

Mission Report

on

**The Geographic Preparatory Activities for
the 2010 Population and Housing Census of Sri Lanka
United Nations Statistics Division
(22 – 24 September 2008)**

By

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**Statistics and Demography Programme:
World Programme on Population and Housing Censuses**

September 2008

MISSION REPORT

The Department of Census and Statistics (DCS) of Sri Lanka requested assistance from UNSD on Census mapping for the 2010 round, and on the development of a GIS. An advisory mission was held to assess the needs and give first recommendations. The following describes the visit, provides an overview of activities of the DCS, and gives conclusions and recommendations based on observation.

Names and Titles of Advisers	Country Visited	Dates of Mission	Workplan Category
Charles Brigham Reese – GIS Specialist, UN Statistics Division	Sri Lanka	22-24 September 2008	Statistics and Demography Programme: 2010 World Programme on Population and Housing Censuses

Agenda

Date	Time	Activity	Participants
22-Sep	09.30 a.m. - 10.30 a.m.	Meeting with Director General	Consultant/ Director General/ Directors & representatives of Div 18
22-Sep	11.00 a.m.- 04.00 p.m.	Study cartographic maps preparation activities being carried out by the department	Consultant & DCS staff (Div 18)
23-Sep	08.30 a.m. - 04.30 p.m.	Field visit: GN Mapping activity in Gamapaha District (in some selected DS Division)	Consultant / representatives of Div 18 & Gamapaha district staff
24-Sep	08.30 a.m. - 02.30 p.m.	Presentation of Findings and way forward	Consultant/ Director General/ Directors & Div 18 Staff

Summary

In September 2008 the Sri Lanka Government announced that the forthcoming Population and Housing Census would be held in July 2011. The operation is set to take place over a period of 6 hours and employ over 100,000 enumerators. The DCS has estimated that 6 months are left for explicitly addressing cartographic concerns and this time constraint has put increased pressure on the census mapping operation as a significant amount of work still needed. Also, the DCS is hindered by insufficient resources and there is a critical need for more hardware, software, digital media (i.e. imagery), personnel and training to complete the large task ahead. It is highly critical that any available resources be mobilized to help the DCS complete this task and without donor support it is likely that the canvassing of the country -excluding the in the northern and eastern provinces will be extremely challenging. This mission allowed for the observation and discussion of census mapping activities from field to office. It allowed the opportunity to view, identify, and analyze mapping problems alongside DCS staff in the office and field. It also permitted participation in the conduct of in-field activities with concern to boundary delineation problems and to observe geographic

techniques and methods used by statistical officers. From these experiences, discussions were held with the Director of Statistics and immediate staff on census geography and GIS at the main office of DCS, Colombo, Sri Lanka. Several methods to maximize efficiency and speed development in the preparation of enumeration area maps for the upcoming 2011 census were recommended.

Quick Synopsis of Recommendations

Due to time constraints, it is recommended that base maps using available imagery and the 1:10.000 scale maps be used to determine boundaries. Landmarks will be referenced along unclear boundaries that will distinguish boundaries between different Gram Niagara (GN) divisions. These areas will be flagged (identified) to be revisited later for explicit delineation. Where unclear boundaries exist there should be focus on identifying the housing units and flagging the area for later boundary delineation. Also, as transferring the GN division map to the GIS takes time, it is recommended that more rapid vectorization method be adopted for getting the GN maps into the GIS database. This can be done through the use of vectorization software. Future activities will involve continued geo-referencing of flagged areas where boundary discrepancies were noted-areas that were not able to be captured before the census. These recommendations aim to accelerate the census mapping activities and simultaneously improve the GIS infrastructure all while meeting the specific needs of the population and housing census. It is also recommended to get a consultant/expert to advise on the future development of the GIS database, adoption/purchasing of new hardware, software, and media (i.e. PDAs to aid in real-time data collection, high resolution imagery), evaluating the feasibility of more detailed geostatistical exercises (geo-referencing housing units) and also to focus and identify the use of GIS beyond the census to address other statistics areas, census applications and products.

Introduction

1) Introduction

- i) The Advisor arrived on 22 September 2008 for a 3-Day mission at the invitation of the Department of Census and Statistics, Sri Lanka. During the reporting period, discussions were held with the persons listed in Annex I. Their cooperation is appreciated.

