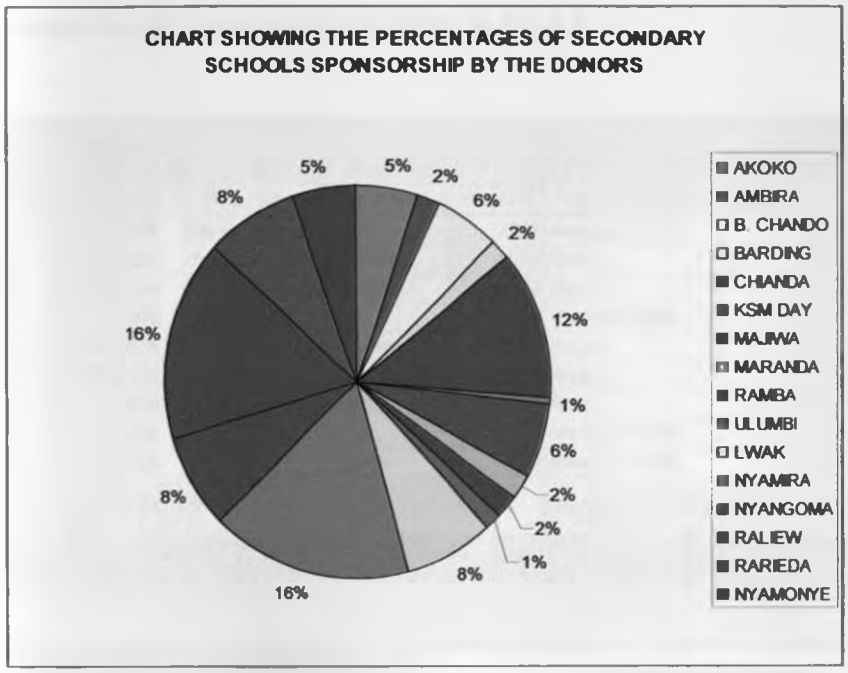

Fig 4.5.2

4.5.3 Vocational Colleges

Out of 42 students sponsored by the various donors, the amount average amount donated was KSH 6,348 per child. The amount donated was significantly lower than that for secondary schools because the fees for the vocational colleges were lower than that of secondary schools.

Out of 42 students sponsored, 13 were from St. Joseph's and the sponsored amounts were varied between KSH 2,000, KSH 2,150 and KSH 8,200. These amounts represent the fees requirements for the three courses offered namely tailoring, mechanics and carpentry respectively. In Maseno youth, 15 students were sponsored with amounts of 4000, 7500 and 11,000 for tailoring, mechanics and carpentry respectively while 11 students were sponsored from Ruma and the fee charged for the two courses offered i.e. carpentry and tailoring are flat rate of 6,000 each. The remaining three students were

sponsored at Ndere youth centre. The latter only offered only carpentry. The average amount sponsored per child is 6348 as per the statistics. From the Vocational attribute table, the statistics can be extracted as viewed in Fig 4.5.3a

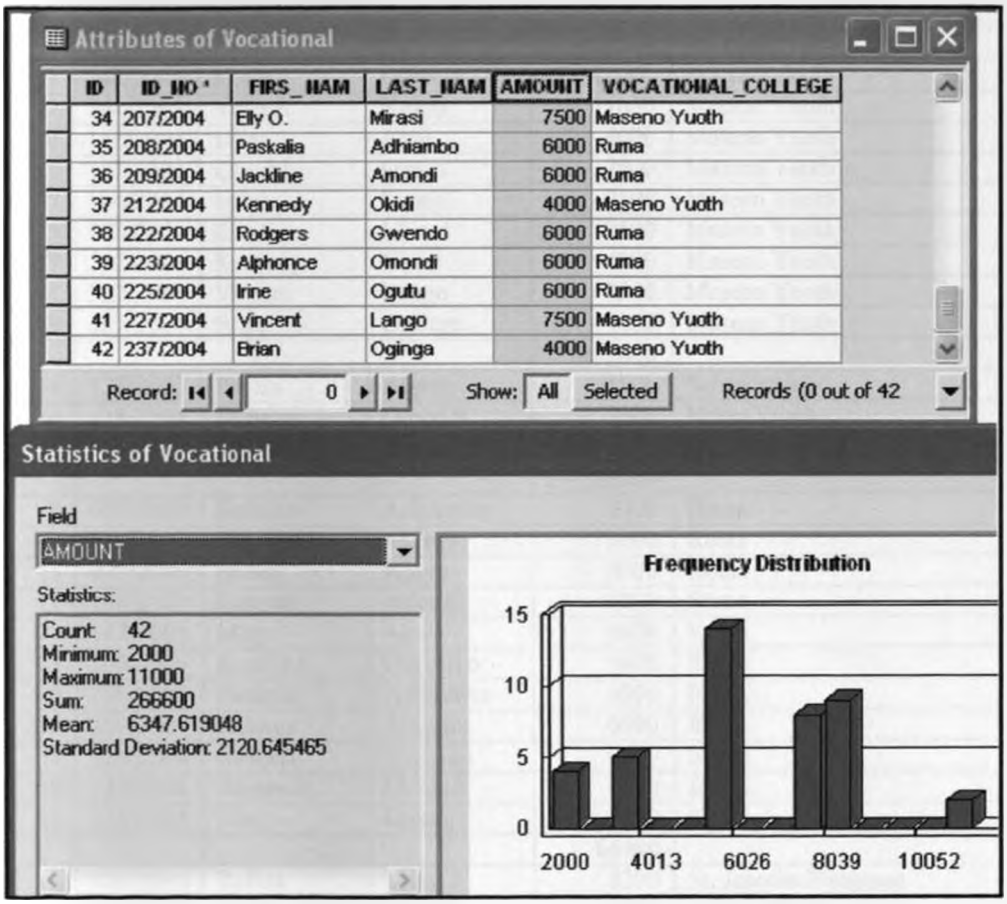

Fig 4.5.3a Statistics of Vocational

Table 4.5.3a

Vocational attribute table

ID	ID NO	FIRS NAM	LAST NAM	AMOUNT	VOCATIONAL COLLEGE
1	016/2000	Fredrick	Ochieng	7500	Maseno Yuoth
7	039/2000	James	Oloo	4000	Maseno Yuoth
8	042/2000	Alfred	Sao	7500	Maseno Yuoth
10	057/2000	Margaret	Odero	4000	Maseno Yuoth
11	058/2000	Kennedy	Dolo	7500	Maseno Yuoth
12	059/2000	Kevin	Okongo	7500	Maseno Yuoth
21	142/2004	Kevin	Owenje	11000	Maseno Yuoth
22	144/2004	Vincent	Aenda	11000	Maseno Yuoth
24	148/2004	Lilian	Akal	4000	Maseno Yuoth
26	182/2004	Edward	Osaso	7500	Maseno Yuoth
27	184/2004	Isaiah	Lango	7500	Maseno Yuoth
34	207/2004	Elly O.	Mirasi	7500	Maseno Yuoth
37	212/2004	Kennedy	Okidi	4000	Maseno Yuoth
41	227/2004	Vincent	Lango	7500	Maseno Yuoth
42	237/2004	Brian	Oginga	4000	Maseno Yuoth
				102000	
19	137/2003	Persila	Akeyo	5500	Ndere Yuoth
20	138/2004	Rodgers	Omondi	5500	Ndere Yuoth
29	191/2004	Mary	Ooma	5500	Ndere Yuoth
				16500	
9	052/2000	Beatrice	Adhiambo	6000	Ruma
14	062/2000	Quinter	Akinyi	6000	Ruma
15	072/2000	Hellen	Apiyo	6000	Ruma
17	122/2000	Maurine	Adongo	6000	Ruma
23	147/2004	Mary	Akal	6000	Ruma
32	195/2004	Roselyne	Odiembo	6000	Ruma
35	208/2004	Paskalia	Adhiambo	6000	Ruma
36	209/2004	Jackline	Amondi	6000	Ruma
38	222/2004	Rodgers	Gwendo	6000	Ruma
39	223/2004	Alphonce	Omondi	6000	Ruma
40	225/2004	Irine	Ogutu	6000	Ruma
				66000	
2	019/2000	Rufina	Moro	8200	St. Josephs Nyagoma
3	020/2000	Hellen	Ogoola	8200	St. Josephs Nyagoma
4	023/2000	Benter	Apiyo	2000	St. Josephs Nyagoma
5	026/2000	Maurine	Opiyo	8200	St. Josephs Nyagoma
6	029/2000	Mercy	Oywak	2150	St. Josephs Nyagoma
13	060/2000	Stephen	Achilo	8200	St. Josephs Nyagoma
16	074/2000	Herine	Onimbo	8200	St. Josephs Nyagoma
18	128/2003	Lilian	Onditi	2150	St. Josephs Nyagoma
25	172/2004	Persila	Ochol	2000	St. Josephs Nyagoma
28	186/2004	Elsa	Adongo	8200	St. Josephs Nyagoma
30	193/2004	Kennedy	Msungu	8200	St. Josephs Nyagoma
31	194/2004	James	Molo	8200	St. Josephs Nyagoma
33	203/2000	Jonathan	Akelo	8200	St. Josephs Nyagoma
				82100	

An example of a query on vocational table (Table 4.5.3a) was to analyse the amounts of fee payments to the vocational colleges by summation of amounts from same colleges (Table 4.5.3b) to get the comparable values by percentage on a pie chart or by visualizing values on a bar graph.

Table 4.5.3b

Vocational College	Amounts in KSH
Maseno	102,000
Ndere	16,500
Ruma	66,000
St. Joseph	82,100

Figure 4.5.3b is a chart showing the percentages of donor's money distributed to various vocational colleges while Figure 4.5.3c is showing the same information by use of bar graph. From the charts, it is observed that Maseno youth gets the greatest percentage of donor funding while Ndere youth polytechnic gets the least. This can be attributed by the fact that Maseno youth has the highest number of students and Ndere has the least.

