



Mission Report

**The provision of technical assistance to the
Central Statistics Office in Zambia with
regard to Census Mapping and GIS**

Prepared by:

Geospace International (Pty.) Ltd.

Francois Bezuidenhout

Prepared for:

**The CSO and the World Bank, General Data Dissemination
System, Socio-Demographic Statistics Project for
Anglophone Africa**

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1. Introduction

The Zambia Central Census Office (CSO) is currently involved in the planning for the next Population Census which will be taking place during the latter part of 2010.

The Geographic Information Branch (GIB) has been afforded the responsibility of the planning and implementation of the Census Mapping phase. Census mapping involves the accurate updating of the current administrative and geographic frame of the country and the systematic demarcation of this frame into small units called Standard Enumeration Areas (SEA) for enumeration, spatial analysis and dissemination purposes.

The CSO needs technical assistance regarding the implementation of modern census methodology, the use of satellite imagery for census mapping as well as the successful implementation and use of Geographic Information Systems (GIS) to drive the whole process, including all the ancillary issues that are implicated, such as staffing, equipment, software and infrastructure.

Moreover technical assistance is needed regarding the sustainability and maintenance of the GIS, specifically with regard to training and skills transfer.

Zambia attended the GDDS 2 GIS Module launch workshop in Accra, Ghana during the end of May, 2007 where they, in conjunction with the lead consultant, drew up their Country Work Plan regarding the deliverance of three technical assistance missions covering three country identified priorities. The purpose of the work plan is to act as a living document for the duration of the technical assistance and to serve as an information base from which the ToR for every mission can be drawn up.

As noted, the technical assistance has been divided into three missions, this document being the mission report on the first mission.

The specific objectives, activities and deliverables for this mission was detailed in the Terms of Reference which is included in Annexure 1. The CSO's general objective regarding GIS is to develop and implement a sustainable GIS which can act as a corporate service provider to the statistical agency in the long term while short term objectives are to implement a successful census mapping and support methodology.

The basic objectives and deliverables for this mission are however stated below.

Specific issues to be covered during the consultancy were the following:

- To review the current census mapping documentation
- To assess and determine satellite imagery costing and composition
- To review the current census mapping methodology and amend where necessary
- To provide technical assistance during the training of field mappers
- To draw up a detailed census mapping methodology document
- To do a situational analysis on the current status of the GIS Unit
- Technical assistance on the acquisition of appropriate GIS infrastructure
- Technical assistance on the set up of GIS Infrastructure and Provincial offices
- Technical assistance on the recruitment of staff and identification of training requirements

Specific outputs:

- Satellite imagery assessment and costing document and quotes
- Revised census mapping methodology documentation
- Revised Place Name layer creation strategy
- GIS Unit situational analysis report

- GIS Infrastructure assessment report
- Report on training requirements
- Strategies for the planning and implementation of sustainable GIS infrastructure

2. Implementation of the consultancy

The mission was implemented by Mr. Francois Bezuidenhout from **Geospace International**. As specified in the ToR, the total mission time was 8 days on site at the CSO with two additional days for preparation and report writing. The first mission ran from the 23rd of July until the 2nd of August.

3. Acknowledgements

The consultant would like to thank the Acting Director for Census and Statistics, Ms. Efreda Chulu, the Deputy Director of Social Statistics, Mr. William Mayaka, Mr. Iven Sikanyiti and Mr. Edward Kasali for their support and cooperation during the consultancy. Special thanks to all the staff at the Geographic Information Branch for their enthusiasm, assistance and positive attitude. The consultant would also like to thank the General Data Dissemination Project of the World Bank for sponsoring the consultancy.

4. Program context

With financial support from the Department for International Development (DFID) of the United Kingdom, the World Bank is implementing a project to assist 21 Anglophone Africa countries to participate in the General Data Dissemination System (GDDS). Participating countries are being assisted to participate in the GDDS through two separate, but linked projects both financed by DFID. The IMF is providing project management and technical support in the area of economic and financial statistics. The World Bank is providing technical support in the area of socio-demographic statistics. Both projects run concurrently until February 2010.

Technical assistance is being provided through the World Bank to help countries implement plans for improvement in population, health, agriculture, labor market, justice and security, management of statistical systems, GIS and small area statistics. The GDDS framework developed by the IMF provides the framework for the detailed elaboration of long-term statistical development strategies. Participating countries have already expressed their requests for technical assistance and both the IMF and the World Bank have developed their assistance strategies. Zambia was one of the countries which asked for technical assistance in the field of GIS and small area statistics.

5. Challenges facing the CSO in Zambia

It is evident that the increased demand for developmental socio-demographic statistics with regard to issues such as poverty and famine monitoring is exposing existing statistics data collection, integration, analysis and dissemination techniques in developing countries. Developmental issues all have a distinct geographic or spatial component which must be part and parcel of the whole statistics collection and creation process for the statistics to be fully relevant and meaningful.

The GIB faces a real challenge with regard to educating line departments within the CSO to make use of their skills and potential. The fact that GIS and the use thereof with regard to statistical agencies in developing countries is a fairly new concept leads to inadequate understanding on how it must best be implemented and utilized.

This being said, the staff of the GIB and their management understand the potential for the use of GIS within the organization and is committed to use the Census as an opportunity to firmly establish the GIB as a corporate service provider for the organization as a whole. They

have already created and disseminated data from the 2000 Census by creating products such as the DEVINFO data set, thereby increasing the profile of spatial statistics within the CSO and the government as a whole. The general quality of statistics creation seems adequate, but there is potential do achieve so much more.