2) Terms of Reference

- i) The overall purpose of the mission was to assist the Department of Census and Statistics with preparations for the July 2011 Population and Housing Census. The specific terms of reference were to:
 - (a) Assist with updating the calendar of geographic activities to fit the mapping needs of the census.
 - (b) Observe mapping activities from field to office in order to advise on best practices and methods.
 - (c) Providing technical and administrative advice on the use of geographic information systems for the census and recommendations on future activities;

3) Census Geography and the Mapping Operation

- i) **Current Objective of the Department of Census and Statistics**

The current objective of the Department of Census and Statistics (DCS), Sri Lanka, is to establish GIS layers at the different administrative boundary levels for the census and other statistical activities. For the Census of Population and Housing 2001, maps were prepared using 1:50,000 hard copy maps previously provided by the ministry of Public Administration. These maps had serious accuracy issues associated with boundaries, features and other locational information.

The DCS is now using GIS and GPS to improve the accuracy of maps to be used in the 2011 Population and Housing Census. To assist the development of the new maps for enumerators, the DCS is using 1:10,000 digital maps prepared by the Survey Department. These maps are often not accurate and boundaries and features still need to be captured in the field. This is being done with the assistance of imagery and the use of GIS. To address these accuracy issues and to canvass as much of the country as possible, the DCS has an established methodology for preparing cartographic maps to be used for the forthcoming Census.

ii) Geographic Structure

Aside from the 9 provinces, the geographic structure in Sri Lanka consists of 4 major census geography levels. The first is the (1) District level to which there are 25. Following the District level is the (2) Divisional Secretariat division (DSD) level. The total number of DSDs is 330. With concern to the census, the most important geographic level is the (3) Grama Niladari (GN) division, the lowest administrative division beyond the census blocks itself. There is a total of 14013 GNs in Sri Lanka. It is at the GN level where a threshold of 150 housing units is used to break up the region into (4) Census Blocks.

iii) Mapping Activities

Since the GN division boundary delineation process is incomplete, no accurate number of EAs has been identified. After clearing the GN division boundaries each GN division is sub-divided into a few census blocks. Criteria require that each census block consist of approximately 150 housing units; that census block boundaries be clear and serve to guide enumerators to their respective destination. As of this writing, 8 of the 25 district GNs were either complete or in the process of being completed with 2 of the 8 districts (Gamapaha and Kandy) consisting of the highest number of GNs.

The Gamapaha and Kandy district make up the largest number of GNs in Sri Lanka (14013 or 17%). In the Gamapaha district, the second largest district in consisting of 14 sub-districts and 1177 GN's, the mapping activity pilot study was initiated 1-year ago. There has been significant success in accurately completing the mapping activities in the district but just over ¼ of the GNs have been completely delineated and a significant amount of work is still needed. Even more pressing is the time constraints associated with the 2011 P&H census which forced a re-evaluation and restructuring and prioritizing of method and practices in census geography in order to canvass much the country before the 2011 census.

iv) Statistical Officer Mapping Operation

All field work related to the preparation of digital maps is carried out by the DCS field staff. The field work required to prepare the EA maps is extensive and requires a significant amount of time as statistical officers must correspond closely with district level officers, divisional (DSD) officers and GN level officers to obtain, correct and validate geographic and statistical data and information. There is one statistical officer assigned to each DSD and these officers are tasked with statistical activities allocated by the District Statistical director. Activities range from survey

data collection to household identification, to GN and EA boundary delineation for the purpose of the census and to enhance/improve the national geospatial infrastructure.

Sketch maps of GN divisions are prepared by overlaying tracing paper on satellite images and using existing base maps. These maps are taken into the field by the statistical officer. Although base maps prepared for the last census are not accurate enough for geographic analysis, they are used to aid census field work and build or update new or existing maps. Following the location of Geographical features contained in the satellite images and base maps, boundaries of the GN divisions are drawn on the tracing paper. If GN division boundaries do not fall within clear geographical features such as roads and rivers etc., the names and location of property owners along the boundaries are recorded on the map. The boundaries along properties are georeferenced and vectors along these boundaries are georeferenced. These vectors or “turning points” can take a significant amount of time as they require taking a GPS reading at different points of interest (road, path, river, etc.).

