



## **Mission Report**

# **The provision of technical assistance to the Central Statistics Office in Zambia with regard to Census Mapping and GIS Mission T3**

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## 1. Introduction

The Zambia Central Census Office (CSO) is currently involved in the census mapping operations 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 **third** mission.

The specific objectives, activities and deliverables for this mission were detailed in the Terms of Reference which is included in Annexure 1.

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

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

- Assess current census mapping status in general
- Follow up on satellite imagery acquisition process and assist where necessary
- Assess fieldwork methodology
- Follow up technical assistance in clipping and registering of scanned 1:50000 images – progress evaluation
- On-site monitoring and evaluation, assessment of current activities and rectification of possible errors
- Provide necessary subject matter training as specified by the CSO
- Assess current database and provide follow up technical assistance in database integration operations
- Assess GPS field data integration operations
- Identify and determine list of post census activities and actions regarding census product creation and other downstream activities

### **Specific outputs:**

- Assessed current activities
- Assessment report
- Clipped and registered 1:50000 topographic imagery
- Assessed fieldwork methodology
- Training manuals and documentation
- Follow up training as acquired and requested by the CSO
- Skilled staff
- Functional GIS database
- Georeferenced 1:50000 imagery

## **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 10 days on site at the CSO with two additional days for preparation and report writing. The mission ran from the 9<sup>th</sup> to the 20<sup>th</sup> of February.

## **3. Acknowledgements**

The consultant would like to thank the Director for Census and Statistics, Ms. Efreda Chulu, the Deputy Director of Social Statistics, Mr. William Mayaka, the Deputy Director of Research and Dissemination and also the GDDS Country Coordinator, Mr. John Kalumbi, 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, as well as Ms. Frances Heeks, DFID Statistics Adviser, and Ms. Lynn Macdonald, DFID Results Adviser for their assistance and participation during the mission.

## **4. Program context**

With financial support from the Department for International Development (DFID) of the United Kingdom, the World Bank has been 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 and this report focuses on the findings and activities of the third and final mission.

## **5. Critical Issue: Census Mapping Status and Progress.**

Due to the critical nature of this issue, it is prudent to discuss beforehand since it sets the tone for the rest of the report as well as provides insight into the importance of the Census Mapping Status Assessment document which is provided as a separate document.

To put this issue into perspective the following is an extract from the Census Mapping Assessment document.

“The previous GDDS mission took place during July, 2008, approximately 6 months ago. Very little tangible progress has taken place since then. The reasons for this lack of progress will be discussed later in this document. Following are the main issues that progress were made on.

- Nine new vehicles were delivered by the UNFPA which means that every province now has a dedicated census mapping vehicle.
- 14 Motorcycles were also delivered by the UNFPA and will be deployed in the provinces in most need of them.
- The UNFPA indicated that they will provide the necessary fieldwork laptop PCs, GIS software and high end A3 printers
- Regarding the laptops, one for each province will be acquired which might not be enough in the long run. Moreover, the need for fieldwork laptops is immediate.
- The scanning and georeferencing of the topographic map sheets have been continuing steadily. Thus far, 800 topographic sheets have been scanned and clipped while all the topographic sheets of the Lusaka and Southern provinces as well as parts of the Copper Belt and North Western provinces have been georeferenced. Lack of computer capacity has been hampering progress but new memory chips have been ordered and will be installed to speed up the process.
- The plan is to complete scanning and georeferencing operations by the end of April.
- Since the beginning of February, fieldwork allowances have been increased (doubled) which allows fieldworkers to stay in field for most of the month, in stead of only 10 days per month which was initially the case.
- 1 Gigabyte memory cards have been acquired for the GPS units so that more points can be stored enabling the fieldworkers to stay in the field for longer periods without moving back to the regional office to download data.

The following list depicts actions which should have taken place between July 2008 and January of 2009, but was not implemented. Reasons will be discussed later on.

- Obtain dedicated census operational funding outside of the routine CSO funding from Government and Donors
- Make sufficient funds available for the day to day operations and allowances of the provincial field mapping staff – although this has been done, it only came into effect the first week in February, 2009.
- Acquire specific GIS software for census mapping digitizing
- Order and procure essential base map data (satellite imagery) as decided upon by senior management during previous mission
- Order and procure at least 3 A3 format colour laser printers at Head Office for SEA and CSA map printing operations

It is clear that very little progress has been made regarding census mapping operations from July 2008 to January 2009. What this lack of progress boils down to is that the CSO is still facing a crisis regarding census mapping operations and ultimately, implementing the census itself.”