The GIB in particular, has the following challenges to face:

- Inadequate integrated and properly designed data warehouse and database
- Inadequate awareness within the organization as a whole regarding the potential and use of GIS in statistical agencies
- Current lack of institutional support regarding the on going maintenance and sustainability of GIS
- Inadequate geographic base data
- Inadequate equipment
- Although very able staff is in place, more skills development and training is needed for them to see the holistic process and potential of GIS
- Inadequate funding and operational assistance to make the difference

The CSO is aware of these challenges and have already invested time and money to improve on some of the issues. The main challenge now is to move forward in an integrated fashion and overcome the obstacles one by one in order to realize the full potential of GIS by realizing their short and long term goals.

The role of the GIB not only within the organization as a whole but also specifically related to the up and coming census activities was discussed at length. A brief overview of the findings regarding the GIB's census specific roles are discussed in the next section.

5.1 The role of the GIB in population census activities

A functional and properly implemented GIB will play a major part in all the facets of the Census. Any Census can be divided into **5 main phases**. The role of the GIB in each of these phases will be discussed. The phases are:

- The Planning phase
- The Census Mapping revision phase
- The Enumeration phase
- The Data Processing phase
- The Analysis and Dissemination phase

5.1.1 The Planning phase

This is the most important phase, since the basic methodology, operations and logistics for the Census is determined. These three factors determine the amount of money and resources needed to implement the Census. Care should be taken to include the different roles to be played by the GIB in the budgetary planning so that enough resources will be available for it to fulfill its role.

The role of the GIB during the planning phase will be the following:

- To provide accurate information with regard to the existing census cartography, specifically concerning:
 - The state of the cartography (currency, maintenance, accuracy)
 - Problems identified, such as EA coding structure, EA size structure, EA parameters, administrative boundary problems
 - New raster and vector data needed to implement the revision
- To provide suggestions for addressing these issues as well as possible methodologies
- To provide suggestions on questionnaire content which would enhance spatial analysis possibilities
- To provide suggestions with regard to database design and development

The GIB will therefore form an integral part of the planning team. The resources needed will be dealt with according to its role during each of the phases.

5.1.2 The Census Mapping revision phase

The GIB will play a leading role during this phase since it will be its **responsibility**. A weak and inaccurate cartographic base, especially where the revision and demarcation of EA boundaries are concerned, leads to ineffective and inaccurate field data collection (enumeration) as well as poor analysis and dissemination. It is therefore the **foundation of all census operations**.

Accurate and current base maps and digital imagery will be a pre-requisite for the completion of this phase.

5.1.3 The Enumeration phase

The main responsibilities of the GIB will be three-fold:

- To create and print the **SEA Fieldwork maps** for the enumerators with the necessary EA boundary, imagery backdrop and locational features such as Place Name and Landmark information depicted.
- To plan certain **logistics activities**, such as the number of enumerators needed per District or Ward, number of questionnaires needed per area, types of vehicles needed etc. The rollout of materials can also be monitored using the GIS. **Progress maps** can be printed.
- The **progress of enumeration** itself can be monitored at an EA level with regular progress **thematic maps** printed to show enumeration progress. Problematic areas can therefore easily be identified.

5.1.4 The Data Processing phase

- The flow of materials back to the data processing center can be monitored at EA level and the GIS used to print progress maps

5.1.5 The Analysis and Dissemination phase

- The relevant census data can be populated into the **GIS database** and **various types of analysis** can be done in conjunction with the Social Statistics division.
- The results of the spatial analysis can then be **disseminated** with the database analysis in the form of **maps, tables and graphs**. A new **Census Atlas** can also be created.
- Due to accurate imagery base map and accurate census mapping, analysis and dissemination and product possibilities are increased and also delivers more relevant statistics. Dissemination can also be done using GIS web based techniques and systems.

The GIB will therefore form an integral part of the whole Census process.

5.1.6 Obtaining the most from the GIB

An **institutional shift** will have to take place with regard to the GIB and its functions within the CSO. The role of the unit must be re-defined as a corporate service provider to the CSO with the following services in mind:

- Spatial data and digital map provider to all departments and external users
- Spatial database custodian responsible for new data creation and maintenance
- Custodian of the Master Sample frame responsible for its maintenance, Secondary Sampling Unit creation according to relevant survey needs and updating

- Responsible for all spatial analysis according to CSO departmental and external user needs (for economic and socio-demographic data). Analysis to be done in conjunction with relevant unit expertise.
- Responsible for Census Mapping revision and maintenance
- Responsible for GIS attribute data integration, updating and maintenance
- Responsible for spatial analysis and graphic dissemination of the Census Atlas
- Responsible to host the spatially enabled web application spatial database.

6. Overview of meetings and discussions

The following meetings and discussions took place:

Tuesday, 24 July

- An introductory meeting was held with Mr. Mayaka and Mr. Sikanyiti who is the Chief Information Officer and Branch Head of the GIB.
- Informal discussions was held with Mr. Sikanyiti and Mr. Kasali where the current status of the GIB and its Census Mapping operations were discussed. A question and answer session followed where the consultant asked specific questions relating to the methodology review. A basic schedule for the rest of the mission was also determined.

Wednesday, 25 July

- The consultant prepared and delivered a presentation to the management of the CSO and a representative from the Surveyor General's office regarding "Modern Census Mapping Methodology using Remote Sensing and GIS Technology". Practical demonstrations was also provided using actual CSO imagery and data. The presentation is too large to be made part of the Annex but will be supplied as a separate document accompanying this report.

