



Mission Report

The provision of technical assistance to Seychelles National Statistics Bureau with regard to ArcGIS Census Mapping Training and Census Mapping methodology assessments and development.

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1. Introduction

The Seychelles National Statistics Bureau (NSB) is currently involved in the planning for the next Population Census which will be taking place during 2010. They are also busy with the creation of a spatially referenced dwelling frame.

The Geographic Information System Unit 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.

NSB needs technical assistance regarding the use of ArcGIS in modern census methodology as well as assessing the current and creating a new Census Mapping methodology.

Seychelles was one of the countries which attended the GDDS 2 Socio-demographic statistics launch workshop in Mombasa, Kenya during the end of June 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. To this end, this ToR for the first mission to the Seychelles has been drawn up from the work plan, based on the expressed objectives of the chosen priorities.

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 were detailed in the Terms of Reference which is included in Annexure 1. NSB 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:

- Assessing current Census Mapping Methodology
- Providing ArcGIS 9 training
- Providing training in spatial and attribute data integration and linking, database creation and maintenance
- Drafting of relevant documentation regarding census mapping and GIS and database creation and maintenance processes

Specific outputs:

- Assessed GIS infrastructure and Census Mapping methodology
- Trained staff
- Linked field maps to geo-referenced master files
- Reviewed and updated GIS and Census Mapping methodology documentation

2. Implementation of the consultancy

The mission was implemented by Mr. Etienne de Fortier from **GeoSpace International**. As specified in the ToR, the total mission time was 10 days on site at the NSB with two additional days for preparation and report writing. The first mission ran from the 19th of November until the 30th of November 2007.

3. Acknowledgements

The consultant would like to thank the CEO, Mr. Errol Dias; Ms. Laura Ahtime, the Director General as well as the Principal Statistician, Ms Helena de Letourdis for their support and cooperation during the consultancy.

Special thanks to the Ms. Therese Gopal and the staff of the GIS Unit for their enthusiasm, assistance and positive attitude during the training and assessment. 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. Seychelles was one of the countries which asked for technical assistance in the field of GIS.

5. Challenges facing Seychelles National Statistics Bureau

There is an increased demand for developmental socio-demographic statistics that can be analyzed and disseminated utilizing the ability of GIS technology. 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. This new increased demand for spatially linked socio-demographic data is seriously exposing existing data capturing, integration, analysis and dissemination techniques used in developing countries.

The NSB GIS unit has already started to address this new demand through the use of GIS technology. They have already created and disseminated data from the 2002 Census by creating a Census Atlas using GIS technology. GIS technology has also been used to create a Geo-reference dwelling frame data set. This dwelling frame forms an integral part of the Census Mapping Methodology and is currently being updated using GIS technology.

The current staff allocated to the GIS Unit and their management understands the potential for the use of GIS as well as the need for GIS within the organization and is committed to firmly establish the unit as a corporate service provider for the organization as a whole.

The need and understanding of the importance of GIS has thus been established within NSB.

The challenge for the GIS unit is to further develop and implement a fully functional and sustainable GIS unit in order to ensure that the momentum created thus far is not lost. The current GIS software infrastructure of the GIS unit is not sufficient to operate a successful GIS in a Statistical Department. This has a huge impact on the way GIS data is collected, analyzed, disseminated and maintained. The role of the unit has not been properly defined and will need to be addressed in order for the GIS unit to become a corporate service provider to the National Statistics Bureau.

The GIS UNIT in particular, has the following challenges to face:

- Inadequate staff requirements to operate the GIS unit
- Inadequate hardware and software
- Inadequate integrated and properly designed data warehouse and database
- Current lack of institutional support regarding the on going maintenance and sustainability of GIS

- Inadequate geographic base data
- Inadequate equipment
- The current staff allocated to the GIS unit are very able, though more skills development and training is needed

The National Statistics Bureau is aware of these challenges and has already invested time and money to improve on some of the issues. Unfortunately this must be a sustainable effort which requires time and money. The main challenge now is to move forward in an integrated fashion and overcome the obstacles one by one in order to fulfill the full potential of GIS by realizing their short and long term goals.