## **5.1 Issues and Reasons**

“The main reason for the lack of progress is still lack of funding, which are basically the same reason denoted in the previous mission's report. However, the underlying causes of this obstacle have changed somewhat since the previous mission. Without rehashing the points made during the previous report, these underlying causes will be discussed in more detail.

The lack of implementation drive has been addressed to an extent with the CSO management making concerted efforts to engage the government and donors to provide them with the necessary funding. However, as will be explained, events out of their control caused much of the underlying issues which affected funding.”

### **5.1.1 Lack of access to funding**

“This is still the major issue that the CSO has to contend with. During the latter part of 2008, no additional funding was made available by government to the CSO for census operations. This effectively meant that all fieldwork operations ground to a halt. From August 2008 to January 2009 no fieldwork at all took place. The main reason for this lack of funding was the untimely and unfortunate illness and death of former President Mwanawasa. During this time most government operations and funding allocations stopped.

Moreover, the subsequent unplanned election that had to take place according to the country's constitution meant that all government spending was cut or frozen in order to finance the election.

As a result, routine funding was made available to the CSO only at the start of the new financial year (Jan 2009). Additional, dedicated funding for census operations has been negotiated with the Department of Finance but still needs to be officially approved and released. It is almost certain that this additional funding will not satisfy all the census mapping operation needs on the critical path to success.

Fieldwork operations only recommenced in the first week of February, 2009. Effectively, 6 months worth of census mapping was lost.

Another consequence of the lack of funding was that the funds initially set aside for the procurement of high resolution satellite imagery for selected urban areas was used for other purposes. A tender did go out for the procurement of the imagery and a service provider was selected, however, it will take time for the funds to be made available from the routine funding bundle. It has been provided for in the routine budget.

The tender process itself was flawed and there are real concerns whether the selected service provider will be able to deliver. Moreover, the terms of reference in the tender required service providers to quote in Zambian Kwacha, in stead of dollars. As a consequence of the slowdown of the global economy, the Kwacha has lost approximately 40% of its value against the dollar. Effectively, this means that the amount of Kwacha initially quoted by the successful service provider will not be sufficient to procure the specified sets of imagery, which has to be paid for in US dollars.

Regarding donor funding, the CSO management has made inroads in the acquisition of funding. The UNFPA has been engaged to provide additional software, hardware and equipment. So far, no definite funding has been secured but negotiations are ongoing with DFID and GTZ while the US Census Bureau is providing technical support in certain areas. The CSO management and the consultant are hopeful that relevant donor funding will be secured soon.

Indeed, with the delays in census mapping experienced over the past year, sufficient donor funding is essential to the success of census mapping operations, since sufficient funding will simply not be forthcoming from the government.

The CSO management is acutely aware of the fact that the census mapping effort is facing a crisis and forms the foundation of a successful census. October 2010 may seem far away still, but a year and a half is a very short time to implement meaningful census cartography for a country the size of Zambia, particularly taking into account the poor state of current base map availability and currency.

The irony is that the shorter the time available to implement census mapping operations, the more it will cost. Financial resources needed to implement meaningful census mapping increases exponentially if to be implemented in a very short timeframe.

Zambia CSO has unfortunately now reached past the point of no return. Realistically, only 15 months are left to implement census mapping operations successfully. Due to the amount of time lost, more financial and human resources would be needed than what was previously planned for. This also means revising the relevant donor documentation to reflect the increase in resources needed.”

## **5.2 Action Taken**

The consultant made the senior management aware of this issue and set up a meeting with all the relevant CSO senior management to discuss the problem. A follow up meeting was held with specific donor representatives from DFID, the US Census Bureau and GTZ and the relevant CSO representatives. The purpose of the first meeting, which took place on Monday, 16 February, was to inform the Donors of the current census mapping needs of the CSO, specifically the need for satellite imagery as well as highlighting the current census mapping situation and various scenarios and methodologies which can be implemented to alleviate the CSO's current predicament.

The meeting also served the purpose of briefing the US Census Bureau delegation which visited the CSO on a week long technical assistance mission on the current status of census mapping operations.

As a result of that meeting, the consultant was tasked with preparing various methodological and cost scenarios and budget comparisons as well as the re-optimization of the satellite imagery coverage to determine the costs and benefits of the various methodological scenarios available. This was done in consultation with the relevant CSO counterparts and was presented to the same participants at a meeting on Thursday, the 19<sup>th</sup> of February.