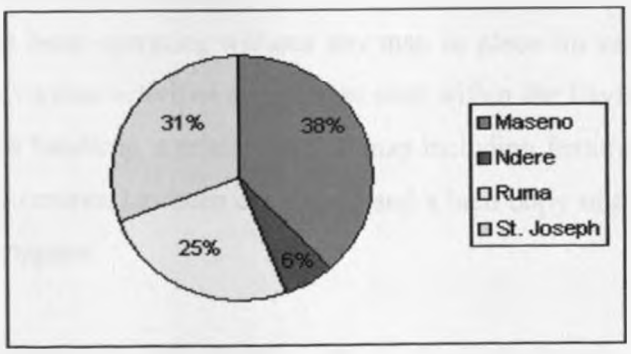

Fig 4.5.3b

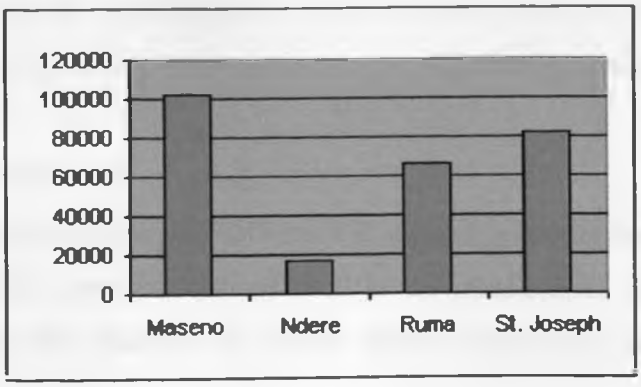

Fig 4.5.3c

CHAPTER FIVE

5.0 Conclusion and Recommendations

5.1 Conclusions

The study on RWDG has several implications on the operations of the CBO,s project. The objectives of the Ruma CBO were to develop a working database system and to produce up-to-date maps which can be used to facilitate the CBO,s management and decision making. The map results are very useful in the visualization of the locations which have or have not been covered adequately with the service delivery and hence aid in deciding on which areas need to be covered in case of new developments. From the study, several implications on the operations of RWDG are evident and have resulted to the following to the following conclusions.

5.1.1 Production of Maps

The CBO has been operating without any map in place for referencing purposes, even though it has various activities at different sites within the Division in which it operates. In view of this handicap, a relative digital map including features of interest for instance, VCT friendly centres, has been developed and a hard copy of the required layers can be produced on request.

However periodic up-date of the maps are essential and needs to be undertaken routinely, especially when expansion of the activities within the CBO are anticipated. In addition, more layers/themes can be incorporated in the digital map.

5.1.2 GIS database

As was mentioned earlier, RWDG has had difficulties in service delivery on schedule time due to the analogue methods used in the management of the various types of resources the CBO handles. The group should subscribe to use the piloted RWDG

database developed in the study, to ease the management problems. The developed GIS database will prove to be of great benefit as it will enhance the functional service delivery undertaken by the CBO.

5.1.3 Implementation of GIS System

In order to implement a GIS database, it is important to create awareness for the new system to be acceptable within the organization. Despite the fact that the acquisition of optimal hardware/software equipment and the collection of appropriate data has been in the fore-front, it is also important to have a structured and systematic implementation plan to achieve successful operations.

The existing manual processes used by the CBO should be automated gradually via phased implementation. Procedure to carry out the automation should be put in place through adoption of the various stages of GIS implementation involving technical, financial and institutional considerations as well as the awareness creation aspect.

5.1.4 Capacity building

It is essential to maintain and up-date the GIS database for it to be of any significant value. In liaison to the database maintenance, capacity development on data capture, data manipulation and data retrieval is necessary for a GIS database to function sufficiently. This process should be continuous and an ongoing activity at various stages to ensure sustainability of the database.

This task was not carried due to limitation of finances and availability of adequate personnel to be trained.

5.2 Recommendations

A GIS tool can help foster a stronger connection between CBO's and the community in the neighbourhood. The results from a GIS system may be used to initiate development and to create and maintain partnership with other CBO,s in the region by sharing goals that would enhance progress within the community. In order to have a sustainable GIS database the following are recommended.

5.2.1 Developing technical staff

Since RWDG is a fast upcoming CBO, involved with various types of resource management in Madiany division, the group has embraced the idea of implementing GIS as tool for managing its resources

(i) It is important to have the technical staff trained, or the services of an expert be incorporated for the purpose of maintaining a sustainable and an up-to-date database.

(ii) Data capture is time consuming and very expensive when in the process of implementing GIS. If too expensive in initial stages, the services of an expert can be outsourced periodically instead of employing or training a technician on permanent basis. This factor may reduce the initial expenses.

5.2.2 Data sharing

More research on data sharing should be carried out to avoid redundancy during data capture. Sharing of data will save on time and finances used during implementation of the database.

5.2.3 Partnership with CBO's within the region

Similar CBO's to the one of run by RWDG, should partner together and form a network for the purpose of effective and un-biased service delivery. From the study it was observed that clients closer to Ruma centre benefited more than the ones far from the centre. Sharing of information by the CBO's may cater for the division effectively.

5.2.4 Future progress

As the services become more intensive, a study should be carried out for future development of the RWDG database. Object oriented database management concept may be introduced.

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APPENDIX I

Row data collected from field

Annex I

Ruma Women Develop Group
Adolescnts Sexual Reproductive Health
Monthly breakdown (Year 2008)

Expenditure	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Total
1.0 Project running cost													
Stationery	3,000.00			3,000.00			3,000.00			3,000.00			12,000.00
Communication	1,500.00			1,500.00			1,500.00			500.00			5,000.00
Photocopying	636.00			636.00			636.00			642.00			2,550.00
Sub total	5,136.00	0.00	0.00	5,136.00	0.00	0.00	5,136.00	0.00	0.00	4,142.00	0.00	0.00	19,550.00
2.0 Activity 1 - Training													
2.1 Life skill				53,360.00			53,360.00						106,720.00
2.2 Peer learning sessions			6,000.00	6,000.00		6,000.00	6,000.00	6,000.00		6,000.00	6,000.00	6,000.00	48,000.00
2.3 Peer Trainers Training				48,100.00									48,100.00
2.4 Community/Schools outreach	38,585.00					24,565.00				47,370.00			111,500.00
2.5 Training parents Familie's matter						36,360.00				36,360.00			72,720.00
2.6 Marking world Aids Day											76,500.00		76,500.00
2.7 Facilitating RH discussion forum					15,000.00				15,000.00				30,000.00
Sub total	38,585.00	0.00	6,000.00	108,460.00	15,000.00	66,925.00	59,360.00	6,000.00	15,000.00	89,730.00	82,500.00	6,000.00	484,520.00
3.0 Activity 2													
3.1 Vocational training						40,000.00	40,000.00						80,000.00
3.2 Strengthening IGA									100,000.00				100,000.00
3.3 Distribution of IEC materials			25,000.00			25,000.00						25,000.00	75,000.00
Sub total	0.00	0.00	25,000.00	0.00	0.00	65,000.00	40,000.00	0.00	100,000.00	0.00	0.00	25,000.00	255,000.00
4.0 Monitoring and Evaluation													
4.1 Club monitoring and Evaluation	9,000.00			9,000.00			9,000.00			9,000.00			36,000.00
Sub total	9,000.00	0.00	0.00	9,000.00	0.00	0.00	9,000.00	0.00	0.00	9,000.00	0.00	0.00	36,000.00
Total Project Cost	53,701.00	0.00	31,000.00	122,596.00	15,000.00	131,925.00	113,496.00	6,000.00	115,000.00	102,872.00	82,500.00	31,000.00	886,070.00

Food supply for needy guardians

RUMA FAMILY BASED AIDS ORPHAN SUPPORT PROGRAM
FOOD FOR NEEDY GUARDIANS SUPPORTED BY RWG/TDH PARTNERSHIP

NO.	NAME OF GUARDIAN	NO. OF ORPHANS	NO. OF CHILDREN IN HOMESTEAD	MAIZE (TINS)	BEANS (TINS)	COOKING FAT (TINS)	T. LEAVES (PKT)	SUGAR (PKT)	BAR SOAP (PCS)	SALT(PKT)	ID. NUMBER	SIGNATURE
1	Anton Gwada	1	2	3	1	1	1	1	1	1		
2	Chrispine Jamwa	2	3	6	2	1	1	1	1	1		
3	Christine Ogulu	2	3	6	2	1	1	1	1	1		
4	Susana Anyango	1	13	3	1	1	1	1	1	1		
5	Pelesia Kuma	1	6	3	1	1	1	1	1	1		
6	Selina Mirasi	1	1	3	1	1	1	1	1	1		
7	Leah Mbwayo	1	4	3	1	1	1	1	1	1		
8	Syprose Agola	2	4	6	2	1	1	1	1	1		
9	Peres Anyango	2	4	6	2	1	1	1	1	1		
10	Jeel Chira	1	4	3	1	1	1	1	1	1		
11	Isabela Ombok	1	3	3	1	1	1	1	1	1		
12	Christine Nyangidi	1	5	3	1	1	1	1	1	1		
13	Jacinter Otieno	2	10	6	2	1	1	1	1	1		
14	Sylvester Arwa	1	1	3	1	1	1	1	1	1		
15	Sulmena Obando	1	2	3	1	1	1	1	1	1		
16	Susana Akodhe	5	2	15	5	3	2	3	3	2		
17	Jenipher Otiende	1	2	3	1	1	1	1	1	1		
18	Mary Omondi	1	4	3	1	1	1	1	1	1		
19	Diana Omoth	1	4	3	1	1	1	1	1	1		
20	Phoebe Bolo	3	6	9	3	2	2	2	2	2		
21	Helida Ogongo	1	5	3	1	1	1	1	1	1		
22	Francis Oyugi	5	2	15	5	3	2	3	3	2		
23	Monica Oywali	3	2	9	3	2	2	2	2	2		
24	Magdaline Okome	4	1	12	4	2	2	2	2	2		
25	Pheobe Mbede	2	4	6	2	1	1	1	1	1		
26	Rose Olunda	2	2	6	2	1	1	1	1	1		
27	Richard Aloo	4	4	12	4	2	2	2	2	2		
28	Mary Odie	1	7	3	1	1	1	1	1	1		
29	Dorcas Odhiambo	2	5	6	2	1	1	1	1	1		
30	Sara Owiti	2	4	6	2	1	1	1	1	1		
31	David Owiti	2	5	6	2	1	1	1	1	1		
32	Teresa Jura	1	6	3	1	1	1	1	1	1		

