The development of a GIS for an informal settlement

Benita NORDIN, Swedesurvey AB

Key words: GIS, informal settlement, land tenure, adjudication

SUMMARY

The purpose of the paper is to try to show examples of the use of GIS as one of the tools for solving land related problems in informal settlements on the ground. It focuses on GIS in relation to regularisation of informal settlements in order to provide secure tenure. Three examples of situations where GIS can be used in unplanned settlements are given:

1. Inventory of existing informal settlements and land suitable for new residential areas for low-income groups for planning purposes
2. Inventory for the purpose of formalising land tenure
3. Inventory for the purpose of resettlement of areas which have to be evicted

Experiences from the development of a GIS for the purpose of formalising land tenure in Lusaka are shared. Chaisa settlement was chosen as pilot area for an adjudication process. A digital orthophoto map was used for on-screen digitisation in an ArcView database, in order to make polygons defining the building structures on the ground. The house numbers and other complementary information gathered in the field were entered on the digitised map in the ArcView database. For the purpose of formalising land tenure for the owners of the structures, information about the owners and the status of the tenure was collected in the field using a questionnaire. A Peri-Urban Property database system was developed and the information collected in the field was entered in the database. The attribute database was linked to the ArcView database using a unique identification number. The adjudication process was carried out in cooperation with the community and included awareness campaigns.

The paper includes comments on development of GIS for informal settlements.

The development of a GIS for an informal settlement

Benita NORDIN, Swedesurvey AB

1. INTRODUCTION

The growth of informal settlements in major cities in the third world has resulted in a situation were more than half of the population in some of those cities reside in informal settlement. Land tenure in an informal settlement is informal, and does not provide enough security for its residents. Since these settlements are not part of the formal land management system there is also a general lack of information or at least reliable information necessary for planning purposes as well as for the formulation of policies and programmes for upgrading and regularisation of the areas.

GIS stands for Geographic Information System and can be described as "a system of hardware, software and procedures to facilitate the management, manipulation, analysis, modelling, representation and display of geo-referenced data to solve complex problems regarding planning and management of resources" (NCGIA, 1990). Another way of explaining GIS is this:

> Components of a GIS include more than just computer technology. A GIS is an integrated system of users, data, hardware and software. Data tend to be at the center of any GIS system, while the computer components of the system support data management and analysis (Lloyd P. Queen &Charles R Blinn).

The task of solving the growing problems related to informal settlements in fast growing cities of developing countries is huge. Can GIS be used as one of the tool? The purpose of this paper is to try to show examples of the use of GIS in that context. It focuses on GIS in relation to regularization of informal settlements mainly in order to provide secure tenure and to a certain extent for urban planning and management. It contains examples of situations where GIS can be used.

1.1 GIS and Cadastre

GIS is an integrated technology developed within many disciplines and the emphases are different depending on the discipline. For example, within Land Registration the main focus is the information related to ownership usually related to a land-parcel with a property number. When the property number is used as the parcel identifier and ownership information is linked to the parcel in the map in a computerized system it becomes a GIS. In this case the ownership information is still the most important, but the geo-reference makes the access easier. Traditionally the survey data on these land parcels with unique property designation is based on their surveyed boundaries, which are shown on large-scaled maps can be found in a Property Register, usually with a written register (attribute data) and a register map (spatial data).

Historically a cadastre was established for the purpose of taxation and can be described as a public register showing details of ownership and value of land. The concept of cadastre has changed over time and there are many definitions of the term, for example:

> A cadastre is the core or basis of a land administration system and is defined as a parcel based and up-to-date land information system containing a record of interest in land (e.g. rights, restrictions and responsibilities). It usually includes a geometric description of land parcels linked to other records describing the nature of the interests, and ownership or control of those interests, and often the value of the parcel and its improvements (FIG, 1995).

In Cadastre 2014 the land parcel has been replaced by land object defined as “a piece of land in which homogeneous conditions exist within its outlines. The legal land objects are described by the legal content of a right or restriction and the boundaries which demarcate where the right or restriction applies.” A modern cadastre is based on the GIS technology.

2. EXAMPLES

2.1 Working model for the introduction of a cadastral system in cities with informal settlements

In the report, Urban Growth and Cadastral Development – a manual for the development of appropriate cadastral methods for cities and towns in developing countries (Benita Nordin & Tommy Osterberg 2000), written within a joint project between the Swedish International Development Cooperation Agency (Sida) and Swedesurvey an attempt is made to show a step-by-step working methodology for the introduction of a cadastral system in cities with informal settlements. The model focuses on the more technical parts of cadastral activities. Since the actual situation differs from country to country and from city to city it has to be adapted especially to the legal situation regarding land tenure.

The model suggests that an inventory of existing informal settlements and land suitable for new residential areas for low-income groups is carried out as a starting point. The main purpose of the inventory is that it should form a basis for decision-making and planning. This kind of inventory is particularly important in urban areas where land shortage is a major problem. After the inventory it should be possible to classify the land and settlement in the following categories:

- settlements where land tenure can be formalized
- settlements not suitable for transfer to formal tenure
- land suitable for new settlements