All the relevant results, issues, scenarios and recommendations were consequently documented in the Census Mapping Assessment document and presented to the CSO.

The Census Mapping Assessment Document will not form part of this mission report, but will be provided as a separate document.

## **6. Overview of meetings and discussions**

The following meetings and discussions took place:

### **Tuesday, 10 February**

- A meeting was held with Mr. Sikanyiti (Head: GIB) to discuss the mission schedule and activities, as well as the current census mapping status
- A consequent meeting was held with Mr. Sikanyiti, Mr. Mayaka (Deputy Director: Social Statistics) and Ms. Chulu (Director: Census and Statistics) to further discuss the current census mapping status as well as the status of satellite imagery acquisition and funding.
- A discussion also took place with the GIB staff to review the image scanning, compression, clipping and georeferencing workflow.

### **Wednesday, 11 February**

- Reviewing of time and completion rates, costing and methodological scenarios with Mr. Sikanyiti

### **Friday, 13 February**

- Conducting a field visit: Meet with three fieldwork teams in the Chongwe district and discuss various fieldwork issues and concerns while reviewing the effectiveness of the current fieldwork methodology and logistics

### **Monday, 16 February**

- Meeting with the CSO, DFID,GTZ and US Census Bureau representatives to discuss the current census mapping status with specific focus on the need for satellite imagery and funding

### **Tuesday, 17 February**

- Discussion with Mr. Sikanyiti to review and assess current satellite imagery coverage as well as obtaining information to create cost comparisons between traditional and modern census mapping methods

### **Wednesday, 18 February**

- Meeting at Ministry of Lands and Surveys: Meet with the Surveyor General, Mr. Danny Mubanga to discuss imagery needs and possible cooperation regarding the acquisition of imagery

### **Thursday, 19 February**

- Follow up meeting with the CSO, DFID, GTZ and US Census Bureau representatives to discuss and present the cost and methodological comparisons and findings and recommendations from the Census Mapping Assessment document

### **Friday, 20 February**

- Debriefing meetings with Mr. Mayaka and Mr. John Kalumbi, Deputy Director (Research & Dissemination) and GDDS Country Coordinator
- Final way forward discussion with Mr. Sikanyiti

## **7. Overview of technical assistance provided**

### **7.1 Assessment of current census mapping status and progress**

The current census mapping status and progress was assessed. Critical issues were brought to the attention of the CSO senior management where after the Census Mapping Assessment document was prepared and its findings presented not only to the CSO but also DFID, GTZ and the US Census Bureau representatives. The document covered the following topics:

#### **7.1.1 Assessment of the satellite imagery acquisition process**

The current status of the satellite imagery acquisition process was assessed taking into account both the IKONOS and SPOT imagery status. The findings and recommendations were tabled in the document. As mentioned, meetings did take place with relevant donor organizations to communicate and discuss the need for imagery, the types of imagery needed as well as cost and procurement issues. Satellite imagery coverage was further optimized to obtain the most cost effective options and various licensing options were discussed and costing for them was provided.

#### **7.1.2 Assessment of methodological options**

Various methodological scenarios were tabled and discussed, which included costing scenarios as well as GIS infrastructure equipment needs. An effort was made to provide the CSO with different options which would suit various budgetary requirements while the timeline for all scenarios tabled remained

constant. Resource issues such as staffing, equipment and logistics was also taken into account and discussed.

### **7.1.3 Scanning and georeferencing of topographic map sheets**

The scanning and georeferencing of the topographic map sheets progress was assessed and was found to be satisfactory. Issues surrounding this activity were denoted in the Census Mapping Assessment document.

### **7.1.4 Assess GPS field data integration operations**

The process and actions used to integrate the GPS captured field data into the GIS was assessed and tested. An example of GPS data overlaid in a GIS on topographic map sheet information are provided in the Annexure of the Census Mapping Assessment document

### **7.1.5 Assess current GIS database functionality and use**

The current GIS database use and functionality was assessed and found sufficient. The GIB provided examples where they on screen digitized the entire Kafue area using sample imagery and the relevant GIS databases and the consultant was pleased to note that they processes they used was correct. Similarly with the GPS data integration processes, the relevant GIB staff seems to understand the methodology very well and have grown in skill level to such an extent that they are able to operate successfully where this task is concerned.