Food supply for needy guardians

NO.	Name of guidian	No. of orphans in the H/stead	Other Children in the H/stead	Total No. of people in the homestead	MAIZE (TINS)	BEANS (TINS)	COOKING FAT (TINS)	TEA LEAVES (PKT)	SUGAR (PKT)	BAR SOAP (PCS)	SALT (PKT)	I.D NUMBER	SIGNATURE
33	Rael Opiyo	3	6	10	20	10	1	1	1	1	1		
34	Agneta Deya	4	4	9	18	9	1	1	1	1	1		
35	Wilfrida Abuoda	1	3	5	10	5	1	1	1	1	1		
36	Elisha Osano*	2	0	3	6	3	1	1	1	1	1		
37	Christina Rasugu	3	2	6	12	6	1	1	1	1	1		
38	Alice Owuor	2	10	13	26	13	1	1	1	1	1		
39	Doreen Omedo	2	10	13	26	13	1	1	1	1	1		
40	Christine Oluoch	1	10	12	24	12	1	1	1	1	1		
41	Janet Ojuang'	1	5	7	14	7	1	1	1	1	1		
42	Violet Owino	4	3	8	16	8	1	1	1	1	1		
43	Benta Oyugi	1	6	8	16	8	1	1	1	1	1		
44	Doreen Alando	2	3	6	12	6	1	1	1	1	1		
45	Nelly Ambila	2	4	7	14	7	1	1	1	1	1		
46	Alice Adhiambo	3	5	9	18	9	1	1	1	1	1		
47	Wilkista Otieno	1	2	4	8	4	1	1	1	1	1		
48	Wilfrida Abota	1	3	5	10	5	1	1	1	1	1		
49	Joan Ochung	1	4	6	12	6	1	1	1	1	1		
50	Monica Otieno	2	5	8	16	8	1	1	1	1	1		
51	Margaret Opiyo	2	3	6	12	6	1	1	1	1	1		
52	Millycent Aluoch	1	6	8	16	8	1	1	1	1	1		
53	Juliana J. Mito*	2	0	3	6	3	1	1	1	1	1		
54	Conslata Oyuu	2	4	7	14	7	1	1	1	1	1		
55	Leonida Dolo	1	5	7	14	7	1	1	1	1	1		
56	Prisca Odawa	1	4	6	12	6	1	1	1	1	1		
57	Robinson Onura	1	4	6	12	6	1	1	1	1	1		
58	Salome Lusi	2	4	7	14	7	1	1	1	1	1		
59	Rose Odiembo	3	2	6	12	6	1	1	1	1	1		
60	Rose Ogola	2	4	7	14	7	1	1	1	1	1		
61	Helida Arwa	1	2	4	8	4	1	1	1	1	1		
62	Syprose Akal	3	15	19	38	19	1	1	1	1	1		
Total	62	117	284	463	926	463	62	62	62	62	62		

Note:

Column 1: Serial number of the guardian to the orphans

Column 2: Name of the guardian

Column 3: Other children in the homestead

Column 4: Total number of persons in the homestead

Staff of RWDG

RUMA WOMEN DEVELOPMENT GROUP

NO	NAMES	PAYROLL NUMBER	ID NUMBER	RENUME-RATION	NHIF	NSSF	PAYE
1	Gladys O. Chika	001	1867559	22,050.00	R1591495	6933815	A003098399L
2	Charles C. Omondi	002	7879317	19,845.00	R1552699	500137927	A003098404N
3	Damaris A. Ogude	004	10718679	7,738.00	R1549428	716649810	
4	Rose A. Nyawenda	006	2695978	7,738.00	R1549560	716683814	
5	Eunice A. Bwong	005	9398007	7,738.00	R1549559	716648814	
6	Tom M. Alaro	018	12519749	6,063.00	R1549569	500135924	
7	Lawrence O. Abuyo	007	22492389	2,756.00	R1591496		
8	Paulo	019		5,00.00			
9	Florence Moro	009	3880689	1,500.00			
10	Janet Omedo	010	2876258	1,500.00			
11	Jectone Ajwang	016		6,000.00			
12	Richard Oele	014		6,000.00			
13	Maurice O. Nyiera	011	24534032	3,00.00			
14	Benter Muga	017	6784437	1,000.00			
15	Felix O. Anyango	012	22612629	9,000.00			
16	Millicent A. Okwiry	013	22206211	9,000.00			
17	Diana A. Alawo	015	24933996	5,000.00			

REPUBLIC OF KENYA

THE REGISTERED LAND ACT

(Chapter 300)

Title Deed

Title Number WEST UYOMA/MASALA/2965

Approximate Area (0.1) ha.

Registry Map Sheet No. 20

This is to certify that RUMA WOMEN GROUP

. . . . . .

. . . . . .

. . . . . .

is ~~(are)~~ now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the

SIAYA District Land Registry

this 23rd day of AUGUST, 20 07

Land Registrar

P. O. Box 098

REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(Chapter 300)

Title Deed

Title Number SIAYA/MASALA/2966

Approximate Area (0.14) ha.

Registry Map Sheet No. 20

This is to certify that RUMA WOMEN GROUP

. . . . . .

. . . . . .

. . . . . .

is ~~(are)~~ now registered as the absolute proprietor~~(s)~~ of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the

SIAYA District Land Registry

this 23rd day of AUGUST, 20 07

D. O. Dulo
Land Registrar

REPUBLIC OF KENYA

THE REGISTERED LAND ACT
(Chapter 300)

Title Deed

Title Number SIAYA/MASALA/2967

Approximate Area (0.16) ha.

Registry Map Sheet No. 20

This is to certify that RUMA WOMEN GROUP

(. . . . .)

. . . . . .

. . . . . .

is/~~are~~ now registered as the absolute proprietor(s) of the land comprised in the above-mentioned title, subject to the entries in the register relating to the land and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land.

GIVEN under my hand and the seal of the

SIAYA District Land Registry

this 23rd day of AUGUST, 20 07

D. O. District Registrar

First term tuition fee for supported Orphans in secondary

TERM ONE SECONDARY SCHOOL FEES SCHEDULE					
1	**LWAK GIRLS**		7	**AKOKO**	
	MAUREEN A. AIRO	18,000		ALEX AIKI	12,750
	JAEL A. KUNGU	18,000		RICHARD NYAKINYA	12,750
	SHARON EVE O	22,650		GEORGE DIBOGO	12,750
	BANK COMM	200		RONALD OMONDI	3,875
	TOTAL	**58,850**		SAMWEL OKWIRI	3,875
				BANK COMM.	200
2	**NYAMIRA**			**TOTAL**	**46,200**
	CHRISTINE OGOLA	10,700			
	ROSEMARY AKINYI OMBEWA	10,665	8	**NYANGOMA BOYS**	
	WINNIE ACHIENG OPEYO	10,700		DUNCAN OMOLLO	17,493
	DONNA AKOTH AWUOTH	17,877		JOSEPH A. AMOLO	14,843
	MARGARET ATIENO OLUNDHA	18,077		STEPHEN OYUGI	14,843
	LAURA ELSIE OGINGA	17,877		EMMANUELA OWINO	14,841
	EUNICE ATIENO RAYUOYI	15,027		BANK COMM	200
	EDITH ATIENO OCHIENG	15,027		**TOTAL**	**82,220**
	BANK COMM	200			
	TOTAL	**116,150**	9	**MAJIWA**	
				CHARLES OKUNGU	18,587
3	**NYAMONYE**			DENNIS MILLA	14,437
	ANNE ONYONGE	10,000		ZACHARIA OPIYO	14,437
	EVELYN OWINO	10,000		BANK COMM	200
	ROSE OGWENY	10,000		**TOTAL**	**47,661**
	BANK COMM	200			
	TOTAL	**30,200**	10	**RALIEW**	
				NAHSHON OUKO	15,100
4	**BARCHANDO**			PHELIX ONURA	15,100
	AGNES OMOSO	19,050		MICHAEL JAMWA	15,300
	BEATRICE ONEKO	19,050		BANK COMM.	600
	GRACE JAGONGO	19,050		**TOTAL**	**46,100**
	BANK COMM	400			
	TOTAL	**57,550**	11	**CHIANDA**	
				KENNEDI BONDI	17,440
				OSCAR MILLA	17,440
5	**ST. SYLVESTERS**			WYCLIFFE OMONDI OWINO	17,440
	EMMA OTUMBA	10,150		JOSEPH OCHIEL	13,200
	JERUSHA ORACHA	10,150		WYCLIFFE DEYA	13,600
	MAUREEN GWENDO	10,150		BANK COMM.	200
	MAUREEN MILLA	10,150		**TOTAL**	**79,320**
	CATHRINE OPIYO	13,150			
	CAROLINE OGONY	13,150	12	**OKELA MIXED SEC.**	
	DOREEN MOLO	13,150		JULIANA MITO	
	QUINTER ODETE	13,150			
	VIVIAN OBIERO	13,150	13	**KISUMU DAY SEC. SCHOOL**	
	RISPER OGUTU	10,150		LAWRENCE CHIKA	**4,700**
	BANK COMM	200			
	TOTAL	**116,700**	14	**MASENO**	
				MICHAEL OTIENO OGOLA	22,950
6	**RAMBA BOYS**			BANK COMM.	200
	GILBERT OUMA	13,027		TOTAL	**23,150**
	TOTAL	**13,027**			