The following persons attended the presentation:

Name	Position
Ms Efreda Chulu	Acting Director of Census and Statistics
Mr William Mayaka	Deputy Director (Social Statistics)
Mr Modesto Banda	Deputy Director (Agriculture)
Mr Peter Mukuka	Deputy Director (Economics)
Mr John Kalumbi	Deputy Director (Research & Dissemination)
Mr Iven Sikanyiti	Geographic Information Officer
Mr Frank Kakungu	IT Manager
Mr Daniel Daka	Principle Statistician
Mr Edward Kasali	Senior Cartographer
Mr Joseph Tembo	Statistician
Mr Aaron Phiri	Cartographer
Mr Lusajo A.	Intern (GIB)
Mr Kabungo Mbaao	Cartographic Assistant
Mr Lee Chileshe	Statistician
Mr Stan Kamocha	Senior Statistician
Mr M Mooka	Surveyor General's Office
Mr Kambaila M	Statistician

- Informal discussions was held with Mr. Sikanithi regarding the current status of GIS CSO

Thursday, 26 July

- The first draft of the Census Mapping Methodology document was submitted to the GIB and discussed
- The different satellite costing, type and optimization scenarios was discussed with Mr. Sikanyiti and Mr. Kasali.
- Further discussions took place regarding the GIS situational analysis and infrastructure assessment with the GIB staff.

Friday, 27 July

- The first draft of the GIS Situational Analysis and Infrastructure assessment document was submitted to the GIB and discussed
- In consultation with Mr. Sikanyiti and Mr. Kasali, further satellite imagery optimization and costing scenario's was discussed

Monday, 30 July

- Traveled to Kabwe to the Central Provincial Office and had a meeting with the Census Mapping Provincial Staff. Specifically discussed GIS infrastructure, current status and methodology issues.

Tuesday, 31 July

- Discussion with Mr. Sikanyiti regarding the compilation and content of the Donor Work Plan
- Discussion on specific training and technical assistance requirements with Mr. Sikanyiti and Mr. Kasali

Thursday, 2 August

- Debriefing meeting with the CSO Management

7. Overview of technical assistance provided

7.1 Processing and compressing of current Lusaka and Kafue satellite imagery

The CSO is currently in possession of 1m colour Ikonos satellite imagery covering parts of Lusaka and all of Kafue town. However, they struggled loading the imagery due to its large file size. The consultant showed them how to compress the imagery with tiles and overviews using appropriate software. The imagery was compressed and stored. The consultant offered to provide the CSO with the necessary software free of charge should they need it in future.

7.2 On-screen digitizing technique and methodology

The consultant demonstrated to the GIB staff how to demarcate SEAs on-screen using actual CSO data and the Kafue satellite imagery. With the assistance of the GIB staff, the whole of Kafue was demarcated and a demonstration was given to the CSO management during the Census Mapping Methodology presentation.

7.3 GIS Situational analysis and infrastructure assessment

A detailed situational analysis and infrastructure assessment was done on the current status of GIS both at Head and the Provincial offices. A document discussing the findings and recommendations was drawn up by the consultant and presented for review. After review

and discussions, the final document was presented to the CSO. The document can be found in Annexure 5.

Findings and recommendations were discussed along the following topics:

- Short term goals
- Long term goals
- Hardware requirements
- Software requirements
- Data requirements
- Human resource requirements
- Administrative requirements
- Institutional context
- Management requirements
- External assistance and training
- Maintenance and Support
- Inter-governmental Coordination
- Risks

7.4 Census Mapping Methodology review and updating

The current census mapping methodology documentation was reviewed and updated. A new proposed Census Mapping Methodology document was drawn up and submitted for review to the CSO. After reviewing and updating the final document was presented. The document can be found in Annexure 6.

7.5 Satellite imagery technical assistance

Technical assistance was provided regarding:

- The appropriate type, format and resolution of imagery needed for census mapping
- The optimization of coverage using differing types and resolution of imagery for different settlement types
- The development of different costing scenarios for budgetary purposes.
- The optimization of imagery coverage by province
- The provision of appropriate training material for imagery interpretation. A training presentation was created and provided to the GIB staff. It cannot be included in the Annexure because of its large file size (it is in Power Point format) but will be provided to the World Bank as a separate document.

Several Costing and optimization documents have been drawn up and reviewed during the mission. Specific costing scenarios for budgetary purposes will not be included in this document. Examples of various optimization scenarios can be found in the Annexure.

7.6 Technical Assistance with the creation of the Donor Work Plan

The consultant provided assistance with the compilation of the Donor Work Plan and Financial document. In this document the specific census mapping activities and costs are outlined. The GIB is currently finalizing the document themselves and will present it to the relevant donors when appropriate.

7.7 Basic Geomedia Professional training

The consultant provided basic Geomedia training for one day using the CSO's own data. The objective was to enable the GIB staff to do basic load, view, query and data and map creation exercises by themselves using their own data. The consultant also prepared a step by step manual for guidance though these basic functions. Practical exercises was done using

the Lusaka imagery where wards and consequently SEAs was digitized on-screen. The consultant also created an appropriate A3 map layout for map creation which the GIB is currently going to use to create sample maps for the Economic Survey using the GIS and their newfound knowledge.

7.8 Training requirements

The current skill levels of relevant staff was assessed an training requirements and options discussed with the GIB staff. Recommendations were made as part of the GIS Situational Analysis and Infrastructure Assessment document.

7.9 Place Name creation strategy

The current situation was assessed and various Place Name creation strategies was discussed with the GIB staff. The desired strategy was included as part of the Census Mapping Methodology document.

7.10 Maintenance and sustainability

Maintenance and sustainability issues was assessed according to:

- Skills transfer and capacity building
- The GIS itself
- Current and accurate data
- Budgetary issues

Discussions took place with the GIB and CSO Management regarding these issues and the findings and recommendations was included as part of the GIS Situational Analysis and Infrastructure Assessment document.