### **7.1.6 Assess GIS infrastructure requirements**

The current GIS infrastructure needs were re-assessed and discussed with the GIB Head. Specifications and requirements as well as possible costs were provided as part of the Census Mapping Status Assessment document.

### **7.1.7 Methodological and imagery use cost comparisons**

At the request of the relevant donor representatives, the consultant, in consultation with the CSO, developed various satellite imagery and census mapping methodology costing scenarios to present to both the CSO and relevant donors. For the most part, it served to illuminate the predicament that the CSO find themselves in at the moment and to answer the following question:

**“Is the use of satellite imagery prohibitively expensive or will it save money as opposed to completing census mapping using the traditional approach and increasing the number of field teams?”**

To obtain the answer to this question, refer to the Census Mapping Assessment document, Chapter 5.

### **7.1.8 Determining the possible need for and commitment to obtaining a Government User license for national satellite imagery coverage**

Satellite imagery is normally provided to government agencies using one of two license options; a single user license, meaning only the specified agency can use the imagery and a government license, which means all government agencies, except the Department of Defense or its equivalent can use the imagery. Unfortunately the cost difference between the two options is vast and the question arose if obtaining a government license is really worth it? In other words, are there a need among other government agencies for satellite imagery, will they benefit from having access to it and are they able to contribute financially to its acquisition?

The first two questions were easy to answer since it has been well documented that nation wide high resolution satellite imagery coverage is a national asset to government as a whole, specifically in

developing countries where up to date base map coverage are incredibly outdated or does not exist at all. This issue is also further discussed as part of the Census Mapping Assessment document.

Whether the relevant government departments will be willing to contribute financially to a government license is however another issue entirely, specifically since government agencies in Zambia continuously struggle to obtain adequate funding to successfully fulfill their mandates. To obtain a better understanding of this issue, the consultant set up a meeting with the Surveyor General, since they will directly benefit from having access to up to date base map information such as satellite imagery. During the meeting it became apparent that their need is acute, but they do not have sufficient funding to fulfill, amongst others, their topographic and cadastral map updating mandates.

They did indicate that they are willing to make a financial contribution as far as their current funding allows them and made a definite commitment should the opportunity arise.

The onus is now on the CSO to engage all the government agencies who can benefit from up to date imagery coverage to determine their needs and obtain financial commitments from them where possible in order to illustrate to the donor community that the need and commitment is there for a government license, even though the financial contributions might be small.

## **7.2 Fieldwork methodology assessment**

The current fieldwork methodology was assessed by the consultant by visiting three fieldwork teams in the Chongwe district. Operational, logistics and methodological issues was discussed with each fieldwork team and the findings, as well as concerns and recommendations was documented as part of the Field Visit Report, which will be presented as a separate document with this Mission Report. The Field Visit Report was presented to the CSO and many of its findings and recommendations were also included in the Census Mapping Assessment Report.

## **8. Overview and assessment of problems and shortcomings encountered**

### **8.1 Mission administration and schedule**

Very few problematic issues were 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.

The timing of the mission was fortunate since it allowed the consultant to meet with the major donor role players and have discussions with them regarding the specific funding, procurement and methodological needs of the CSO.

### **8.2 Technical and methodological issues**

All the pertinent issues and current shortcomings are discussed in the Census Mapping Status Assessment document and were brought to the attention of the CSO senior management staff as well as the relevant donor organizations.

As noted, the relevant GIB staff skills were assessed regarding the implementation of the modern methodology and the consultant is satisfied with their understanding of the relevant GIS operations and software. The recommendation that the digitizing operations are centralized at the Head Office has been accepted and will go ahead as planned.

The specific monthly and fixed operational costs of fieldwork teams were calculated on a per team basis which can be used for future cost comparisons. Moreover, these costs were used as the basis for the methodological scenario cost comparisons documented as part of the Census Mapping Assessment document.

### **8.3 Procurement and funding issues**

All procurement and funding issues are dealt with in detail in the Census Mapping Status Assessment document.

#### **8.3.1 Procurement and delivery of equipment**

Although the UNFPA did deliver most of the equipment needed, the following critical pieces of equipment are still lacking. These are:

- At least two high volume A3 colour printers at Head Office
- A minimum of nine field laptops for the teams currently in the field to assist them with the downloading of GPS data
- One standard data server dedicated to the GIB Unit which will serve as data storage for all the spatial vector and raster census mapping data.
- Additional workstations for the GIB at Head Office
- Nine GIS software licenses

The UNFPA has made a commitment to provide the printers, 3 GIS software licenses and field laptops. The CSO must ensure that these items are delivered on time. Moreover, the CSO must ensure that the internal funding is available to ensure the acquisition of the server and the additional workstations and GIS software licenses.