First term tuition fee for supported Orphans in secondary

15	**NGERE HIGH**		19	**RARIEDA MIXED**	
	JOEL ORWA	10,850		SHARON MORO	4,600
	TOTAL	**10,850**		JUDITH OTUMBA	4,600
				MERCILINE AMBILA	4,600
				BRENDA OMINDO	4,600
16	**ULUMBI MIXED**			BERYL AWINO	4,600
	ERIC ANYANGO	10,000		MERCY AWANDO	3,900
	BANK COMM	200		MONICA AMOLO	3,900
	TOTAL	**10,200**		OSCAR ODHIAMBO	4,600
				WALTER ODERO	4,600
17	**GAGRA MIXED SEC.**			ELISHA OKUKU	4,600
	EVANS AYUNGO	4,000		GEOFFREY ODIEMBO	4,600
	ELIZABETH OOMA	7,150		VINCENT ODERO	3,900
	COLLINS OWITI	7,150		PETER ODERO	3,900
	COLLETA AWINO	4,000		SAMUEL ODAWA	3,900
	HARUN ONYANGO	3,000		CHARLES OKUKU	3,900
	CHARLES OPIYO	3,000		BANK COMM.	400
	STEPHEN MBAWI	3,000		**TOTAL**	**65,200**
	DAVID OCHIENG	4,000			
	JOHN ODHIAMBO JUMA	4,000	20	**BARDING**	
	PAULINE AKOTH	3,490		BRIAN OKULLU	12,050
	JOHN OKOTH OWUOR	4,000		BANK COMM.	200
	BANK COMM.	400		**TOTAL**	**12,250**
	TOTAL	**47,190**			
			21	**AMBIRA**	
18	**MARANDA HIGH**			VICTOR OCHIENG	15,750
	PETER OCHIEL	15,000		BANK COMM.	200
	TOTAL	**15,000**		**TOTAL**	**15,950**
	SUMMARY OF SEC. PAYMENTS			**TERM ONE 2008**	
	SCHOOL	**CHQ. NO**		**AMOUNT**	
1	**LWAK GIRLS**			58,850	
2	NYAMIRA GIRLS			116,150	
3	**NYAMONYE GIRLS**			30,200	
4	BAR CHANDO			57,550	
5	**ST. SYLVESTERS**			116,700	
6	AKOKO MIXED			46,200	
7	**NYANGOMA BOYS**			62,220	
8	MAJIWA BOYS			47,661	
9	**RALIEW MIXED**			46,100	
10	CHIANDA BOYS			79,320	
11	**RAMBA BOYS**			13,027	
12	NGERE HIGH			10,850	
13	**BARDING**			12,250	
14	AMBIRA			15,950	
15	**MARANDA**			15,000	
16	ULUMBI			10,200	
17	**RARIEDA MIXED**			65,200	
18	GAGRA MIXED			47,190	
19	**MASENO**			23,150	
20	OKELA MIXED SEC				
21	**KISUMU DAY**			4,700	
	TOTAL			**878,468**	

Second term tuition fee for supported Orphans in secondary

TERM TWO SCHOOL FEES SCHEDULE

1	**LWAK GIRLS**		7	**NYANGOMA BOYS**	
	MAUREEN A. AIRO	18,567		DUNCAN OMOLLO	11,868
	JAEL A. KUNGU	15,567		JOSEPH A. AMOLO	10,384
	SHARON EVE. O.	8,774		STEPHEN OYUGI	11,584
	BANK COMM	200		EMMANUELA OWINO	9,136
	TOTAL	**43,108**		BANK COMM	200
				TOTAL	**43,172**
2	**NYAMIRA**				
	DONA AKOTH	11,100	8	**MAJIWA**	
	LAURA OGINGA	11,100		CHARLES OKUNGU	8,990
	MARGARET OLUNDHA	11,100		DENNIS MILLA	9,190
	EUNICE AYUOYI	11,100		ZACHARIA OPIYO	9,190
	EDITH OCHIENG	11,100		BANK COMM	200
	CHRISTINE OGOLA	10,057		**TOTAL**	**27,570**
	ROSE OMBEWA	10,022			
	WINNIE OPEYO	10,020	9	**RALIEW**	
	BANK COMM	200		NAHSHON OUKO	5,527
	TOTAL	**85,799**		PHELIX ONURA	5,527
				MICHAEL JAMWA	2,525
3	**NYAMONYE**			BANK COMM	200
	ANNE ONYONGE	11,493		**TOTAL**	**13,779**
	EVELYN OWINO	11,493			
	ROSE OGWENY	11,493	10	**CHIANDA**	
	BANK COMM	200		KENNEDI BONDI	16,127
	TOTAL	**34,679**		OSCAR MILLA	16,127
				WYCLIFFE OWINO	16,127
4	**BARCHANDO**			JOSEPH OCHIEL	16,167
	AGNES OMOSO	7,727		WYCLIFFE DEYA	16,167
	BEATRICE ONEKO	7,727		BANK COMM	200
	GRACE JAGONGO	7,727		**TOTAL**	**80,915**
	BANK COMM	200			
	TOTAL	**23,381**	11	**RARIEDA MIXED**	
				SHARON MORO	2,200
5	**ST. SYLVESTERS**			JUDITH OTUMBA	2,200
	EMMA OTUMBA	10,000		MERCILINE AMBILA	2,200
	JERUSA ORACHA	10,000		BRENDA OMINDO	2,200
	MAUREEN GWENDO	10,000		BERYL AWINO	2,200
	MAUREEN MILLA	10,000		MERCY AWANDO	2,200
	CATHRINE OPIYO	7,000		MONICA AMOLO	2,000
	CAROLINE OGONY	7,000		OSCAR ODHIAMBO	2,200
	DOREEN MOLO	7,000		WALTER ODERO	2,200
	QUINTER ODETE	7,000		ELISHA OKUKU	2,200
	VIVIAN OBIERO	7,000		GEOFFREY ODIEMBO	2,200
	RISPER OGUTU	10,000		VINCENT ODERO	2,000
	BANK COMM	200		PETER ODERO	2,000
	TOTAL	**85,200**		SAMUEL ODAWA	2,200
				CHARLES OKUKO	2,000
6	**AKOKO**			VINCENT O. OMOLLO	10,400
	ALEX AIKI	5,000		BANK COMM	200
	RICHARD NYAKINYA	5,000		**TOTAL**	**42,800**
	GEORGE DIBOGO	5,000			
	RONALD OMONDI	5,000	12	**RAMBA BOYS**	
	SAMWEL OKWIRI	5,000		GILBERT OUMA	11,230
	BANK COMM	200		BANK COMM	200
	TOTAL	**25,200**		**TOTAL**	**11,430**

Second term tuition fee for supported Orphans in secondary

13	**NGERE HIGH**	
	JOEL ORWA	9,700
	BANK COMM.	200
	TOTAL	**9,900**
14	**MASENO**	
	MICHAEL OGOLA	**11,800**
15	**ULUMBI MIXED**	
	ERIC ANYANGO	5,500
	BANK COMM	200
	TOTAL	**5,700**
16	**MARANDA HIGH**	
	PETER OCHIEL	7,777
	BANK COMM	200
	TOTAL	**7,977**
17	**AMBIRA**	
	VICTOR OCHIENG	7,777
	BANK COMM	200
	TOTAL	**7,977**
18	**BARDING**	
	BRIAN OKULLU	6,534
	BANK COMM	200
	TOTAL	**6,734**

19	**GAGRA MIXED DAY**	
	ELIZABETH OOMA	250
	COLLINS OWITI	450
	HARUN ONYANGO	450
	STEPHEN MBAWI	450
	FREDRICK O. OPONDO	1,500
	PAULINE ONIMBO	2,110
	JOHN OKOTH	1,600
	CHARLES OPIYO	2,600
	TOTAL	**9,410**
20	**OKELA MIXED SEC.**	
	JULIANA MITO	**1,900**
21	**KISUMU DAY**	
	LAWRENCE OMONDI	**3,800**
22	**RALIEW MIXED**	
	PHELIX ONURA	1,500
	NAHSHON OUKO	1,500
	MICHAEL JAMWA	1,500
	TOTAL	**4,500**

	SUMMARY OF SECONDARY SCHOOL FEES PAYMENTS			**TERM TWO 2008**
	SCHOOL	**CHQ. NO**		**AMOUNT**
1	**LWAK GIRLS**	100,237		43,108
2	NYAMIRA GIRLS	100221		85,799
3	**NYAMONYE GIRLS**	100223		34,879
4	BAR CHANDO	100,230		23,381
5	**ST. SYLVESTERS**	100226		85,200
6	AKOKO MIXED	100,232		25,200
7	**NYANGOMA BOYS**	100227		43,172
8	MAJIWA BOYS	100222		27,570
9	**RALIEW MIXED**	100,228		13,779
10	CHIANDA BOYS	100229		80,915
11	**RARIEDA MIXED**	100,239		42,800
12	RAMBA BOYS	100,225		11,430
13	**NGERE HIGH**	100220		9,900
14	MASENO	100,216		11,800
15	**ULUMBI**	100,231		5,700
16	MARANDA	100234		7,977
17	**AMBIRA**	100,238		7,977
18	BARDING	100233		6,734
19	**GAGRA MIXED**	CASH		9,410
20	OKELA MIXED SEC.	CASH		1,900
21	**KISUMU DAY**	CASH		3,800
22	RALIEW MIXED	CASH		4,500
	TOTAL			**586,731**

Second term tuition fee for supported Orphans in vocational

2008 TERM TWO VOCATIONAL TRAINING FEES SCHEDULE

1	**ST. JOSEPHS NYANGOMA TECH**		4	**MASENO YOUTH**	
	LILIAN ONDITI	2,150		KEVIN OWENJE	11,000
	MERCY OYWAK	2,150		VINCENT AENDA	11,000
	ELSA ADONGO	8,200		JAMES OLOO	4,000
	HERINE ONIMBO	8,200		KENNEDY OKIDI	4,000
	HELLEN OGOLA	8,200		BRIAN OGINGA	4,000
	RIFFINA MORO	8,200		MARGARET ODERO	4,000
	MAUREEN ATIENO	8,200		LILIAN AKAL	4,000
	JONATHAN AKELO	8,200		VINCENT LANGO	7,500
	KENNEDY MSUNGU	8,200		ISIAH LANGO	7,500
	STEPHEN ACHILA	8,200		ALFRED SAO	7,500
	JAMES MOLO	8,200		EDWARD OSASO	7,500
	BENTER APIYO	2,000		KENNEDY DOLO	7,500
	PERSILA OCHOL	2,000		FREDRICK OCHIENG	7,500
	BANK COMM	200		ELLY MIRASI OCHERE	7,500
	TOTAL	**82,300**		KEVIN OKONGO	7,500
				BANK COMM	200
2	**NDERE YOUTH**			**TOTAL**	**102,200**
	MARY OOMA	5,500			
	PERSILA AKEYO	5,500			
	RODGERS OMONDI	5,500			
	BANK COMM	200			
	TOTAL	**16,700**			