8. Overview and assessment of problems and shortcomings encountered

8.1 Mission administration and schedule

Very few problematic issues was encountered during the mission itself. The CSO and GIB staff was well prepared and was always available when the consultant needed them. They are well aware of the importance of GIS and Census Mapping for the success of the census as a whole and therefore provided assistance freely and participated enthusiastically and with skill. If one has to be technical, the following two shortcomings can be identified:

- Unfortunately, a one on one meeting with a representative from the Surveyor General's office did not materialize due to conflicting schedules and lack of availability. The representative did however manage to attend the presentation made to CSO Management and did provide valuable input at that time. In Zambia's case, the Surveyor General is not on the critical part of census mapping implementation due to the following reasons:
 - The CSO has already acquired all the necessary base data from the SG, which is mostly outdated
 - Due to the use of satellite imagery the CSO will in fact have more superior base data than the SG
 - The SG and the CSO have a good relationship but budget constraints on the SG side forces them to charge other government departments for data, a common problem in Africa.
- One of the mission deliverables, namely the provision of technical assistance during the training of field mappers could not be met simply because the CSO has not yet

begun with the training of field mappers. The reason for this being the essential equipment procured through the UNFPA has not arrived. Training has therefore been postponed until the equipment arrives.

8.2 Technical and methodological issues

The Census Mapping Methodology and GIS Situational Analysis and Infrastructure Assessment documents both discuss in detail methodological, logistical, capacity, equipment and infrastructural problems and short comings as well as recommendations on how to address them successfully.

8.3 Specific process flow, procurement and funding issues

Although not being seen as problematic, there are certain critical issues which needs to be addressed for the Census Mapping methodology to be implemented successfully. These are:

8.3.1 Procurement and delivery of equipment

As specified in the GIS Situational Analysis and Infrastructure Assessment document, the timely delivery of the equipment procured through the UNFPA is critical. This process has already delayed the start of the census mapper training and must be completed as soon as possible. The UNFPA did indicate that they expect delivery to take place by the middle of August, 2007.

The procurement of the additional equipment is just as important and has to be completed before November, 2007.

8.3.2 Procurement of Satellite Imagery

Satellite imagery is essential since it provides the basis for the census mapping methodology. Simply put, without it the CSO would not be able to complete the census mapping exercise in time, on budget or as correctly and accurately as they should. The main obstacle is however funding. The CSO is more than prepared to use their own funds to procure the imagery for one or two provinces. They would need additional donor funding for the rest of the country. The timely acquisition of this funding is essential for the success of the project. It therefore depends on the CSO's bargaining ability and the willingness of the donor organizations to provide the necessary funds whether all the imagery can be procured on time. The CSO's management did however seem confident that they would be able to obtain the necessary funds.

8.3.3 Training and capacity building

Appropriate and proper training of not only the field and provincial staff but also the GIB staff at Head Office is naturally important to the success of this project. The GDDS missions can play their part in this need, but specialized GIS and database training would be needed at some point. The CSO is aware of this and have begun making the necessary arrangements for the training to take place.

8.3.4 Implementation of the GIS

The whole census mapping process will be driven by an operational and sustainable GIS. The timely procurement of the necessary hardware and software, coupled with the training highlighted above will be paramount to the success of the census mapping effort. It is therefore essential that the GIS infrastructure and database be implemented before the middle of October, 2007.

9. Assessment of the way forward

The GIS Situational Analysis and Infrastructure Assessment document details specific processes that must be achieved in the short and long term in order for the GIB to fulfill its role successfully within the CSO.

The CSO has until March 2010 to conclude its census mapping activities, then the SEA maps must be printed and completed.

The way forward can be condensed into certain milestone activities:

ACTIVITY	PLACE	RESPONSIBLE	STARTING DATE (DURATION)	EXPECTED OUTPUT
1. Preparation of an inventory of the existing 2000 CSA/Ward maps, Polling District maps, as well as topographic base maps/resource maps of rural and urban areas, etc	Lusaka / Provinces	Geographic Information Branch/Mapping section	January 2007 (2 Weeks)	Classified inventories of 2000 Census Maps and various other types of maps available
2. Acquisition of 2006 Polling District Maps, Topographic Maps, Orthophoto maps, other base maps	Lusaka	Geographical information Branch	January 2007 (2 Weeks)	Electoral boundary, topographic, orthophoto and other base maps.
3. Preparation of Digital District CSA Master Copies. Extraction and printing of individual CSA boundaries with SEAs.	Lusaka	Geographic Information Branch/Mapping section	January 2007 (Ongoing)	Hardcopy District CSA Master copies and prints of individual CSA/SEA boundaries for verification at provincial offices
4. Investigation and acquisition of appropriate base map imagery	Lusaka	Geographical information Branch	August 2007 (9 months)	High resolution current colour imagery covering the whole of Zambia
5. Procurement and acquisition of necessary hardware and software to implement GIS infrastructure	Lusaka / Provinces	Geographic Information Branch/Mapping section	August 2007 (8 Weeks)	Appropriate hardware and software to implement GIS
6. Relevant GIS, Remote Sensing and office demarcation training	Lusaka	Geographical Information Branch	September 2007 (2 Weeks)	Sufficient skills transfer and capacity building
7. Training of field staff imagery interpretation field verification methodology	Lusaka	Geographical Information Branch	August 2007 (2 Weeks)	Properly trained field staff
8. Scanning and georeferencing of 1:50000 toposheets and 2000 Census EA Dylline Maps	Lusaka	Geographical Information Branch	September 2007 (ongoing)	Scanned and georeferenced sheets
9. Incorporate administrative boundaries onto new imagery	Lusaka	Geographical Information Branch	October 2007 (4 Weeks)	Accurate administrative boundaries
10. Implement office demarcation activities	Lusaka	Geographical Information Branch	November 2007 (5 months)	Printed field verification maps
11. Implement field verification activities	Provinces	Geographic Information Branch/Mapping Section	September 2007 (24 months)	Verified SEAs and updated verification maps
12. Implement office updating activities	Lusaka	Geographic Information Branch	December 2007 (24 months)	Finalisation of census geographic frame
13. Finalisation of creation and printing of Census maps	Lusaka	Geographical Information Branch	January 2010 (8 Weeks)	Printed and distributed census maps

10. CSO Counterpart actions

The consultant counterpart at the CSO is Mr. Iven Sikanyiti. The counterpart actions specified are to be concluded before the commencement of the second mission. The tentative timeline for the second mission was set at the end of January/beginning February 2008.