#### **8.3.2 Procurement of Satellite Imagery**

The need for satellite imagery is even more pressing due to the crisis the CSO finds itself in regarding census mapping progress. Issues regarding the need, cost and acquisition of SPOT satellite imagery have been dealt with in detail in the Census Mapping Assessment document.

Regarding the acquisition of the IKONOS imagery, a tender for the acquisition of said imagery went out in December of 2008 and was awarded in January of this year. The tender process is however flawed with technical considerations regarding the ability to deliver satellite imagery or even basic knowledge about satellite imagery by prospective service providers largely ignored by the Tender Board. The CSO also seem to have little say in the technicalities of the selection process which are mainly the domain of the Tender Board itself, which boggles the mind. The reasons for this flawed process are numerous, but it will not be discussed in detail since it is not within the scope of this document.

Sufficed to say that the service provider who was ultimately selected is not an active or official reseller of Ikonos imagery and its sole purpose will merely be to act as a middle man between the CSO and a supposedly kosher company which has the necessary technical skill to provide satellite imagery and is an official and mandated reseller of Ikonos imagery. This company still needs to be determined.

The CSO management did consider canceling the tender, but there simply is not enough time available to go through the entire process again and there are also no guarantees that a suitable company will indeed be selected. Consequently, it was recommended that the CSO engages the appointed service provider to determine if they do indeed have some plan of providing the images.

Since an official contract has not yet been signed with the service provider, the CSO should contractually force the service provider to use an officially mandated provider of Ikonos imagery to process and deliver the imagery. Moreover, it should stipulate in the contract that an official and written quotation and delivery commitment will be needed from the mandated official Ikonos imagery provider and the quotation must be supplied by the selected service provider before any monies exchange hands.

Using this approach it will not be necessary to put the tender out again. The CSO can begin with the negotiating process even before the funds for the procurement of the imagery is released. This is an urgent issue and it needs to be concluded before the end of March, 2009.

### **8.3.3 Further technical assistance**

The CSO has expressed the need for further technical assistance, especially once the first satellite imagery arrives since they will require assistance in integrating the images into the spatial GIS database while needing further assistance in the use of the imagery within the GIS environment. They also want to ensure that they do not start off on the wrong track so the consultant's main task would be to ensure that the selected methodology is implemented correctly from the beginning so as to avoid any costly rectification issues down the line. The same applies to the set up and configuration of the GIS infrastructure.

## **9. Assessment of the way forward**

An assessment of the way forward is provided as part of the Census Mapping Status Assessment document and was discussed in detail with both the CSO and the relevant donors.

## **10. CSO Counterpart actions**

The consultant counterpart at the CSO is Mr. Iven Sikanyiti.

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

- Follow up on the UNFPA regarding the provision of the printers, field laptops and GIS software
- Ensure that the provision of the GIS server, additional workstations, staffing and GIS software is catered for in the annual budget and that the CSO Senior Management is aware of that.
- Ensure that the funds for the Ikonos imagery is released
- Engage with the service provider selected by the Tender Board to determine if they do have a solid plan to provide the Ikonos imagery
- Ensure that the selected service provider for the Ikonos imagery is contractually forced to use an officially mandated provider of Ikonos imagery to process and deliver the images
- Continue with the traditional field operations in all the provinces where possible
- Complete the scanning, compression and georeferencing of the topographic map sheets by the end of April, 2009.
- Ensure that the GIB staff obtains the necessary hands on experience in image georeferencing and clipping, as well as GIS operations and digitizing. Staff at Head office must be used optimally.
- Ensure that the additional staff needed for digitizing operations are appointed and trained
- Ensure that the required GIS infrastructure at Head Office is procured and installed before the end of April, 2009.
- As soon as relevant satellite imagery is available, centralize the digitizing effort by relocating suitable provincial digitizing staff to Head Office for training. Therefore create a digitizing team at the Head Office which will implement office demarcation, map printing and updating.
- As soon as the scanning and georeferencing is complete, update the geographic frame for all the provinces.