6. Overview of meetings and discussions

The following meetings and discussions took place:

Monday, 19 November

Introductory meetings were held with the CEO, Mr. Errol Dias, The Director General, Ms. Laura Ahtime and the Principal Statistician, Ms. Helena De Letourdis

Informal discussions were held with Ms. Therese Gopal where the current status of the GIS UNIT was discussed. The terms of reference was reevaluated and a question and answer session followed where the consultant asked specific questions relating to the GIS Unit. A basic schedule for the rest of the mission was also determined.

Thursday, 22 November

The consultant accompanied the field work teams to the field to assess the current fieldwork methodology and to discover the country specific complexities regarding fieldwork in the Seychelles

Tuesday, 27 November

A meeting was held with Mr. Francis Coeur de Lion the Director of GIS and IT of the Ministry of National Development to discuss the current data capturing and sharing agreement.

Wednesday, 28 November

The consultant held a debriefing meeting with the management of the NSB.

7. Overview of technical assistance provided

7.1 Training

An Introduction to GIS and basic database fundamentals training were conducted where after practically based Arcview 9 training was held. The training took place in the GIS unit offices. The first part of the training was performed on Monday and Tuesday 19 -20 November 2007. The practically based training was split into different days namely Wednesday 21 November, Friday 23 November, Tuesday 27 November and Wednesday 28 November.

The following topics were included in the training:

INTRODUCTION TO GIS AND BASIC DATABASE FUNDAMENTALS

GIS CONCEPTS AND DEFINITIONS

MAPPING CONCEPTS

VECTOR AND RASTER

GIS BUILDING BLOCKS

DATA FUNDAMENTALS

DATA DISPLAY

REAL-WORLD INFORMATION

GIS ANALYSIS

DATABASE FUNDAMENTALS

GIS DATA FORMATS

DERIVED MAPPING

MOBILE GIS

GIS FOR STATISTICAL AGENCIES

Practically based training included the following:

START WORKING WITH ARCGIS
ARCGIS TOOLS
FEATURE/LAYER PROPERTIES
ORDERING & THEMATIC OF LAYERS
LABELING
TABLE MAINTENANCE
SPATIAL QUERIES
DEFINE & RE-PROJECT DATA
PERSONAL GEO-DATABASE
DIGITIZING (CREATING DATA)
CREATING A MAP LAYOUT
MODIFYING DATA

7.2 GIS UNIT and Census mapping methodology assessment

The assessment of the current Census Mapping methodology and GIS unit forms part of the consultant's assignment. The assessment was done in conjunction as they are interdependent. After the assessment was completed a separate document discussing the recommended Census Mapping Methodology was drawn up together with the GIS unit staff, the document can be found in Annexure 3.

7.2.1 Current status of the GIS Unit

Currently, the potential of the GIS Unit is under utilized. Though most of the hardware infrastructure and staffing is in place to drive the GIS forward progress is severely hampered by the fact that outdated GIS software is being used. Not all of the staff members in the GIS unit have full time access to the GIS software. All the necessary elements, including the software, hardware, data and staff must be in place in order to make the unit a success. Currently, 3 people are assigned to the GIS unit. GIS has been, and is currently being used by the unit. Although management is fully aware of the potential of GIS in a Statistical Agency, the GIS unit currently fulfills the function of a limited map creation and production unit, with minimal time and effort being spent on actual data integration, analysis and relevant thematic mapping. This lack of operational diversity is stifling the growth of the Unit and the potential functionality of the GIS.

GIS consists of 5 basic components:

People
Hardware
Software
Data
Method

The current status of each of these components will now be discussed. Recommendations will be discussed later in the document.