3	**RUMA VOCATIONAL TRAINING UNIT**	**AMOUNT**
	MAUREEN ADONGO	6,000
	HELLEN APIYO	6,000
	ROSELYNE ODIEMBO	6,000
	JACKLINE AMONDI	6,000
	MARY AKAL	6,000
	QUINTER AKINYI	6,000
	PASKALIA ADHIAMBO	6,000
	BEATRICE ADHIAMBO	6,000
	IRINE OGUTU	6,000
	ALPHONCE OMONDI	6,000
	KENNEDY ODHIAMBO	6,000
	RODGERS GWENDO	6,000
	TOTAL	**72,000**

SUMMARY OF EXPECTED PAYMENTS — TERM TWO

	INSTITUTION	CHEQUE NO.	**AMOUNT**
1	**ST. JOSEPHS NYANGOMA TECH.**	100224	82,300
2	NDERE YOUTH POLY	100219	16,700
3	**MASENO YOUTH POLY**	100236	102,200
4	**RUMA VOCATIONAL TRAINING UNIT**	100301	72,000
	TOTAL		**273,200**

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1	DORCAS	ATIENO	ALARO	F	14	RUMA B	PRISCA ALARO	SEMI	EX POLY	DIS	
2	ELISHA	OSANO	OKUKU	M	18	RUMA B	KEZIA OKUKU	SEMI	RARIEDA	F3	032/2000
3	LAWRENCE	OCHIENG	OGUTU	M	17	OWIMBI	CHRISTINE OGUTU	SEMI	EX POLY	DIS	084/2000
4	ALEX	OBALA	ARAM	M	18	MASALA	JENIPHER AKUMA	TOTAL	EX GAGRA	DIS	085/2000
5	SHEM	RAJORO	OMOTH	M	16	MASALA	EXEKIEL ONYANGO	TOTAL	EX POLY	DIS	086/200
6	RUEBEN	AMALA	OMOTH	M	17	MASALA	EXEKIEL ONYANGO	TOTAL	MASALA	F 1	088/2000
7	WALTER	ODERO	OWINO	M	18	RUMA C	MARY OWINO	TOTAL	RARIEDA	F3	089/2000
8	VINCENT	OMONDI	ODERO	M	17	RUMA C	MARY OWINO	TOTAL	RARIEDA	F1	090/200
9	MICHAEL	OTIENO	JUMA	M	12	NYAMRAMBE	TERESA OMONDI	SEMI	DROP OUT	*	117/2000
10	MICHAEL	OMONDI	OCHUNG	M	14	LANGI KOBONG	ANASTASIA OUMA	TOTAL	GAGRA	6	091/2000
11	DENNIS	YONGO	ACHOLA	M	16	AKOM	CHRISTABEL OMOLO	TOTAL	EX ARAMBE	DIS	001/2000
12	MARCEL	AUJA	AJUOGA	M	18	LANGI KOBONG	MAURICE AJUOGA	SEMI	POLY	Y2	093/2000
13	STEPHEN	OYUGI	OWINO	M	18	RUMA A	HELIDA ARWA	TOTAL	NYANGOMA	F3	097/2000
14	MARCEL	AUJA	ODENY	M	17	GAGRA	LEONIDA OLULO	SEMI	EX ARAMBE	DIS	098/2000
15	ALEX	OBANDO	AIKI	M	18	GAGRA	HEREHIA AIKI	SEMI	AKOKO	F4	079/2000
16	DAN	DIMBA	AGOLA	M	23	OWIMBI	SULMENA OBANDO	TOTAL	EX POLY	DIS	096/2000
17	CHRIS	AGOLA	AGOLA	M	13	OWIMBI	SULMENA OBANDO	TOTAL	DAGAMOYO	6	118/2001
18	JOEL	ORWA	ONYANGO	M	18	OWIMBI	ELIZABETH ONYANG	SEMI	NGERE	F3	119/2001
19	FREDRICK	OCHIENG	ONYANGO	M	13	OWIMBI	ELIZABETH ONYANG	SEMI	GAGRA	6	120/2001
20	THOMAS	CHIALO	OWINO	M	19	PEDO RACHAR	JAMES CHIRA	TOTAL	EX LUSI	DIS	099/2000
21	STEPHEN	OTIENO	OWINO	M	18	PEDO RACHAR	JAMES CHIRA	TOTAL	EX MASEN0	DIS	100/2000
22	JOSEPHAT	OGOLA	ONYATTA	M	17	LANGI KOBONG	THOMAS OOMA	TOTAL	EX VOC	DIS	104/2000
23	ERICK	ODHIAMBO	AMOLO	M	18	GWENA	ESTHER ONDEGO	TOTAL	DROP OUT	DIS	107/2000
24	ERICK	OMONDI	OLUOCH	M	15	RUMA C	MARIA OBUJI	TOTAL	RUMA	8	095/2000
25	KEVIN	AWINDA	OMOGO	M	14	RUMA B	JANE ONDIEK	TOTAL	EX RUMA	DIS	125/2002
26	ALPHONCE	OYOMBA	NYANGIDI	M	17	RUMA A	CHIRSTINE NYANGIDI	SEMI	EX POLY	DIS	064/2000
27	NICODEMUS	ACHOLA	BONDO	M	19	RUMA A	PENINA GWELA	SEMI	EX POLY	DIS	065/2000
28	MICHAEL	ODWESO	ODIRO	M	20	RUMA A	SYLVIA ODEDE	TOTAL	EX GAGRA	DIS	067/2000
29	COLLINS	OTIENO	AYUNGO	M	14	LANGI KOBONG	ROSEMARY AYUNGO	SEMI	GOTOKOLA	6	070/2000

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204	ANNA	OTIENO	OPANDE	F	14	MASALA	JOHN OPANDE	TOTAL	DROP OUT	DIS	204/2004
205	HARUN	ONYANGO		M	16	RUMA B	SYLVIA ODEDE	TOTAL	GAGRA	F 2	205/2004
206	STEPHEN	ODHIAMBO	MBAWI	M	16	NYASEDA	HESBON MBAWI	SEMI	GAGRA	F 2	206/2004
207	ELLY	OCHERE		M	19	OKELA	SELIE MIRASI	TOTAL	MASENO POL	Y 2	207/20047
208	PASKALIA	ADHIAMBO		F	18	PALAKOBONG	JACINTER ONGINJO	SEMI	R UNIT VOC	Y 2	208/2004
209	JACKLINE	AMONDI		F	18	RUMA B	TURPHENA AGENGO	TOTAL	R UNIT VOC	Y 2	209/2004
210	PAULINE	AKOTH	ODERO	F	16	AKELE	CONSALATA ONIMBO	SEMI	GAGRA	F 1	210/2004
211	ROSELYNE	OGWENY		F	16	GAGRA	JACINTER NGESA	SEMI	NYAMONYE	F 2	211/2004
212	KENNEDY	OKIDI	CHIALO	M	18	OWIMBI	MONICA CHIALO	SEMI	GAGRA	6	212/2004
213	DORIS	ACHIENG	BONDO	F	14	CHIANDA	ROSE BONDO	SEMI	DROP OUT	DIS	213/200/
214	KEVIN	OMONDI	ASEMBO	M	14	RUMA B	JESSICA ASEMBO	SEMI	RUMA	DIS	213/2004
215	JERUSA	NYABOLA		F	17	RUMA B	WILLIAM ORACHA	TOTAL	ST. SYLVESTE	F 2	215/2004
216	EVELYN	AKINYI	OWINO	F	16	KOMENYA	GRACE OWINO	TOTAL	NYAMONYE	F2	216/2004
217	PERSILA	OMOSO		F	15	RUMA B	MARY OMOSO	SEMI	RUMA	4	217/2004
218	JACKLINE	AWINO		F	16	OWIMBI	WILFRIDA OWITI	SEMI	RUMA	8	218/2004
219	EMMANUEL	OWINO		M	16	AKELE	ELIZABETH OWITI	SEMI	NYANGOMA	F 2	219/2004
220	KENNEDY	OCHIENG		M	16	AKELE	ALICE ADHIAMBO	SEMI	GOTOKOLA	6	220/2004
221	CATHRINE	ATIENO	OPIYO	F	16	AKELE	MARAGRET OPIYO	SEMI	ST. SYLVESTE	F 1	221/2004
222	RODGERS	OMONDI		M	16	LANGI	MARIA OBIJI	TOTAL	RUMA	6	222/2004
223	ALPHONCE	OMONDI		M	16	RUMA A	MONICA ATWENGA	SEMI	RUMA	6	223/2004
224	CHARLES	OMOLLO	OKUKU	M	16	RUMA B	KEZIA OKUKU	TOTAL	RARIEDA	F 1	224/2004
225	IRENE	AKINYI	OGUTU	F	17	OWIMBI	CHIRSTINE OGOLO	SEMI	LUSI	7	225/2004
226	SUSAN	AWUOR		F	17	MIRANDO	AGNETA AKOTH	TOTAL	DROP OUT	DIS	226/2004
227	VINCENT	LANGO	OWENJE	M	18	GAGRA	C. ATIENO	SEMI	MASENO POL	Y 2	227/2004
228	VICTOR	OMONDI		M	16	RUMA B	ROSE OMEDO	SEMI	AMBIRA	F 2	228/2004
229	VIVIAN	ACHIENG	OBIERO	F	15	OWIMBI	PACIFICA AWINO	SEMI	ST. SYLVESTE	F 1	229/2004
230	DOREEN	ADHIAMBO	MOLO	F	16	AKELE	MARGARET MOLO	SEMI	ST. SYLVESTE	F 1	230/2004
231	ANDREW	OUMA	OWUOR	M	16	LANGI	HELEN AWUOR	SEMI	GOTOKOLA	6	231/2004
232	MONICA	ASESA	OTIENO	F	17	MASALA	PERSILA ACHIENG	TOTAL	DROP OUT	DIS	232/2004