The following actions can be specified for the mission counterpart at the CSO:

- Complete Donor Work Plan and Financial document and submit it to the relevant donor organizations for review.
- With CSO management, decide on the first province for which satellite imagery must be procured
- Obtain more quotes for SPOT and Ikonos satellite imagery from reputable organizations in order to satisfy the government procurement specifications. (The consultant is assisting with this process)
- Review and decide on an appropriate quote and imagery provision company. Appoint the relevant firm as soon as possible and draw up delivery schedule.
- Finalise the procurement for the additional hardware and software as specified in the GIS Situational Analysis and Infrastructure Assessment document. Ensure the UNFPA procured hardware is delivered in a timely fashion.
- Finalise the GIB staff and provincial field mapper staff training schedules and implement training.
- Set up GIS infrastructure and database with appropriate implementation partner
- Acquire, process and integrate the first delivered satellite imagery into the GIS database
- Commence with office demarcation activities as specified in the Census Mapping Methodology document.
- Commence with the scanning of the 1:50000 toposheets and EA dyline maps as specified in the Census Mapping Methodology document
- Create and print SEA maps and commence with the Field Verification phase as specified in the Census Mapping Methodology document.
- Continue the process of imagery acquisition, integration and demarcation.

11. Deliverables

The following table depicts the expected deliverables, if they were achieved or not and accompanying reasons.

DELIVERABLE	COMPLETED
Satellite imagery assessment and costing document and quotes	Yes. The final costing and optimization for both Kompsat, Ikonos and Spot imagery was done. The CSO is currently pursuing additional quotes in order to satisfy government procurement rules with the consultant assisting them where possible.
Revised census mapping methodology documentation	Yes. The final document is included as part of the Annexure.
Revised Place Name layer creation strategy	Yes. The revised Place Name creation strategy is part of the Census Mapping Methodology document
GIS Unit situational analysis report	Yes. It was made part of the GIS Situational Analysis and Infrastructure Assessment document. The final document is part of the Annexure.
GIS Infrastructure assessment report	Yes. It was made part of the GIS Situational Analysis and Infrastructure Assessment document. The final document is part of the Annexure.
Report on training requirements	Yes. All training requirements has been specified as part of the GIS Situational Analysis and Infrastructure Assessment document.
Strategies for the planning and implementation of sustainable GIS infrastructure	Yes. It was made part of the GIS Situational Analysis and Infrastructure Assessment document.

11.1 Additional Deliverables

This pertains to additional deliverables not specified for this mission.

- Basic training in Geomedia professional and on-screen digitising
- Creation and provision of a step by step basic Geomedia manual, as included in the Annex.
- Creation and provision of an imagery interpretation training document
- Processing and compression of current CSO imagery
- Creation and provision of an ArcGis 9 training document

12. Annexes

12.1 Annexure 1: Original Terms of Reference for Mission 1

General Data Dissemination System, (GDDS phase 2) Socio-Demographic Statistics Project for Anglophone Africa: Provision of technical assistance as a lead expert for the topic (module) Geographic Information Systems to the Zambia Central Statistical Office (CSO), Lusaka.

Background

With financial support from the Department for International Development (DFID) of the United Kingdom, the World Bank is implementing a project to assist 21 Anglophone Africa countries to participate in the General Data Dissemination System (GDDS). Participating countries are being assisted to participate in the GDDS through two separate, but linked projects both financed by DFID. The IMF is providing project management and technical support in the area of economic and financial statistics. The World Bank is providing technical support in the area of socio-demographic statistics. Both projects run concurrently until February 2010.

Technical Assistance

Technical assistance is being provided through the World Bank to help countries implement plans for improvement in population, health, agriculture, labor market, justice and security, management of statistical systems, GIS and small area statistics. The GDDS framework developed by the IMF provides the framework for the detailed elaboration of long-term statistical development strategies. Participating countries have already expressed their requests for technical assistance and both the IMF and the World Bank have developed their assistance strategies. Zambia was one of the countries which asked for technical assistance in the field of GIS and small area statistics.

Terms of Reference Background

Zambia attended the GDDS 2 GIS Module launch workshop in Accra, Ghana during the end of May where they, in conjunction with the lead consultant, drew up their Country Work Plan regarding the deliverance of three technical assistance missions covering three country identified priorities. The purpose of the work plan is to act as a living document for the duration of the technical assistance and to serve as an information base from which the ToR for every mission can be drawn up. To this end, this ToR for the first mission to Zambia has been drawn up from the work plan, based on the expressed objectives of the chosen priorities.

It has been agreed that there are two types of reports. First there is the report of the consultant about the mission, secondly, the report of the staff of the statistical office of Zambia.

The consultant will assist the staff of Zambia to draft their report as part of the living document.

Separately, the consultant has agreed to draft his own mission report. This report will use the format that will be provided in detail by the World Bank before the mission. But it will comprise of: a) introduction, b) background, c) detailed agenda of all working days (in annex), d) description of the type of discussions, e) overview of all technical advises given, f) overview of problems and shortcomings encountered, g) overview of the own assessment of these issues, h) assessment of the way forward, i) list of recommendations of work to be done by the counterpart for the next period till the next visit, j) list of deliverables achieved/not achieved (and why), k) List of persons worked with for each of the days.