7.2.1.1 People

The current contingent of staff consists out of one GIS Manager, one Senior Statistical Officer and One Statistical Officer. All the staff has some kind of tertiary qualification. Technical expertise varies, but all the staff members having adequate basic skills regarding computer and software literacy. The GIS Manager skills are excellent and with the necessary support will be able to run the unit successfully. The two Statistical Officers have intermediate GIS skills and must be further enhanced through hands on training and the actual use of the GIS technology in the day to day activities.

Skills and knowledge regarding traditional and modern census cartography methods seems to be in abundance.

Knowledge and experience regarding GIS principles and applications, especially applications regarding statistics agencies is limited. It will be of utmost importance that the staff is given the opportunity to enhance their skills and become experience GIS users in order in order to

drive the crucial short term processes that must be implemented to ensure the sustainability and success of the GIS unit.

Currently, not all the staff has access to GIS software and are used in other roles. It is essential that the roles and responsibilities are clearly defined and the staff is permanently deployed to the Unit.

7.2.1.2 Hardware Infrastructure

Each of the GIS unit personnel does have a Workstation that has acceptable specifications for the use in a GIS office

One HP Designjet 1050c plotter. The plotter is operated on a daily basis. At the moment the plotter is mostly used for the creation of fieldwork maps. One major problem with the plotter is that it is using inkjet technology and therefore the ink on the paper smudges easily. This poses a real problem due to the high humidity and rainfall in Seychelles.

One A3 black and white printer/copier is available at the GIS unit. The copier is still operational but do give problems from time to time.

Most of the directors and senior staff do have laptop computers or workstations that are sufficient for General GIS Analysis.

The internal IT support is very good. A very reliable network with internet and email is in place.

No GPS units are available at the GIS Unit

Office space and furniture

NSB is housed in a very modern office block, the Office setup at the GIS unit is totally satisfactory. High end Workstations, Screens, printers and plotters need a stable environment to operate at peak performance. The equipment emits high amounts of heat and operational air-conditioners are required in the office. Currently the air conditioning at the offices is in very good operational condition. The GIS unit must ensure that the status quo is maintained in this regard.

Electricity and backup Electricity

The electricity supply in Seychelles is relatively good. At the moment no UPS backup power supply systems are in place for the workstations. It is advisable to have a UPS at every workstation, plotter and printer to make provision for power dips that can be very harmful for high end IT equipment.

7.2.1.3 Software

1 x ESRI Arcview 3.3 license is available

1 x ESRI Arview 8.0 license is available

Microsoft Office is available on all the workstations

7.2.1.4 Data

Currently, the following data sets are part of the GIS setup:

Spatial data

- 0.25m Digital Orthorectified Color Aerial Photography created in 1998 from the Ministry of National Development
- Digital Road Layer from the Department of Lands and transport
- Digital Rivers layer from the Department of Environment
- Digital Land Parcel layer from the Ministry of National Development
- Digitised digital Building Layer from the Ministry of National Development
- Digitised digital 2002 EA Layer
- Georeferenced Dwelling Frame (3 districts completed)
- The attribute field of the EA layer does have a District Field that can be used to create a District Layer
- No topographic map sheets (1 : 50 000 maps) are available in digital format.
- No Locality name area layer exists but can easily be derived from the EAs and the Georeferenced Dwelling frame data as village and locality name information forms part of the dataset

Attribute data

The 2002 Census statistical data is available.

New data:

The Ministry of Environment, Natural Resources and Transport under the FAO project is currently procuring Colour Ikonos Satellite Imagery for the whole of Seychelles. NSB will be able to access the imagery once all the data has been delivered.

NSB is currently busy updating the Dwelling frame data. Hardcopy maps are printed for the fieldwork teams who then set out to update the data by annotating the new dwellings on the maps. The listing form information is also updated. The new dwelling is then digitized by the Ministry of National Development. The updated listing form information is captured and linked to the newly created and updated building layer to form an updated Geo-referenced Dwelling frame.