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435	WINNIE	ADHIAMBO		F	10	KANUSUO	CHRISTINE OCHILO	TOTAL	KAWUONDI	3	435/2008
436	WELDON	ONYANGO		M	9	GAGRA	SARA OGUDE	SEMI	GAGRA	3	436/2008
437	CONSOLATA	AUMA		F	10	OWIMBI	GAUDENSIA ACHOL	SEMI	GAGRA	3	437/2008
438	SHEM	OTIENO		M	10	OBAGA	COSMAS ONYANGO	SEMI	OBAGA	5	438/2008
439	CHARLES	ONYANG		M	8	GAGRA	ELIZABETH ONYANG	SEMI	GAGRA	2	439/2008
440	CALISTO	ONYANGO	ODHIAMBO	M	11	AKELE	CAREN ODHIAMBO	TOTAL		6	440/2008
441	LEWIS	ATIENO		F	9	NYAMRAMBE	SUSANA ABONDO	SEMI	RARIEDA	3	441/2008
442	CELESTINE	AWUOR	OUNGA	F	7	NYAMRAMBE	CAROLINE ABONDO	TOTAL	RARIEDA	1	442/2008
443	RICHARD	OTINEO	ANYANGO	M	11	NYAMRAMBE	ANNA ANYANGO	SEMI	RARIEDA	4	443/2008
444	NANCY	AKINYI		F	13	AKELE	MARGARET AWANA	TOTAL	GOT OKOLA	6	444/2008
445	ELIZABETH	AKINYI	OLANG	F	15	LANGU	AGNES OLANG	SEMI	OJAWA	8	445/2008
446	MAREN	ADHIAMBO		F	10	RUMA A	CONSOLATA ACHIEI	SEMI	RUMA	5	446/2008
447	GORDON	DEYA	OPIYO	M	11	LANGU	RAEL OPIYO	SEMI	RUMA	NRY	447/2008
448	MICHAEL	OMOLO	OGONGO	M	10	RUMA B	MAGARET OGONGO	SEMI	GOT OKOLA	NRY	448/2008
449	CONSILIA	AOKO	ONGINJO	F	7	PALA KOBONG	JACINTER ONGINJO	TOTAL	PALA .K	NRY	449/2008
450	MILLICENT	AKOTH	ODHIAMBO	F	5	PALA KOBONG	ROSE ADHIAMBO	SEMI	RUMA	1	450/2008
451	LINA	AKINYI	ONYANGO	F	6	RUMA	AFLINE ONYANGO	SEMI	DAGAMOYO	1	451/2008
452	CLINTON	OMONDI		M	7		ELSA OMONDI	SEMI	DAGAMOYO	NRY	452/2008
453	STEPHEN	APOLO	DULO	M	6	NYAMBOE	CAROLINE DULO	SEMI	NYAMBOE	NRY	453/2008
454	GEORGE	MAWERE		M	12	NYAMBOE	EUNICE OSEWE	SEMI	RUMA	4	454/2008
455	ELIZABETH	ADHIAMBO	OGOLA	F	11	GAGRA	HELIDA OGONGO	SEMI	GAGRA	4	455/2008
456	STEPHEN	OUMA	OUMA	M	9	NDHERE	JACKLINE OUMA	SEMI	NDHERE	2	456/2008
457	JANET	AKINYI	ODHIAMBO	F	6	NYAMSORE	SARA ADHIAMBO	SEMI	NYAMASORE	NRY	457/2008
458	DERICK	OCHIENG		M	10	RUMA C	GLADYS ABAYO	TOTAL	RUMA	3	458/2008
459	BERIL	AKOTH		F	11	RUMA C	GLADYS ABAYO	TOTAL	RUMA	1	459/2008
460	WALTER	OKUMBE	OJALA	M	12	OBAGA	ROSE OJALA	SEMI	OBAGA	5	460/2008
461	JACKLINE	ASEWE	OJALA	F	5	OBAGA	ROSE OJALA	SEMI	OBAGA	NRY	461/2008
462	BERIL	AUMA	ONYANGO	F	9	OSEWRE	FLORENCE ONYANG	SEMI	DAGAMOYO	3	462/2008

Register of orphans supported by RWDG (pg 16)

Points picked in from the field using GPS

TOPO!_GPS	N5	N9	N10	SCH_NAM	SCH_LEV	STATUS	SUB_LOC
005	-0.2213889	34.3352778	1163	Ruma Centre	Centre	Overall	Masala
RP1	-0.2161111	34.3366667	1143	Ruma	Primary	mixed	Masala
RP10	-0.2063889	34.3238889	1157	Obaga	Primary	mixed	Akom
RP11	-0.2113889	34.2919444	1172	Masala	Primary	mixed	Masala
RP12	-0.2252778	34.2755556	1174	Kawuondi	Primary	mixed	Masala
RP13	-0.2191667	34.3180556	1177	Lusi	Primary	mixed	Masala
RP14	-0.2450000	34.3291667	1185	Got Okola	Primary	mixed	Kobong
RP15	-0.2633333	34.3244444	1202	Pala Kobong	Primary	mixed	Kobong West
RP16	-0.2838889	34.3211111	1211	Madiany	Primary	mixed	Katwenga
RP17	-0.2722222	34.3077778	1185	Komollo	Primary	mixed	Rachar East
RP18	-0.2758333	34.3433333	1219	Okela	Primary	mixed	Katwenga
RP2	-0.2372222	34.3283333	1193	Gagra	Primary	mixed	Kobong East
RP3	-0.2438889	34.3416667	1193	Chianda	Primary	mixed	Katwenga East
RP4	-0.2611111	34.3569444	1212	Kobonyo	Primary	mixed	Katwenga
RP5	-0.3055556	34.3397222	1230	Lweya	Primary	mixed	Lieta
RP6	-0.3236111	34.3308333	1227	Rabel	Primary	mixed	Ndigwa
RP7	-0.2800000	34.3625000	1208	Rageng'ni	Primary	mixed	Rageng'ni
RP8	-0.2322222	34.3397222	1157	Daga Moyo	Primary	mixed	Masala
RP9	-0.1983333	34.3413889	1147	Rarieda	Primary	mixed	Akom
RS1	-0.2352778	34.3280556	1198	Gagra	Secondary	mixed	Kobong West
RS2	-0.2447222	34.3433333	1192	Chianda	Secondary	boys	Katwenga East
RS3	-0.2877778	34.3561111	1219	Migowa	Secondary	mixed	Katwenga
RS4	-0.3327778	34.3211111	1234	Ndigwa	Secondary	mixed	Ndigwa
RS5	-0.1977778	34.3416667	1141	Rarieda	Secondary	mixed	Akom
RS6	-0.2847222	34.3200000	1206	St. Sylvester	Secondary	girls	Kobong West
RS7	-0.2755556	34.3416667	1217	Okela	Secondary	boys	Katwenga