The CSO's general objective regarding GIS is to develop and implement a sustainable GIS which can act as a corporate service provider to the statistical agency in the long term while short term objectives are to implement a successful census mapping and support methodology.

Purpose of the assignment

The purpose of the assignment would be to complete the first technical assistance mission at the Central Census Office in Zambia.

The mission will cover two pre-set priorities to varying degrees. These are:

- Priority 1: Census Mapping
- Priority 2: GIS database development, infrastructure and maintenance

Priority 1 will comprise 70% of the mission time and priority 2 will comprise 30% of the mission time. The total consultant time for the mission is 10 days divided as follow:

- 8 days actual mission time, can also be used in part for report writing
- 2 days consultant preparation and additional report writing time

Following are the objectives and planned activities by priority for the mission:

Priority 1

- Objectives
 - The CSO is currently preparing for its next population census which will take place in 2010. To this end they want GIS to drive the Census Mapping process and use it as a platform for the census mapping methodology implementation and monitoring.
 - In order to implement a modern and effective census mapping methodology, the CSO would need up to date base map solutions, such as satellite imagery. An assessment therefore needs to be done on the need, cost, type and distribution of satellite imagery for base map creation
 - Their current census mapping methodology needs to be revised and their staff would need training in various census mapping and GIS issues in order to implement the methodology successfully.
- Activities
 - Review current census mapping documentation
 - Assess and determine satellite imagery costing and composition
 - Review census mapping methodology and amend where necessary
 - Provide technical assistance during the training of field mappers
 - Draw up detailed census mapping methodology document
 - Do situational analysis on current status of GIS Unit

Priority 2

- Objectives
 - Assess and determine appropriate GIS infrastructure and necessary training
- Activities
 - TA on acquisition of appropriate GIS infrastructure
 - TA on set up of GIS Infrastructure and Provincial offices
 - TA on recruitment of staff and identification of training requirements

Skill requirements

The consultant would need relevant census mapping and GIS experience and skills within the African context and need to read and write English fluently. GIS experience needs to be hands-on and practical instead of purely theoretical.

Deliverables

The deliverables is listed by priority:

Deliverables for Priority 1:

- Satellite imagery assessment and costing document and quotes
- Revised census mapping methodology documentation
- Revised Place Name layer creation strategy
- GIS Unit situational analysis report

Deliverables for Priority 2:

- GIS Infrastructure assessment reports
- Report on training requirements
- Strategies for the planning and implementation of sustainable GIS infrastructure

A concluding Mission Report will form part of the final deliverable (see above under background).

Duration

As noted, the total consultant time for the mission is 10 days with 8 days mission time and 2 days preparation time.

Timing

To be completed during the latter part of July/early August, 2007

12.2 Annexure 2: List of Abbreviations and Acronyms

CSO	Central Statistical Office
GIB	Geographic Information Branch
SG	Surveyor General
SEA	Standard Enumeration Area
GIS	Geographic Information System
IT	Information Technology
GDDS	Global Data Dissemination System
IMF	International Monetary Fund
DFID	Department for International Development
UNFPA	United Nations Population Fund
GPS	Global Positioning System

12.3 Annexure 3: List of Participants

Participants from the CSO

Name	Designation
Senior Management	
Ms Efreda Chulu	Acting Director of Census and Statistics
Mr William Mayaka	Deputy Director (Social Statistics)
Mr Modesto Banda	Deputy Director (Agriculture)
Mr Peter Mukuka	Deputy Director (Economics)
Mr John Kalumbi	Deputy Director (Research & Dissemination)
Geographic Information Branch	
Mr Iven Sikanyiti	Geographic Information Officer
Mr Edward Kasali	Senior Cartographer
Mr Aaron Phiri	Cartographer
Mr A Lusajo	GIB Intern
Mr Kabungo Mbao	Cartographic Assistant
Staff from other divisions	
Mr Frank Kakungu	IT Manager
Mr Daniel Daka	Principle Statistician
Mr Joseph Tembo	Statistician
Mr Lee Chileshe	Statistician
Mr Stan Kamocha	Senior Statistician
Mr M Kambaila	Statistician

12.3.1 Participants from other organizations

Surveyor General

Mr. M Mooka

12.4 Annexure 4: Mission Schedule

TIME	ACTIVITY
Tuesday, 24 July	
9h00 – 9h30	Arrive at CSO. Welcome and Introductions
9h30 – 10h00	Meeting with Mr. Mayaka and Mr. Sikanyiti
10h00 – 13h00	Discussions with Mr. Sikanyiti and Mr. Kasali. Briefing on current status. Question and answer session. Determining basic schedule for the rest of the mission.
13h00 – 14h00	Lunch
14h00 – 17h00	Technical assistance: Processed and compressed current Lusaka and Kafue satellite imagery. Loaded imagery into GIS and demonstrated on-screen digitizing methodology. On-screen demarcation of Kafue town for use during presentation to take place following day.
Wednesday, 25 July	
9h00 – 11h00	Prepare for management presentation.
11h00 – 13h00	Presentation to management regarding census mapping methodology using remote sensing and GIS technology with practical demonstrations using actual Zambian imagery and data
13h00 – 14h00	Lunch
14h00 – 15h30	Ongoing situational analysis regarding status of GIS and staffing with Geographic Information Officer
15h30 – 16h30	Preparing 1 st draft of Census Mapping Methodology document
Thursday, 26 July	
8h45 – 10h00	Preparing 1 st draft of Census Mapping Methodology document
10h00 – 10h15	Submit 1 st draft of Census Mapping Methodology for review to CSO
10h15 – 13h00	Investigating satellite imagery costing scenarios by type of imagery and province. Creating satellite imagery footprints by province.
13h00 – 14h00	Lunch
14h00 – 16h30	GIS situational analysis and infrastructure assessment and document creation
Friday, 27 July	
9h00 – 13h00	GIS situational analysis and infrastructure assessment and document creation. Finalization and submission of 1 st draft for review
13h00 – 14h00	Lunch
14h00 – 16h30	Determination and calculation of various satellite imagery type and costing scenarios and creation of supportive documentation