7.2.1.5 Method

Method entails that once the people, hardware, software and data are in place, the following must be implemented or should exist for the GIS to achieve its full potential and provide relevant deliverables:

- In order to ensure that data is captured according to the correct standards, clear guidelines must exist for the census mapping activity taking into account the latest available data and technology
- Clear guidelines must exist for the updating of the Geo-referenced Dwelling frame in order to analyze data efficiently, clear guidelines must be created regarding the methods and type of analysis to be done on the data
- Clear parameters must be set regarding what type of outputs will be required by NSB line units as well as external users
- Knowledge within NSB and the GIS unit regarding the application of GIS to achieve the above and to assist line units in achieving their own goals must exist
- The GIS unit itself must have a clear understanding of data integration, analysis and dissemination techniques for statistical data across various domains such as demography and surveys

Only some of the above mentioned methodological prerequisites currently exists, which constrains the use and value that GIS should have for NSB, severely.

GIS is created through interacting and interdependent components. Without all of these components being effective, the system's use and functionality is limited. This is currently the case at the GIS unit.

As mentioned the method aspect of the GIS unit must be addressed once all the hardware, software and skills are in place.

The NSB GIS office has developed their own methodology for the Census Mapping Activity as well as the updating of the Geo-referenced Dwelling frame. The current methodology is well thought out and addresses most of the issues related to Census Mapping. A new methodology is therefore not necessary and only a few adjustments to the current methodology are advised.

The GIS unit assessment does reveal certain limitations regarding infrastructure, data and resources. The limitations were taken into account by the Unit when the original methodology was developed. It is evident that the GIS unit had to be very creative when the methodology was developed and that they should not have a problem adopting the modified methodology. Although the new modification will also strive to take some of the limitations into account, certain minimum requirements will have to be reached in order for the methodology to be implemented successfully. The minimum requirements will be discussed as part of the recommendations section.

Following is a brief description of the method used to create the digital Enumerator Area dataset:

A digital EA dataset for Seychelles already exists. The dataset was created by the GIS Unit of NSB utilizing the existing infrastructure.

A digital set of the EA boundaries were created by digitizing the 1994 EA sketch maps using a digitizing tablet. The sketch maps of the Enumerator Area Boundaries were drawn on hardcopy Topographical maps. The maps included the land parcels, contours and some topographical data such as roads. These hardcopy maps were used to digitize the EAS.

The EA boundaries were later modified to fit the 1998 digital color aerial photography backdrop data. A digital set of the parcel boundaries was also used to realign the EA boundaries. Arcview 3.2 was used to digitize and modify the boundaries.

The EA dataset is currently being updated by the GIS Unit and field teams.

Following is a brief description of the EA updating methodology:

The Ministry of National Development was tasked to digitize the physical boundaries of all the buildings visible on the Digital Orthophotos. The above mentioned information together with the ministry of Lands and Transport, Roads and Parcel data as well as the Ministry of Environment's rivers data were printed on A2/A1/A0 fieldwork maps. The fieldwork teams then set out to update the information, verify the EA boundaries and capture new data such as roads and places of interest. Buildings not captured by National Development together with new buildings were also captured and indicated on the maps. All the households were given a number per EA on the map; the corresponding number was captured on a listing form together with the following information: District Name, EA Number, Location Name, Name and Surname of Head of Household, Type of Building and Use.

The annotated maps were send back to the Ministry of National Development and the new structures indicated by the fieldwork teams were also captured in the GIS. The newly captured dwelling data was loaded into the NSB GIS system. The Household/Structure number was captured in the GIS and the listing information was separately captured and then linked to the GIS. All the other annotations were also captured.

The data in the listing forms linked to the household/structure per EA in the GIS is known as the Geo-referenced Dwelling frame. After all the data was successfully loaded, linked and captured the EA layer was updated.

The Geo-referenced dwelling frame is an important data set that must be maintained. The information will prove to be very valuable during the census as it will be of great assistance to the census enumerator, the data can also be used for subsequent surveys.

The fieldwork exercise for the creation of the geo-referenced dwelling frame, verifying/updating EA boundaries and capturing new information has been completed.