v) Map Completion/ Validation Process

After the GN division boundaries are validated by the GN district officer and the statistical officer, each GN division is sub-divided into census blocks. The validation of boundaries can take a long time depending on the number of GN district officers per GN and the ability to coordinate meetings between the GN district officers and the statistical officer. This is further complicated when boundary discrepancies are found to exist between adjoining GNs as it involves even more time to come to agreement between all respective GN district officers and statistical officers on precise boundaries. When agreement is made and the maps used by the statistical officer in the field are brought back to the District office to be reevaluated/updated by District cartographic staff, the District Secretariat (e.g. Gamapaha District) creates a separate map for each census block that is given to the main office of census and statistics, Colombo to be used for listings and other census operations. All the finalized maps are stored, digitized, and the georeferenced data points (e.g. landmark information, GPS points) imported at the Head Office.

4) Field Visit Observations

i) Field Visit to the Gamapaha District Secretariat

The Department of Census and Statistics facilitated a full day trip to the field. First to the Gamapaha district and further to GN Division 386/A Millethe-Pahala with the goal of explicitly showing the practices and procedures involved in mapping and logistics from field to district secretariat office, and then to main office.

At the Gamapaha office, there was discussion on problems and solutions with regard to the mapping activities with the head of office and the statistical officer. It was explained that statistical officers are mandated to spend 10 days per month on census mapping activities in their assigned area. One significant organizational issue with this 10-day time allocation was that statistical officers were already overwhelmed with current workloads involving survey activities (e.g. labor force, price collection, building, agricultural etc.). Further to this, during the 10 days dedicated to census mapping, the statistical officer must coordinate activities with GN division personnel in order to locate and validate housing ownership changes and boundaries. The availability and number of GN district personnel varies which presents logistical issues associated with time and availability.

Therefore, significant discussion was held in regards to freeing up the time of both of these position officers. There was agreement that although current activities and methods of boundary delineation are necessary and sufficient for creating the base map layer for census and statistics, the mapping exercise at its current pace will not be completed in time to serve the needs of enumeration.

ii) In-Field Activities in GN Division 386/A Millethe-Pahala

Furthermore, after meeting and discussion on mapping issues at the Gamapaha division office, a field deployment alongside the statistics officer and the GN division official for the GN 386/A - Millethe-Pahala Grama Niladari was conducted. This deployment was to address unclear boundary issues in a heavily forested area. In this deployment, the actual process of geo-referencing, collaboration with the GN and delineation of boundaries was executed. This involved movement through hilly terrain, speaking with the local population, further identifying households, boundary changes and geographic features.

During this field visit, a significant amount of time (~50% each) is spent on (1) housing ownership changes and (2) delineating the boundary itself (e.g. geo-referencing the extent of a paddy field or fallow land), one suggestion made from this observation was to concentrate efforts on geo-referencing housing ownership changes and identifying households rather than on geo-referencing the boundaries where no houses exist. The household identification will become the boundary for the enumerator and where possible, general digitizing of the boundary will be done on the map itself. This area will be flagged and readdressed to determine the boundary more accurately at a later time. The areas where specific boundary delineations need to be flagged and readdressed can be updated at a later time with a return to the field or with high resolution imagery (e.g. ~1 meter).

This alternative will free up time in the field for both statistical officers and GN division personnel and not significantly impact the population and housing census exercise. Operating simultaneously, this provides the ability to first address specific needs for the population and housing census alongside the building and development of the basemap/GIS database. In adopting this procedure, 1:10,000 maps can then be used where available.

5) Conclusions and Recommendations

i) General

The Census and Statistics Division of Sri Lanka expressed their appreciation to the United Nations Statistics Division, Department of Economic and Social Affairs for organizing this advisory mission and outlined their expectations that it will identify organizational and technical issues, such as census geography training and EA delineation processes. It is of utmost importance to continue to focus on mapping for the population and housing censuses and on increasing national capacities to conduct them as they are major sources of relevant country demographic and social statistics. This is especially true to support national informed decision making and aids in the ability to monitor and report on the Millennium Development Goals in a reliable and accurate manner.