- Once the geographic frame is complete, ensure that office digitizing commences using either completed fieldwork maps or satellite imagery
- Follow the normal methodological steps to ensure that digital spatial data (SEAs etc.) is integrated into the master warehouse at head office.
- As each district is completed, ensure that the relevant district, CSA and SEA maps are created and printed and stored safely.
- Ensure that senior management pursues the funding of the SPOT imagery from donors as well as contacting relevant government agencies who can benefit from the imagery in order to obtain possible financial contribution commitments which can be used to further persuade the donors of the need of a government license for SPOT imagery coverage
- Ensure that the relevant additional technical assistance needed is requested through the relevant channels.

## 11. Deliverables

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

<b>DELIVERABLE</b>	<b>COMPLETED</b>
Assessment of Census Mapping status and progress	Yes. Mapping status and progress was assessed and discussed with the CSO and relevant donor agencies. Methodological costing comparisons and imagery optimization was also completed and are all included as part of the Census Mapping Assessment document.
Assessment report	Yes. A Census Mapping Status Assessment document was created and provided to the CSO and relevant donors
Compression, Clipping and Georeferencing of topographic imagery	Yes. The completed topographic sheets were assessed for accuracy and correctness and were found to be sufficient. Examples can be found in the Annexure of the Census Mapping Assessment document
Assessed fieldwork methodology	Yes. The current methodology was assessed by visiting three field teams in the Chongwe district and a Field Visit Report was created and presented to the CSO
Follow up training as required by the CSO	Yes. No additional training was currently required by the GIB regarding census mapping, however they did express the need for additional technical assistance once the GIS infrastructure and imagery is ready to be implemented.
Skilled staff	Yes. The skill levels of the relevant and available staff was assessed regarding digitizing, scanning and georeferencing operations and was found to be sufficient
Functional GIS database	Yes. The GIS databases that was created during the previous missions was reviewed and assessed and was found to be sufficient. Further assistance

	will be needed in the integration of these databases once consolidation activities commences.
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**11.1 Additional Deliverables**

This pertains to additional deliverables not specified for this mission. The additional methodological cost comparisons and reviewed satellite imagery optimization coverage conducted on request of the relevant donors and included as part of the Census Mapping Assessment document.

## 12. Annexes

### 12.1 Annexure 1: Original Terms of Reference for Mission 3

**General Data Dissemination System, (GDDS phase 2) Socio-Demographic Statistics Project for Anglophone Africa: Provision of technical assistance (Mission 3) 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. The second mission took place during July in 2008. This ToR aims to denote the specifics for the third and last mission, which will be guided by the initial country work plan as well as new issues which transpired as a result of the previous two missions.

It has been agreed that there will be 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.

Separately, the consultant has agreed to draft his own mission report. This report will use the format that was specified by the World Bank. 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 third 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 3: Post census mapping activities

Priority 1 will comprise 40% of the mission time, priority 2 will comprise 40% and priority 3 will comprise 20% of the mission time. The total consultant time for the mission is 12 days divided as follow:

- 10 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 was done on the need, cost, type and distribution of satellite imagery for base map creation during the first and second missions and the CSO has made some funds available for the acquisition of base map imagery. Unfortunately, due to various internal administrative issues, the process has been very slow and it seems that only enough funds will be available to cover major urban centers, while the rural areas will be dealt with in a more traditional manner, using 1:50000 topographic map sheets which the CSO are scanning, compressing and georeferencing themselves
  - This implies further revision of the census mapping methodology since two different methodologies will be used for urban and rural areas.
  - The procurement of the satellite imagery for the major urban areas is in the tender stages and therefore the CSO will need assistance regarding the processing and GIS integration of the imagery, as well as follow up training on the use of the imagery in census mapping operations
- Activities
  - Follow up on satellite imagery acquisition process and assist where necessary
  - Assess fieldwork methodology
  - Follow up technical assistance in clipping and registering of scanned 1:50000 images – progress evaluation
  - On-site monitoring and evaluation, assessment of current activities and rectification of possible errors

### **Priority 2**

- Objectives
  - Provide necessary subject matter training as specified by the CSO
  - Assess current database and provide follow up technical assistance in database integration operations
  - Assess GPS field data integration operations

- Activities
  - Follow up training in:
    - GIS Database design and development
    - Imagery interpretation
    - GPS Field data integration operations
    - Review of on-screen digitizing methodology

### Priority 3

- Objective
  - To identify and assess relevant post census mapping issues that will have bearing on the GIS Unit and make them aware of what will be expected from them with regard to post census mapping activities and product creation
- Activities
  - Identify and determine list of post census activities and actions regarding census product creation and other downstream activities

#### 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 are listed by priority:

##### Deliverables for Priority 1:

- Assessed current activities
- Assessment report
- Clipped and registered 1:50000 topographic imagery
- Assessed fieldwork methodology

##### Deliverables for Priority 2:

- Training manuals and documentation
- Follow up training as acquired and requested by the CSO
- Skilled staff
- Functional GIS database
- Georeferenced 1:50000 imagery

##### Deliverables for Priority 3:

- Report on GIS Unit post census activities, actions and expectations

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 12 days with 10 days mission time and 2 days preparation and report writing time.