The creation of the *digital* Geo-referenced dwelling frame, editing of the EA boundaries and capturing of the annotation data in the GIS has not been completed as yet. Only 3 districts out of a total of 25 from the 2005/2006 mapping exercise have been completed. The fieldwork team is presently doing the 2007/2008 mapping update.

The Geo-referenced Dwelling frame will be used for demarcation and integrated as part of the New Census Mapping Methodology. It will be further enhanced and updated through the implementation of the new methodology. As mentioned, the existing 2002 EAS has been verified and updated on the fieldwork maps. The above mentioned information will form the base for updating and re-demarcating the EA boundaries.

The fieldwork teams are currently using a duplicate hardcopy fieldwork map to revisit some of the areas and update/verify the information and capture new information. The NSB fieldwork teams plan to revisit all the EAS in the Seychelles to update the current EAS as well as the Geo-reference Dwelling frame. The new Census Mapping Methodology must be employed in this instance.

7.3 Creating Geo-database

The consultant was tasked to assess all the relevant, available digital data and after consultation with the NSB GIS unit personnel, design a new Geo-database. The consultant successfully created and installed the database and also trained the staff on the methodology to create and manipulate their own databases.

7.4 Creating plotting template

The consultant was asked to design, create and deliver a plotting template that can be used for the field verification maps as well as other relevant maps. The NSB GIS Unit provided an example of the template that they prefer. The template was designed and created by the consultant and delivered and installed. The GIS Unit staff was also trained on the methods of creating a plotting template, which enabled them to make certain changes to the plotting template.

7.5 Defining abbreviation list for feature classification

The consultant was requested to set-up an abbreviation list. A sample/example list was already created by the GIS Unit. The list was assessed and after consideration and discussions with the staff, the list was adopted without any further changes.

7.6 Census Mapping Methodology

The consultant, with assistance from the NSB GIS unit developed a new Census Mapping Document. The document can be found in Annexure 3

8. Recommendations

Recommendations will be constructed along the following headings:

- Hardware requirements
- Software requirements
- Data requirements
- Human resource requirements
- Administrative requirements
- Training, External assistance and Support

8.1 Hardware requirements

As mentioned the existing GIS workstations at the GIS unit is sufficient and of good standard. A maintenance and upgrade strategy must be implemented to ensure that the status quo in this regard is maintained.

The following hardware must be procured to complement the current hardware infrastructure as well as the proposed census mapping methodology:

A high end color A3 laser printer/copier is an essential component for the GIS unit. The laser prints will not smudge as easily and will enhance the fieldwork productivity, especially when smaller EA's are concerned. A3 color prints will also be necessary during the actual Census Enumeration.

GPS units are necessary to enhance the way the Geo-referenced dwelling frame is captured and maintained. Currently the fieldworkers indicate the approximate position of the structures in the field on the hardcopy maps. It is very difficult to accurately annotate the correct location of the structures on the maps as the rich vegetation in Seychelles conceal landmarks and topographical features necessary for accurate map interpretation. GPS units will enable the fieldworkers to correctly capture the location of the structures and for the GIS staff to accurately plot the position of the structures in the GIS

As mentioned UPS units are necessary to ensure that the integrity of the hardware are maintained when power dips occur.

8.2 Software requirements

The current administration and operating system software available to the GIS Unit is sufficient. The GIS software is however not sufficient. The existing Arcview 8.0 and Arcview

3.2 packages must be upgraded to latest ESRI ArcView package (currently version 9.2). An extra Arcview package must also be procured to ensure that three operational GIS workstations are in place. It is also recommended that one ArcEditor is also included to ensure that the integrity of the EA data is maintained when the data is recaptured and edited. The maintenance of the software is also very important. It should be investigated if it would be possible to pay the maintenance for the GIS software a couple of years in advance. Software training will be discussed in detail under the Training section. The Cartographic Unit must ensure that maintenance for the software is paid. This will ensure that the current Software licenses as well as all the necessary software updates are available.