Details of orphans in secondary schools

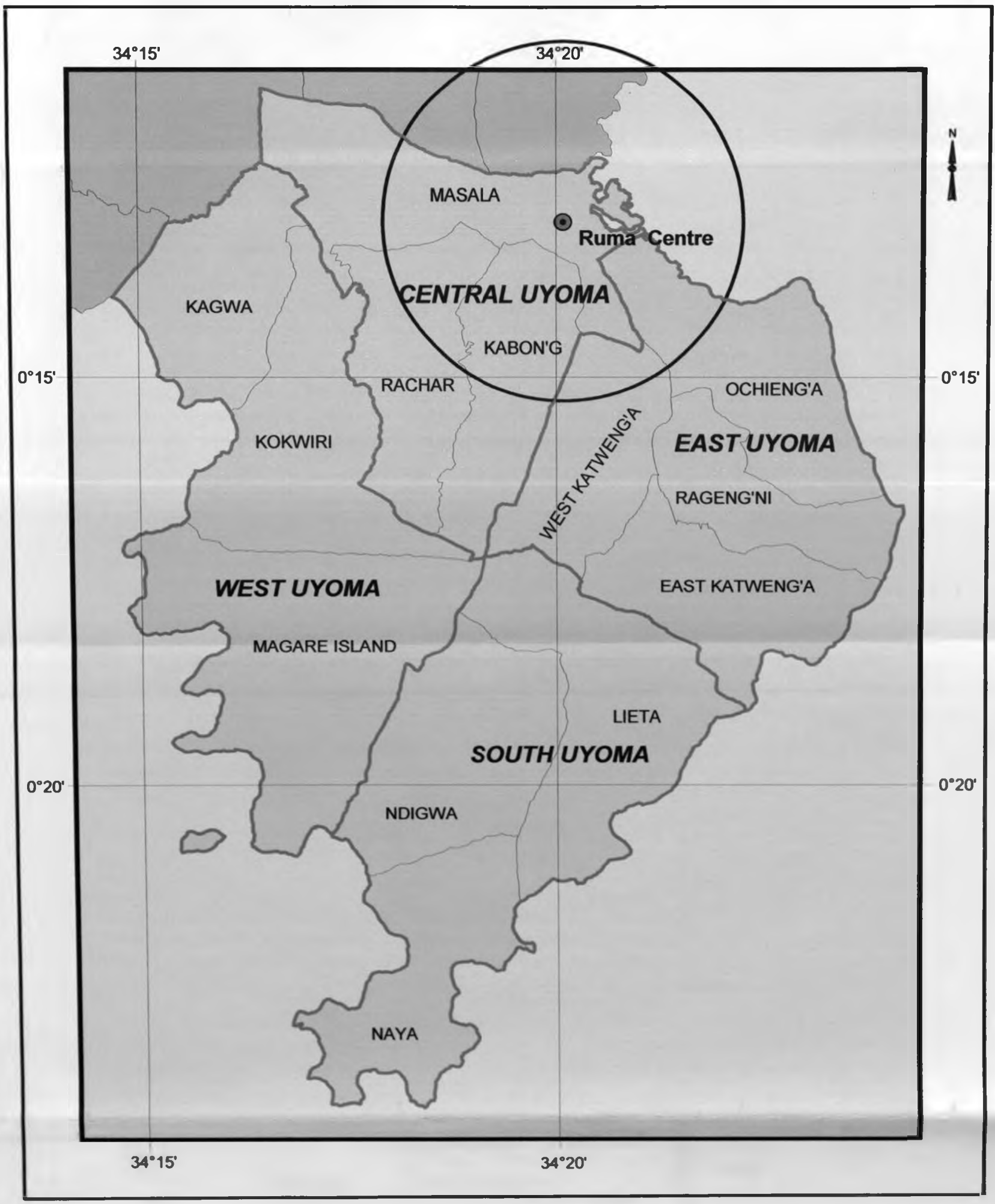
Secondary							
ID	Ch_Id	AGE	FIRST_NAME	SURNAME	SCHOOL	TERM_1	TERM_2
1	004/2000	17	BRENDA A.	OMINDO	RARIEDA	4600	2200
2	005/2000	18	JOSEPH A.	AMOLO	NYANGOMA	14843	10384
3	017/2000	17	EDITH A.	OCHIENG	NYAMIRA	14527	11100
4	018/2000	16	RONALD O.	OKUNE	AKOKO	3875	5000
5	024/2000	17	EUNICE A.	RAYUOYI	NYAMIRA	14527	11100
6	027/2000	16	MONICA A.	AMOLO	RARIEDA	3900	2000
7	030/2000	18	MERCELINE A.	AMBILA	RARIEDA	4600	2200
8	032/2000	18	ELISHA O.	OKUKU	RARIEDA	4600	2200
9	035/2000	18	DUNCAN O.	OMOLO	NYANGOMA	14293	11868
10	038/2000	18	AGNES A.	OMOSO	B. CHANDO	14900	7727
11	043/2000	18	OSCAR O.	NYALIK	RARIEDA	4600	2200
12	044/2000	16	MICHAEL O.	JAMWA	RALIEW	15300	1500
13	046/2000	17	BEATRICE A.	ONEKO	B. CHANDO	14900	7727
14	055/2000	17	SAMUEL O.	OKWIRRI	AKOKO	3875	5000
15	057/2000	18	MARGARET A.	OLUNDHA	NYAMIRA	14527	11100
16	063/2000	18	JUDITH A.	OTUMBA	RARIEDA	4600	2200
17	079/2000	18	ALEX O.	AIKI	AKOKO	8600	5000
18	089/2000	18	WALTER O.	OWINO	RARIEDA	4600	2200
19	090/2000	17	VINCENT O.	ODERO	RARIEDA	3900	2000
20	092/2000	16	EMMA O.	ONYANGO	ST. SYLVESTER	10150	10000
21	097/2000	18	STEPHEN O.	OWINO	NYANGOMA	14843	11584
22	103/2000	18	ELIZABETH A.	OOMA	GAGRA	3000	250
23	105/2000	16	ROSEMARY A.	OMBEWA	NYAMIRA	14105	10022
24	114/2000	14	ANNE	ONYONGE	NYAMONYE	10000	11493
25	115/2000	15	CHRISTINE A.	OGOLA	NYAMIRA	14107	10057
26	119/2001	18	JOEL O.	ONYANGO	NGERE	10850	9700
27	122/2000	18	MAUREEN A.	AIRO	LWAK	13750	18567
28	123/2002	17	BERIL	AWINO	RARIEDA	4600	2200
29	131/2003	17	WYCLIFFE O.	DEYA	CHIANDA	13140	16167
30	134/2003	17	WINNIE A.	OPEYO	NYAMIRA	14070	10020
31	140/2004	17	GILBERT	ODHIAMBO	RAMBA	13027	11230
32	150/2004	17	SHARON A.	MORO	RARIEDA	4600	2200
33	151/2004	17	LAWRENCE O.	OMONDI	KSM DAY	4700	3800
34	152/2004	17	BRIAN O.	OCHIENG	BARDING	12050	6534
35	153/2000	17	OSCAR M.	MILLA	CHIANDA	13190	16127
36	154/2000	17	KENNEDY O.	BONDI	CHIANDA	13190	16127
37	155/2000	17	JABES	DIBOGO	AKOKO	8600	5000
38	156/2004	17	GRACE	ACHIENG	B. CHANDO	14900	7727
39	157/2004	17	DONA A.	AWUOTH	NYAMIRA	14527	11100
40	158/2004	17	COLLINS	ODHIAMBO	GAGRA	3000	450
41	159/2004	17	WYCLIFFE O.	OWINO	CHIANDA	13190	16127
42	160/2004	17	RICHARD N.	OYUGI	AKOKO	8600	5000

Secondary							
ID	Ch_Id	AGE	FIRST_NAME	SURNAME	SCHOOL	TERM_1	TERM_2
43	161/2004	17	LAURA E.	OYUGI	NYAMIRA	14527	11100
44	163/2004	17	CHARLES A.	OKUNGU	MAJIWA	14437	8990
45	164/2004	17	JULIANA J.	MITTO	OKELA	1500	1900
46	168/2004	17	JOHN	ODHIAMBO	GAGRA	4000	1500
47	171/2004	17	COLLETTA	AWINO	GAGRA	4000	1500
48	173/2004	17	GEOFFREY	ODIEMBO	RARIEDA	4600	2200
49	174/2004	17	EVANS	AYUNGO	GAGRA	4000	1500
50	175/2004	17	ZACHARIA	OCHIENG	MAJIWA	14437	9190
51	178/2004	17	JOSEPH O.	OCHIEL	CHIANDA	13140	16167
52	179/2004	17	PETER O.	OCHIENG	MARANDA	15000	7777
53	181/2004	17	DENNIS O.	MILLA	MAJIWA	14437	9190
54	183/2004	17	DAVID	OCHIENG	GAGRA	4000	1500
55	185/2004	17	MERCY A.	AWANDO	RARIEDA	3900	2200
56	187/2004	17	NAHASHON O.	AWANDO	RALIEW	15100	1500
57	198/2004	17	SAMUEL	ODAWA	RARIEDA	3900	2200
58	199/2004	17	MAUREEN A.	MILLA	ST. SYLVESTER	10150	10000
59	200/2004	17	CHARLES	OPIYO	GAGRA	3000	2600
60	205/2004	17	HARUN	ONYANGO	GAGRA	3000	450
61	206/2004	17	STEPHEN O.	MBAWI	GAGRA	3000	450
62	210/2004	17	PAULINE A.	ODERO	GAGRA	3490	2110
63	211/2004	17	ROSELINE	OGWENY	NYAMONYE	10000	11493
64	215/2004	17	JERUSA	NYABOLA	ST. SYLVESTER	10150	10000
65	216/2004	17	EVELINE A.	OWINO	NYAMONYE	10000	11493
66	219/2004	17	EMMANUEL	OWINO	NYANGOMA	14841	9136
67	221/2004	17	CATHERINE A.	OPIYO	ST. SYLVESTER	13450	7000
68	224/2004	17	CHARLES O.	OKUKU	RARIEDA	3900	2000
69	228/2004	17	VICTOR	OMONDI	AMBIRA	15750	7777
70	229/2004	15	VIVIAN A.	OBIERO	ST. SYLVESTER	13950	7000
71	230/2004	16	DOREEN A.	MOLO	ST. SYLVESTER	13150	7000
72	233/2004	16	QUINTERA.	ODETE	ST. SYLVESTER	13850	7000
73	234/2004	17	JOHN	OKOTH	GAGRA	4000	1600
74	236/2004	16	PETER O.	ODERO	RARIEDA	3900	2000
75	240/2004	17	RISPER O.	OGUTU	ST. SYLVESTER	10150	10000
76	303/2005	19	JAEL A.	KUNGU	LWAK	13750	15567
77	304/2005	18	MICHAEL O.	OGOLA	MASENO	18100	11800
78	305/2005	19	ERICK O.	ANYANGO	ULUMBI	10000	5500
79	306/2005	18	MAUREEN A.	GWENDO	ST. SYLVESTER	10150	10000
80	314/2006	16	PHELIX O.	ONURA	RALIEW	15100	1500
81	315/2006	16	CAROLINE A.	OGONY	ST. SYLVESTER	13850	7000
82	382/2008	15	SHARON E	OGONY	LWAK	20500	8774

APPENDIX II

Maps produced from the RWDG database

RUMA CENTRE



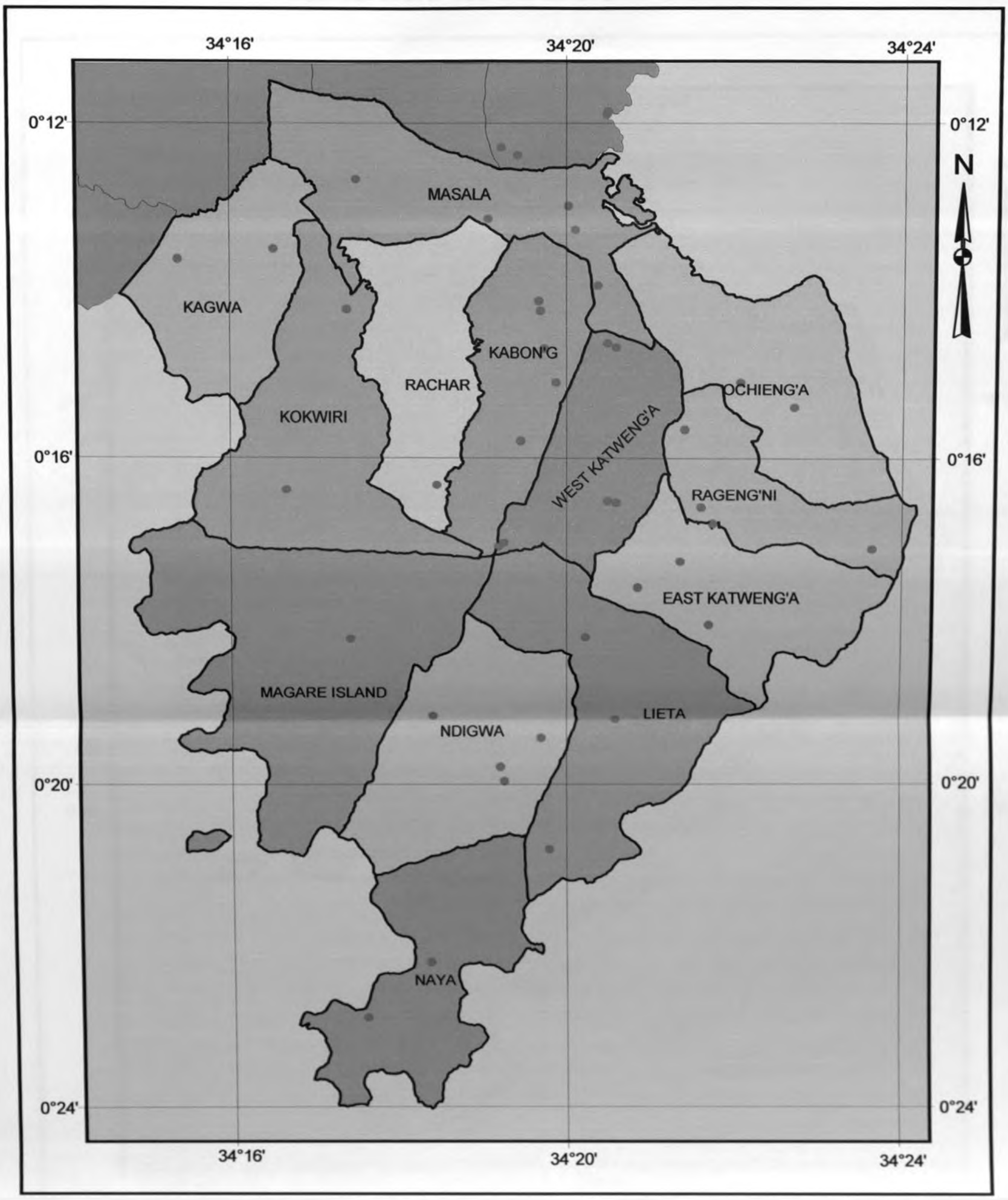
1:100000

4 0 4 8 Kilometers

LEGEND

- Location boundary
- Sub-Location Boundary
- Ruma_buffer _4 km. radius
- Rarieda Division
- Ruma_centre