#### Timing

To be completed during the 9<sup>th</sup> to the 20<sup>th</sup> of February, 2009.

## 12.2 Annexure 2: List of Abbreviations and Acronyms

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

## 12.3 Annexure 3: List of Participants

### Participants from the CSO

Name	Designation
<b>CSO Staff</b>	
<b>Senior Management</b>	
Ms Efreda Chulu	Director of Census and Statistics
Mr William Mayaka	Deputy Director (Social Statistics)
Mr John Kalumbi	Deputy Director (Research & Dissemination) GDDS Country Coordinator
<b>Geographic Information Branch</b>	
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
<b>Field team members</b>	
Mr. A Ngoma	Supervisor
Mr. Phiri	Field team member
Mr. Mpimpa	Field team member
Mr. Musenge	Field team member
Mr. Siakanomba	Field team member
Mr. Sondashi	Field team member
Mr. Mundia	Field team member
<b>Department for International Development (DFID)</b>	
Ms. Frances Heeks	Statistics Advisor, Africa Division
Ms. Lynn MacDonald	Results Advisor, Zambia
Mr. Thomas Moyo	
<b>German Development Cooperation (GTZ)</b>	
Mr. Chris Pain	Finance Manager
Mr. Marco Larizza	
<b>US Census Bureau</b>	
Mr. Peter Way	Chief, International Programs Center
Mr. Joshua Comenetz	Chief, Geographic Studies Branch
Mr. Oliver Fisher	
<b>Zambia Ministry of Lands</b>	
Mr Danny Mubanga	Surveyor General

## 12.4 Annexure 4: Mission Schedule

TIME	ACTIVITY
<b>Tuesday, 10 February</b>	
8h30 – 11h00	Meeting with Mr. Sikanyiti. Discuss project schedule and activities. Discuss current census mapping status and progress
11h00 – 12h00	Meeting with Mr. Mayaka and the Director: Mrs. Chulu. Discuss mission objectives, current census mapping status as well as the procurement of satellite imagery, tendering procedures and possible donor assistance issues.
12h00 – 13h00	Mission Schedule setup and necessary report creation determination
13h00 – 14h00	Lunch
14h00 – 16h30	Reviewing time and completion rates. Determining new methodological and costing scenarios
<b>Wednesday, 11 February</b>	
8h30 – 11h00	Reviewing time and completion rates. Determining new methodological and costing scenarios
11h00 – 13h00	Census mapping status assessment
13h00 – 14h00	Lunch
14h00 – 16h30	Census mapping status assessment
<b>Thursday, 12 February</b>	
8h30 – 13h00	Creation of census mapping assessment document
13h00 – 14h00	Lunch
14h00 – 16h30	Creation of census mapping assessment document
<b>Friday, 13 February</b>	
9h00 – 16h00	Field visit – visited three teams in the Chongwe district
<b>Sunday, 15 February</b>	
10h00 – 15h00	Creation of census mapping assessment document
<b>Monday, 16 February</b>	
8h30 – 13h00	Finalization of Census Mapping Assessment Document
13h00 – 14h00	Lunch
14h00 – 15h00	Preparation for meeting with DFID and US Census Bureau
15h00 – 18h00	Meeting with DFID, GTZ and US Census Bureau