8.3 Data requirements

GIS is data. The amount of benefit any organization will receive from a GIS is directly linked to the relevancy and quality of the data in the database as well as the skills of the persons analyzing and interpreting the data.

NSB is in a very fortunate position that they have an abundance of good and reliable backdrop data.

The Census Mapping activity and Geo-referenced updating exercise requires up to date and accurate base information. It is therefore essential that NSB obtain the new Ikonos Satellite imagery as soon as possible. The new Satellite imagery forms an integral part of the new Census Mapping Methodology.

Certain GIS activities need to be performed on the current data before the updating can commence:

Capturing of an accurate Geographic Frame:

EA's forms the smallest building block of the Geographic Frame and falls within the Districts, the District Boundaries needs to be accurate. Since the District Boundaries were derived from topographic maps sheets, the accuracy is not sufficient. The District Boundaries must be recaptured using the official Electoral Commissions District Boundary descriptions.

Only once the District Boundary Layer of the geographic frame has been created, can the re-demarcation and updating of EA boundaries begin. The newly acquired satellite imagery and vector data must be overlaid onto the EAS. The EAS boundaries must then be modified and realigned in order to follow the natural and man made features as it was originally demarcated.

Creating of a new Dwelling Frame layer:

The new satellite imagery will indicate many new structures not currently captured in the GIS. These structures must first be mapped in the GIS so that new fieldwork maps can be printed for the fieldworkers. This will help the fieldworkers tremendously as they need to only capture the corresponding listing information and do not need to worry about the annotation of the structures on the maps.

8.4 Human Resource Requirements

The human resources managing and operating the GIS will be vital, since their skill and imagination will determine the effectiveness and usefulness of the system. At the moment, the staffing at the GIS Unit is sufficient. Practical training on the use of Arcview 9.2 in modern Census Mapping has already been provided by the consultant as part of the consultancy. The staff is ready and capable to run the GIS unit efficiently. The problem is that they do not have access to up to date GIS software packages. They are therefore under utilized in the GIS unit and are used in other functions. The GIS unit staff can only become efficient GIS users if they use GIS technology on a day to day basis. This is a very serious matter and must be addressed as soon as possible if the new Census Mapping Methodology and Geo-referenced Dwelling frame methodology is to be implemented.

8.5 Sustainability

GIS is an ever changing and evolving subject matter field. In order to achieve long-term sustainability with regard to staff skills, it is advisable to provide the staff with the means to go through formal GIS training. Very good distance learning courses exists for GIS. Intergraph itself hosts a 10-week practical training course over the Internet, while ESRI does the same. Another option is the UNIGIS University diploma hosted by 11 Universities worldwide, of which two is in South Africa. Both these courses are internationally recognized

and distance learning based. There are numerous other training options to choose from and NSB will have the responsibility to make sure further training is done.

Another recommendation is that 2 week follow up training sessions (similar to this one) are held on an annual basis. Care must then be taken to involve staff from other Units so as to spread the awareness and knowledge base of GIS throughout the organization.

The staff members will be in the fortunate position of having high-end software and data available to facilitate the training with. It is imperative to obtain these skills in order to have maximum efficiency and benefit from the GIS unit staff.

8.6 Institutional context

Institutional organization will have to be reaffirmed with regard to the GIS Unit and its functions within NSB. The role of the unit must be defined as a corporate service provider to NSB 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 NSB departmental and external user needs (for economic and socio-demographic data).
- Analysis to be done in conjunction with relevant unit expertise.
- Responsible for Census Cartography 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.

8.7 External assistance

External assistance can be broken up into the following categories:

- Financial
- Technical and maintenance support

8.7.1 Financial

The NSB management must make a decision of financial assistance will be needed from the donor community, since the GIS Unit needs to procure certain hardware and software and implement the Census Mapping Methodology. Sustainable running the unit over time means that there are certain monthly maintenance costs involved, such as the acquisition of toner for the printer and plotter, printing paper, CDs and DVDs, software maintenance and printer maintenance costs.