The advisory mission concluded that the importance of the population and housing census is amplified by the fact that other geographies and demographic data are not readily available in

the Sri Lanka. It was noted that, for example, a boundary level GIS database at the Grama Niladari Division (GN) level and a database of housing locations in the in the country are not covered, making the production of quality statistics even more dependent on population and housing censuses.

ii) Census Geography and Geospatial Infrastructure Development

Regarding imagery, there is difficulty in acquiring high resolution imagery at a feasible price. Where possible, online imagery sources are used. There is a need for the imagery by early 2009 and the Dept of Census and statistics has stressed the need for help from imagery suppliers and other organizations in order to complete necessary census mapping tasks. Acquiring high resolution imagery at the scale of approximately 1 meter would greatly assist in boundary delineation and reduce time in the field.

Regarding hardware, there is a need to purchase/acquire more GPS devices (~120) preferably with ~5 meter accuracy. Currently there are ~100 devices in use and they are shared among the different Statistical officers. This sharing of GPS is beneficial but is a slow process due to the time it takes to get them to users. This does not take into consideration the northern and eastern portion of the country where geographic activities are limited.

It was stressed that priority be given to tasks and activities related to the completion of GN boundaries for the creation of enumeration area maps. In the main office, this involves manual and heads up digitizing of boundaries using satellite imagery and geographic data. Where unclear boundaries exists and the delineation of the boundary has not been geo-referenced, specific housing units in the EA will be identified to guide the enumerator to households in their respective EA. Boundaries will be later updated through geo-referencing and digitizing (*see III below*). As GN divisions are approved, they are sent to the district office for checking and then to the main census and statistics office, Colombo.

Digitizing the incoming maps takes significant time and it was discussed that a commercial scanning product may help speed up the importing of GN division maps into the GIS database. This will minimize the amount of digitizing needed and help to free up time for other geospatial activities. It was suggested that at least 2 office personnel receive in-depth training in the ESRI product ArcScan and intends to organize an on-line ArcScan training course for staff through the ESRI Virtual Campus.

The Department expressed that technical expertise at a higher management level is needed. This would require a GIS consultant/expert to come in and advise new methods for geographic data capture, technology to be adopted, GIS database management strategies, and also to identify and assist preparation of areas to focus on with regard to GIS beyond just census. The consultant/expert would also explore scaling up the existing spatial database to a relational database management system with levels of control and oversight.

Future activities involve development of the statistical and spatial data infrastructure beyond just the census. To accomplish this task the purchasing of new hardware, software, and media must be evaluated and adopted (i.e. PDAs to aid in real-time data collection, high resolution imagery). Other future geographic activities might involve possible geo-referencing of housing units and pictures of dwelling etc- these items have been cited as examples of how to add value

to future statistical activities and censuses. It will enable a much more accurate poverty mapping and significantly facilitate other statistical exercises.

It was noted that statistical officers are tasked with spending 10 days per month to work on census geography activities and must complete 4 GN divisions per month. These necessary cartographic changes require that the GN validate the boundaries and associated additions/changes to the GN boundaries. As this is dependent on the availability of the GN division officer and factors such as geographic terrain and length of travel, serious time considerations need to be taken into account.

While there is no doubt that GIS vastly improves the accuracy of the censuses and surveys, Thus, the advisory mission concluded that it is crucial to harness cooperation at the national, international, and private agency level when it comes to acquiring, using and developing their GIS infrastructure. It welcomed the information on collaborative works that may be possible with these external bodies (i.e. Google, ESRI).

In that context, it is crucial to underline the need for continuous and well-formatted technical assistance provided by national and international agencies. This represents a crucial component in building capacity to conduct complex exercises such as a census mapping.

The Department of Census and Statistics concluded that further development of the spatial data infrastructure is critical and recognized the geocentric nature of the census. At the same time, the size of population requires the adoption of more contemporary methods to improve census mapping but the acquisition of costly devices and software has to be approached cautiously and must be sustainable and compatible with the national strategy.

PERSONS WITH WHOM DISCUSSIONS
WERE HELD DURING THE REPORTING PERIOD
(LIST NOT EXHAUSTIVE)

Department of Census and Statistics, Sri Lanka:

Ms. D.B.P. Suranjana Vidyaratne
Director General

Mr. H.R. Gunasekera
Director, Census

Dr. Amara Satarasinghe
Deputy Director, Census

Mr. G.Y.L. Fernando
Director, Sample Surveys

Mr. S.D. Rajapaksha
Statistical Draughtsman