	and costing spreadsheets as well as GIS optimization and assessment.
Sunday, 29 July	
9h00 – 13h00	Satellite imagery optimization using the 30' x 30' grid and creation of the final draft quote.
Monday, 30 July	
8h45 – 11h00	Finalise optimization and final quote with input from the CSO. Finalise provincial breakdown of costs
11h00 – 17h00	Travel to Kabwe to the Central Provincial Office for information visit and provincial assessment
Tuesday, 31 July	
9h00 – 11h30	Assisting CSO with the compilation of the donor work plan and financial document
11h30 – 13h00	Incorporate lessons learnt from the provincial trip into the GIS assessment and Census Mapping methodology document. Finalise both documents.
13h00 – 14h00	Lunch
14h00 – 15h00	Discuss training and technical assistance with the CSO
15h00 – 16h30	Prepare data for Geomedia demonstration and training
Wednesday, 1 August	
9h00 – 13h00	Geomedia GIS software demonstration and training, focusing on data creation and digitising
13h00 – 14h00	Lunch
14h00 – 16h30	Geomedia training using CSO data
Thursday, 2 August	
9h00 – 10h00	Preparation for debriefing meeting
10h00 – 11h30	Debriefing meeting with CSO management
11h30 – 13h00	Creation of basic step by step Geomedia training manual
13h00 – 14h00	Lunch
14h00 – 15h00	Creation of CSO A3 map layout for use in GIS map creation and printing
15h00 – 15h20	Travel to airport for departure

12.5 Annexure 5: GIS Situational Analysis and Infrastructure Assessment document

To be provided as an accompanying, separate document

12.6 Annexure 6: Census Mapping Methodology document

To be provided as an accompanying, separate document

12.7 Annexure 7: Geomedia basic step by step manual

To be provided as an accompanying, separate document

12.8 Annexure 8: Zambia Country Report

Introduction

The consultant, Mr. Francois Bezuidenhout arrived in Lusaka on the 23rd of July and departed again on the 2nd of August. The main objectives for the CSO regarding this mission was to determine the exact type and cost of satellite imagery that would be necessary for census mapping, to determine how the use of census mapping will affect the census mapping methodology, to solve certain GIS implementation and assessment issues and to persuade our management of the need and importance of the satellite imagery for successful census mapping operations.

All of these objectives were successfully reached during the mission.

The mission Terms of Reference detailed the specific activities and deliverables for this mission. The following tables are a breakdown of the mission activities and deliverables with an indication of successful completion or not.

Specific Activities according to the ToR

ACTIVITY	SUCCESSFULLY COMPLETED
Review current census mapping documentation	Yes, the consultant reviewed the documentation and had discussions with us regarding possible changes. The necessary amendments were made to documentation where necessary
Assess and determine satellite imagery costing and composition	Yes. The consultant requested and received several quotations and was able to assist us with the optimization of the imagery coverage as well as specific costing for budgetary purposes
Review census mapping methodology and amend where necessary	Yes. The current methodology was reviewed and a new census methodology document was created
Provide technical assistance during the training of field mappers	No. Due to the fact that our equipment has not yet arrived from the UNFPA, we are not yet in a position to provide training to the census mapping staff. Training will in all probability only take place in September. The consultant did however provide us with training materials, specifically for imagery interpretation.
Draw up detailed census mapping methodology document	Yes. The document has been drawn up and provided to us for review. The final draft has also been completed and we are satisfied with its contents.
Do situational analysis on current status of GIS Unit	Yes. A situational analysis was done by the consultant at the Head Office while a visit to one of the provincial offices was also arranged and completed.
TA on acquisition of appropriate GIS infrastructure	Yes. The consultant assessed the current infrastructure and made recommendations regarding new infrastructure in the GIS Assessment document.
TA on set up of GIS Infrastructure and Provincial offices	Yes. It was done as part of the situational analysis
TA on recruitment of staff and identification	Yes. The consultant completed this also as

of training requirements	part of the situational analysis.
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Specific deliverables according to the ToR

DELIVERABLE	SUCCESSFULLY COMPLETED
Satellite imagery assessment and costing document and quotes	Yes. All the necessary documentation and quotations have been delivered by the consultant. The consultant also compiled a detailed costing for SPOT satellite imagery on a per province basis for more accurate decision making
Revised census mapping methodology documentation	Yes. The Census Mapping Methodology has been created and reviewed by us and we are satisfied with its contents.
Revised Place Name layer creation strategy	Yes. A revised place name layer creation strategy was discussed with us and is also part of the Census Mapping Methodology document
GIS Unit situational analysis report	Yes. The consultant drew up a GIS Situational Analysis and Infrastructure Assessment report. It was reviewed by us and we are satisfied with the content.
GIS Infrastructure assessment reports	Yes. The consultant drew up a GIS Situational analysis and infrastructure assessment report. It was reviewed by us and we are satisfied with the content.
Report on training requirements	Yes. Training requirements was discussed at length as was included as part of the GIS Situational Analysis and Infrastructure Assessment report
Strategies for the planning and implementation of sustainable GIS infrastructure	Yes. Sustainability and maintenance issues was discussed with us and is also reported on in the GIS Situational analysis and infrastructure assessment document.