8.7.2 Training, Technical and maintenance support

Currently NSB does not have in-house experience regarding the creation and implementation of a complex GIS spatial and attribute database. The current training provided by the consultant is not sufficient in the long run as it covered only the basics and minimum requirements necessary create a GIS database to operate a GIS. As the Census Mapping Methodology and Dwelling Frame methodology are being implemented and maintained, Analysis and dissemination of the data will be the next logical step. The database will therefore become more complex and extra training and support will be necessary. This will also mean that the linking of different datasets will become more frequent. During the actual census A3 demarcation maps must be printed for all the enumerators. The creation of the maps is labor intensive and errors on the maps become a big risk. It is advisable to invest in an automated map creation tool to minimize the human errors. Therefore, external technical assistance will be needed with regard to the following:

Training

- Creation of an automated plotting tool
- Data warehouse design and implementation
- Implementation of linkages
- Methodology support

Training must be hands on while the data warehouse is being designed and implemented. Follow-up training will be necessary in the following areas, which may include software packages as well:

Training Courses:

Detailed spatial database design, administration and maintenance

Automated map production

Trouble shooting principles and techniques

GIS upkeep and maintenance

MS Access

Detailed Data creation and linking methodology

Data warehouse design and implementation

As mentioned, a prerequisite for the creation of enumerators phase is updated EA fieldwork orientation maps. The creation of the maps is labor intensive and time consuming. Errors on the maps due to human error such as finger trouble can occur frequently. An automated plotting tool that can create the maps semi-automatically will improve the accuracy of the maps a great deal. External assistance will be needed to design and implement the tool.

The data warehouse was designed in such a way as to incorporate all relevant spatial and attribute data separately as well as integrated through data linking techniques, however the EA geocode will have to be revised and updated, meaning that the current 2002 Census data administrative hierarchy including the new District Boundaries has to be updated in order to enable true spatial analysis to be possible.

Implementation of linkages

This implies that the attribute data must be linked to the spatial data through the updated EA geocode using both Access and ArcGIS techniques. Once the data is linked it must be ready for integrated spatial analysis. As mentioned, the consultant already provided the linkage technique training. In depth and detailed training will also be needed.

Methodology support

The new Census Mapping methodology based on the Geo-referenced dwelling frame must be implemented once the requirements mentioned in this document are met. The NSB should be able to implement the new methodology successfully, however external assistance might be necessary to refine the methodology and to ensure that there were no oversights..

9. Mission administration and schedule

Very few problematic issues were encountered during the mission itself. Seychelles National Statistics Bureau and GIS Unit 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.

10. Assessment of the way forward

The recommendations indicate what should be done to make the GIS Unit fully operational. Certain activities are essential and must be completed before the new methodology is adopted.

The National Statistics Bureau has until the end of 2009 to conclude its census mapping activities, the EA maps must be printed and completed by then.

11. NATIONAL STATISTICS BUREAU Counterpart actions

The consultant's counterpart at the NSB is Ms. Therese Gopal, at the moment no provision is made for a follow up GIS consultancy. The counterpart should investigate the possibility of obtaining funds for follow-up support. As mentioned in the recommendations, certain

activities will have to completed in order to successfully implement the new methodology. It is recommended that the following actions are to be concluded as soon as possible:

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

- Complete Country report on consultant
- Obtain necessary funds for the procurement of necessary infrastructure
- Finalize the procurement for the additional hardware, software and infrastructure as specified in the document
- Finalize the GIS Unit staff organizational requirements
- Obtain satellite imagery
- Create updated District Boundaries
- Update EA boundaries
- Capture new structures
- Implement new methodology