MADIANY SUBLOCATIONS



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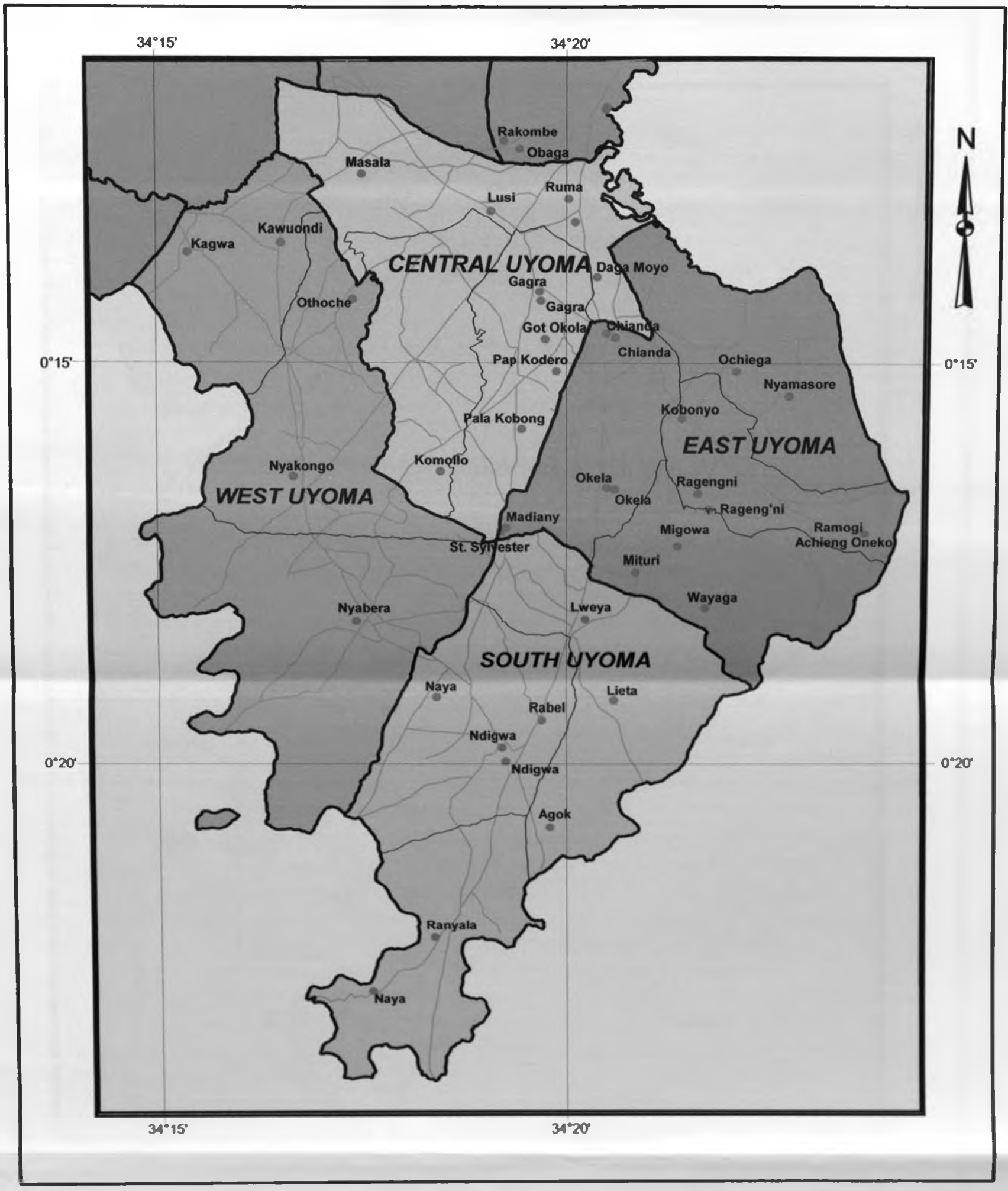
4 0 4 8 Kilometers

LEGEND

- East Kateng'a
- Kaobong'
- Kagwa
- Kokwiri
- Lieta
- Magare Island
- Masala
- Naya
- Ndigwa
- Ochieng'a
- Rachar
- Rageng'ni
- West Kateweng'a
- Lake
- Raieda Division
- Sublocation Boundary

SCHOOLS IN MADIANY DIVISION



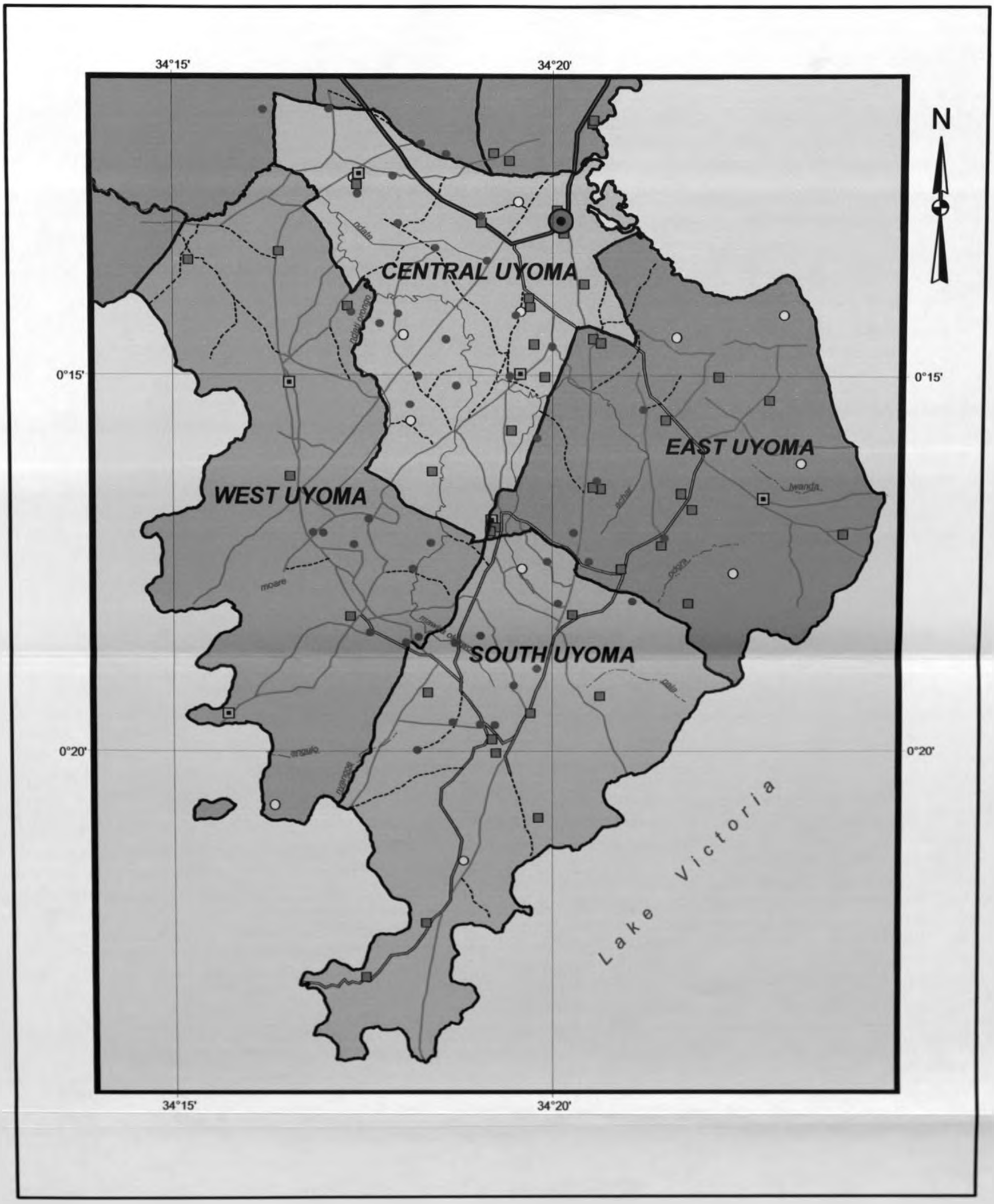
1:100000

4 0 4 8 Kilometers

LOCATION

- Centtral Uyoma
- East Uyoma
- South Uyoma
- West Uyoma
- Lake
- Ranieda Division
- Location Boundary
- Sub-Location Boundary
- School

MADIANY DIVISION



1:100000

4 0 4 8 Kilometers

LEGEND

- Location Boundary
- Permanent River
- Seasonal River
- Footpath
- Primary Road
- Secondary Road
- Motorable Track
- RWDG Centre
- Schools
- Youthfriendly
- Youthclub
- Waterhole

LOCATIONS

- Central Uyoma
- East Uyoma
- South Uyoma
- West Uyoma
- Rarieda Division