Timing

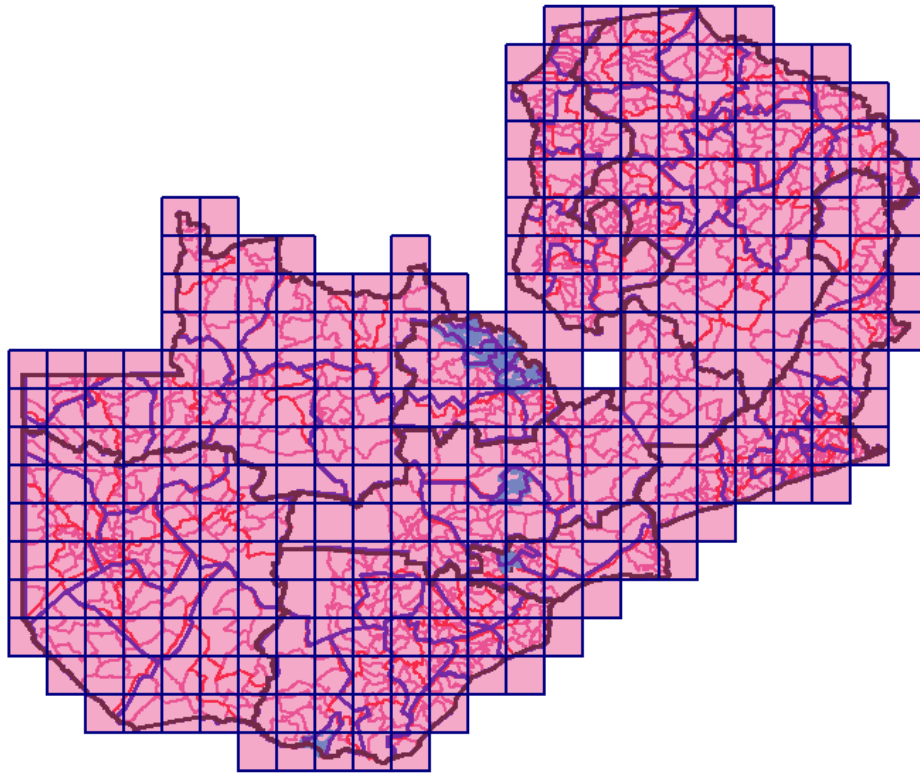
The time allocated to this mission was sufficient and allowed us to cover all the activities successfully.

General remarks

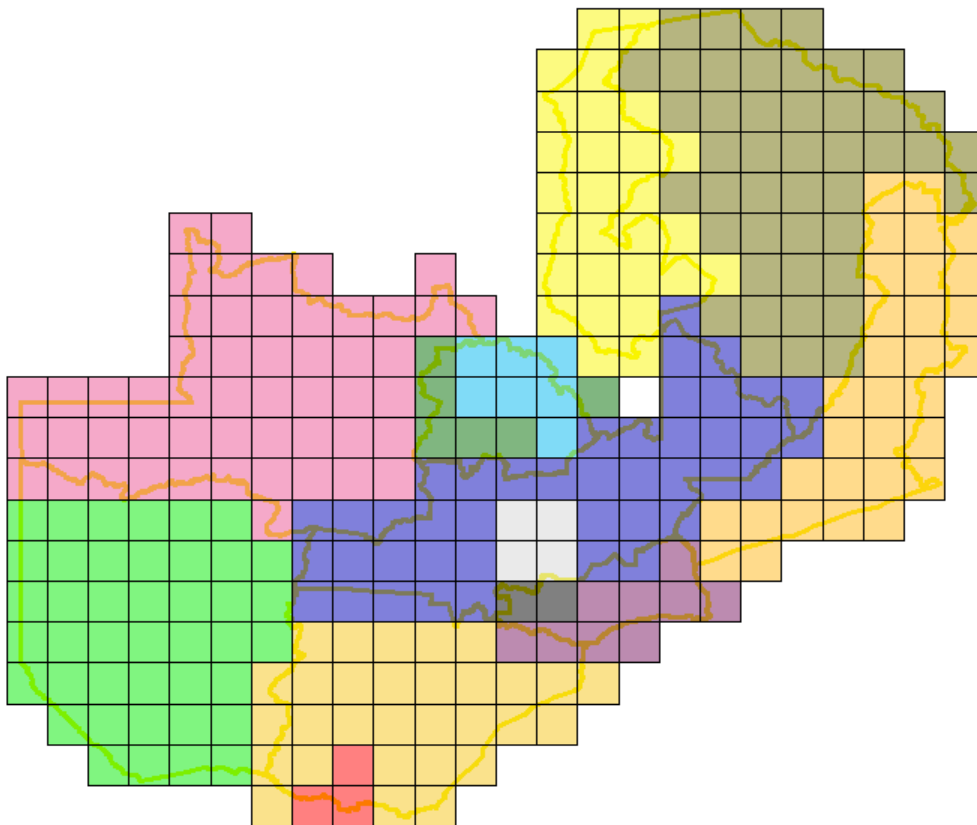
The mission was certainly successful in that the consultant was able to provide us with the answers that we needed, specifically regarding the census methodology and what our specific activities would be in the near future. We were able to sit with the consultant and carefully plan our specific census mapping activities until January 2010 which will enable us to approach donors for additional funding. The consultant himself was excellent and is very knowledgeable about census mapping. We are looking forward to the next mission, hopefully by the end of January/beginning February 2008 when we will be needing specific methodological assistance.

12.9 Annexure 9: SPOT Imagery Optimization example

Optimization on 30x30 Minute blocks



Optimization for SPOT 5m and 2,5m by province



12.10 Annexure 10: Examples of possible digital EA map products to be created by the GIB

A3 Size fieldwork maps created on Geomedia using CSO data