12. Deliverables

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

| | |
|---|--|
| Training of NSB GIS staff in ArcView 9.2 | Yes, the consultant provided the necessary training in ArcView 9.2 highlighting the specific functions needed for Census Mapping. |
| Assess current Census Mapping Methodology | Yes. The consultant assessed the current Census Mapping Methodology. The Methodology was assessed through meetings and general discussions. The consultant accompanied the field work teams to the field to assess the current fieldwork methodology and to discover the country specific complexities regarding fieldwork in Seychelles |
| Providing training in spatial and attribute data integration and linking, database creation and maintenance | Yes. The consultant provided the necessary training. |
| Discuss recommendations regarding the census mapping and GIS Methodology | Yes. The consultant discussed the recommendations with the Seychelles NSB GIS office counterpart Ms. Theresa Gopal. |
| Draft relevant documentation regarding census mapping and GIS Methodology | Yes. After the consultants recommendations were discussed a methodology document was drafted taking into account any alterations requested as well as suggestions made by the NBS GIS office. |

13. Annexes

Annexure 1: Original Terms of Reference for the Mission

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 Seychelles National Statistics Bureau, Victoria.

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. The Seychelles was one of the countries which asked for technical assistance in the field of GIS and population statistics.

Terms of Reference

Background

Seychelles was one of the countries which attended the GDDS 2 Socio-demographic statistics launch workshop in Mombasa, Kenya during the end of June 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. To this end, this ToR for the first mission to the Seychelles 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 Bureau of Statistics. The consultant will assist the staff of the National Statistics Bureau 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. 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 National Statistics Bureau of Seychelles is committed to the use of GIS in the planning and implementation for their next Population Census in 2010 and is in specific need of technical assistance regarding census mapping and GIS.

The specific country objective would be:

To deliver technical assistance and training regarding:

- a. GIS unit assessment
- b. Training in database creation, integration, linking and geo-referencing techniques
- c. Census Mapping Methodology assessment and enhancement (including data requirements) for the 2010 Population and Housing Census

Purpose of the assignment

The purpose of the assignment would be to complete the first technical assistance mission at the Statistics Bureau successfully.

The mission will cover the following predetermined priority: Census Mapping and GIS which will occupy a 100% of the total mission time for the first mission.

Following are the objectives and planned activities for the mission:

Strategic objective:

GIS and Census Mapping Methodology review and assessment. Specific training in spatial and attribute data integration and linking, database creation and maintenance.

Activities required:

- Assessing current GIS infrastructure and use
- Assessing current Census Mapping Methodology
- Assessing staff skills
- Providing training in spatial and attribute data integration and linking, database creation and maintenance
- Drafting of relevant documentation regarding census mapping and GIS and database creation and maintenance processes

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:

- Assessed GIS infrastructure and Census Mapping methodology
- Trained staff
- Linked field maps to geo-referenced master files
- Reviewed and updated GIS and Census Mapping methodology documentation

A concluding Mission Report will form part of the final deliverable as well as a report by the Seychelles National Statistics Bureau staff on the mission success and value.

Duration

The total consultant time for the mission is 10 days with 8 days mission time and 2 days preparation time.

Timing

To be completed from the 19th to the 30th of November, 2007.

Annex

Annexure 1: The Seychelles Country Work Plan

Priority :1

Topic: Census Mapping/GIS

1. Problem to be addressed:
Linking field maps to a geo-referenced master files in preparation for 2010 census Methodology and documentation for the above project
2. Strategic objective:
Linking field maps to a geo-referenced master file, database maintenance
3. Activities required:
Drafting of reference, guide, documentation in census mapping to ensure common standards, linking field maps to a geo-referenced master file.
4. Input required from international sources:
Technical assistance, Arcgis software (latest)
5. Own preparation required:
Make available relevant data, maps
6. Output planned:
Linking field maps to a geo-referenced master file
7. Changes anticipated:
More accurate maps thus ensuring complete enumeration of all households
8. Linkages with other activities
Provide maps / sampling frame for future surveys
9. Other donors supporting this topic
None
10. Timing
-10 days in period T1

Annexure 2: List of Abbreviations and Acronyms

| | |
|-------|--|
| NSB | National Statistics Bureau |
| 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 |

Annexure 3: Census Mapping Methodology Document

To be provided as an accompanying, separate document

Annexure 4: Seychelles Country Report

To be provided as an accompanying, separate document