<b>Tuesday, 17 February</b>	
8h30 – 13h00	As a result of DFID meeting, creating traditional and modern methodology cost comparisons and budgets and further imagery use optimisation
13h00 – 14h00	Lunch
14h00 – 16h30	Creating traditional and modern methodology cost comparisons and budgets and further imagery use optimisation
<b>Wednesday, 18 February</b>	
8h30 – 12h00	Creating traditional and modern methodology cost comparisons and budgets and further imagery use optimization. Reworking and amendment of Census Mapping Assessment report
12h00 – 13h00	Creating Field Visit Report
13h00 – 14h00	Lunch
14h00 – 16h00	Meeting with Ministry Of Lands and Survey; Meet Mr. Danny Mubanga, the Surveyor General to discuss cooperation on imagery acquisition
16h00 – 17h00	Completion of Field Visit Report
<b>Thursday, 19 February</b>	
8h30 – 13h00	Prepare and compile census assessment briefing presentation
13h00 – 14h00	Lunch
14h00 – 15h00	Prepare for Donor meeting
15h00 – 18h00	Meeting with DFID, GTZ and US Census Bureau
<b>Friday, 20 February</b>	
8h30 – 9h30	Informal discussions with Mr. Sikanyiti and a representative from the US Census Bureau
9h30 – 10h00	Preparation for debriefing session
10h00 – 11h00	CSO debriefing session with Mr. Sikanyiti, Mr. Kalumbi and Mr. Mayaka
11h00	Leave for airport

## 12.5 Annexure 6: Zambia Country Report

### Introduction

The consultant, Mr. Francois Bezuidenhout arrived in Lusaka on the 9<sup>th</sup> of February and departed again on the 20<sup>th</sup> of February. The main objectives for the CSO regarding this mission was to assess current census mapping progress, provide us with new and refined options for satellite imagery use and mapping methodology and to assist us in mapping out the way forward.

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
Follow up on satellite imagery acquisition process and assist where necessary	Yes. The consultant reviewed this issue as part of the current census mapping status assessment process and provided us with new costing and coverage options. The costing was also compared to traditional fieldwork methodology costing
Assess fieldwork methodology	Yes. The consultant accompanied us on a field visit to the Chongwe district to visit three field teams and discuss with them the current fieldwork process. The consultant then provided us with a field visit report which contained findings and recommendations
On-site monitoring and evaluation, assessment of current activities and rectification of possible errors	Yes. All current census mapping activities was assessed by the consultant. As a result the Census Mapping Assessment Report was presented to us.
Follow up technical assistance in clipping and registering of scanned 1:50000 images – progress evaluation	Yes. The consultant evaluated the work done so far and expressed his satisfaction with it, although he indicated that progress must be faster
Provide necessary subject matter training as specified by the CSO	Yes. During this mission there was no need for additional training although our skills regarding digitizing and GPS data integration was reviewed. We will however need more technical assistance in future when the imagery arrives and we begin with GIS office operations in earnest to make sure we start of on the right track
Assess current database and provide follow up technical assistance in database integration operations	Yes. The databases created during the previous mission are in use and working well. The consultant did review how the georeferenced topo sheets are integrated into the database.
Assess GPS field data integration operations	Yes. Some of the GPS captured data from the field was tested and integrated into the GIS

	by the consultant to determine its accuracy and usefulness.
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**Specific deliverables according to the ToR**

<b>DELIVERABLE</b>	<b>COMPLETED</b>
Assessment of Census Mapping status and progress	Yes. Mapping status and progress was assessed and discussed with the CSO and relevant donor agencies. Methodological costing comparisons and imagery optimization was also completed and are all included as part of the Census Mapping Assessment document.
Assessment report	Yes. A Census Mapping Status Assessment document was created and provided to the CSO and relevant donors
Compression, Clipping and Georeferencing of topographic imagery	Yes. The completed topographic sheets were assessed for accuracy and correctness and were found to be sufficient. Examples can be found in the Annexure of the Census Mapping Assessment document
Assessed fieldwork methodology	Yes. The current methodology was assessed by visiting three field teams in the Chongwe district and a Field Visit Report was created and presented to the CSO
Follow up training as required by the CSO	Yes. No additional training was currently required by the GIB regarding census mapping, however they did express the need for additional technical assistance once the GIS infrastructure and imagery is ready to be implemented.
Skilled staff	Yes. The skill levels of the relevant and available staff was assessed regarding digitizing, scanning and georeferencing operations and was found to be sufficient
Functional GIS database	Yes. The GIS databases that was created during the previous missions was reviewed and assessed and was found to be sufficient. Further assistance will be needed in the integration of these databases once consolidation activities commences.

**Timing**

The time allocated to this mission was sufficient and allowed us to cover all the activities successfully. It was fortunate that the mission took place at the same time that the DFID, GTZ and US Census Bureau representatives were here since it allowed the consultant to brief them on our status and the need and cost for imagery to complete our census mapping on time and more accurately than before. The Census Mapping Assessment document and the costing comparisons will be very useful in planning our next actions and determining our budgets.