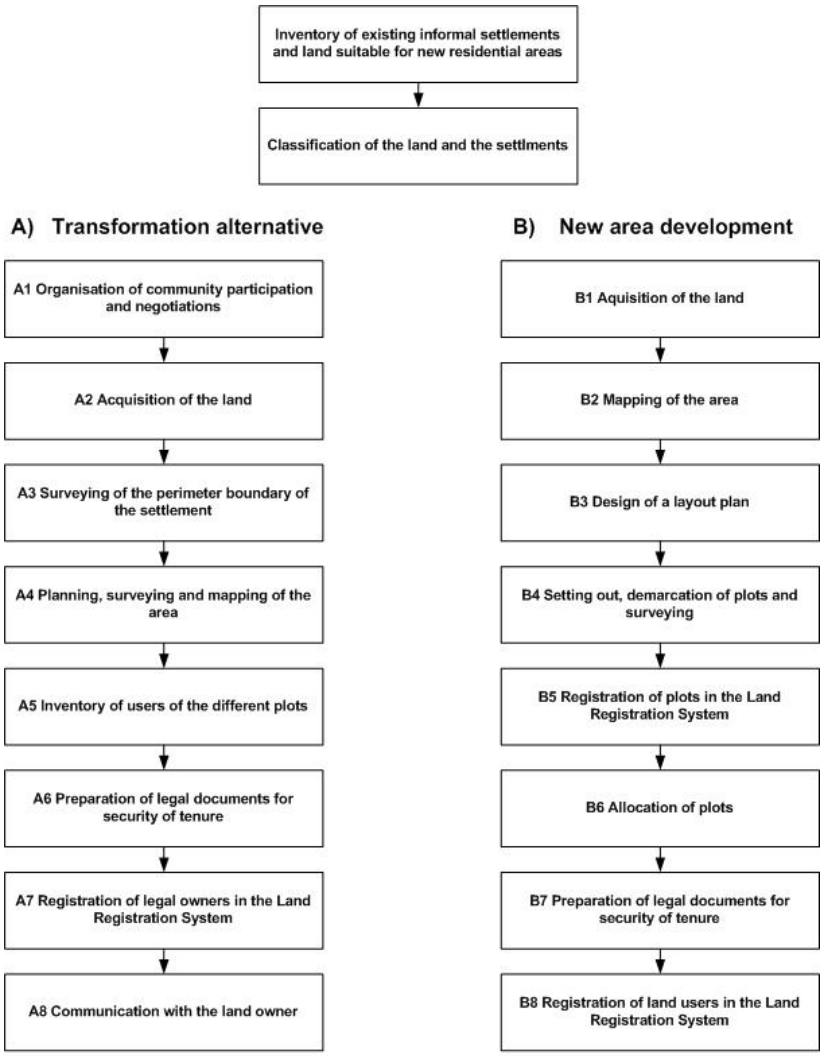
In the following the process is divided into two alternatives, as shown in the figure below:

Alternative A Transformation alternative, which will mainly include establishment of a cadastral system for transformation of informal tenure into formalized tenure and;

Alternative B New area development, which will include establishment of a cadastre in connection with the development of an area for a new settlement.

For settlements, which are classified to be in the first group, settlements where land tenure can be formalized, the transformation alternative is followed. If resettlement of individual families is necessary, new areas for housing must be identified and people need to be motivated to move. In those new areas the new area development alternative is followed. That is also the case for those new low-cost housing areas that needs to be developed to meet the growing demand for housing. Simpler methods need to be used in order to speed up the land delivery process.

The method has to be adapted to the situation. For example, if there is obvious that a settlement qualifies in the first group there is no need for the first two steps.



Source: *Urban Growth and Cadastral Development (Benita Nordin & Tommy Osterberg, 2000)*

The eight steps of the Alternative A are briefly explained below:

Step A1: Community participation is a prerequisite for the establishment of a cadastral system in an informal settlement. Organization of community participation and raising of awareness should be done at an early stage.

Step A2: Acquisition of the land can be made in different ways depending whether it is private or public land and on the legal framework of the county

Step A3: In most cases the perimeter boundary of the settlement should be defined through demarcation and survey in order to be able to allocate the area for the purpose.

Step A4: The planning and surveying of the settlement can be an integrated procedure, where the layout plan and the subdivision plan are merged together. Existing structures on the site must be taken into consideration and respected as much as possible.

Step A5 is an inventory on the ground to collect information of the users on the ground using a form or a questionnaire. At the same time the plot is identified on the field map and is given a unique identification code. The result of the inventory in form of list of users and cadastral

maps are shown to the land users for comments, individually or through an exhibition. Any complaints are sorted out and remaining disputes are referred to a court or special authority dealing with land rights.
Step A6: A legal document is prepared in conformity with the existing legislation. The document must contain the unique identification code of the plot as well as information that identifies the legal owner.
Step A7: The legal owners can now be registered in the Land Registration System. All essential information of the legal document should be registered in the system in order to make the information easily accessible.
Step A8: After registration a document certifying the land use right and the content of the register is sent to the owner
The steps of alternative B, New area development, are not further explained here since it is not unique process for informal settlements.

2.2 GIS for initial inventory

The first example of situation where GIS can be used is for the initial inventory described in the model above. For the spatial data orthophotos or satellite images can be the basic source completed with screen digitization and information collected from the field. The attribute data can be collected from the field using forms or questionnaires completed with other information already available. How detailed this inventory needs to be depends on the situation in the particular city. It might be enough to get the boundaries of the different settlement and the areas suggested for new development and the main characteristics of the settlement, ownership of the land and services available. References to reports or other useful information can form part of the attribute data. When the information is geo-referenced and displayed in a GIS it becomes easy accessible. In another situation it might be necessary to do a detailed inventory collecting information from door to door. In any situation it is important that the information is uniform and that a system for keeping the inventory up to date is built in or else it will soon be of no use. Once the next step, classification in the three categories described above, is done it will be necessary to do a detailed inventory for the purpose of formalizing land tenure in the settlements that has been classified in that category, see 2.3 below. Similar detailed inventories are also needed for areas which have to be evicted, for example along railway lines and main roads, see 2.4 below.

2.3 GIS for inventory for the purpose of formalizing land tenure

The second example of situations when GIS can be used is for the purpose of formalizing land tenure in informal settlements. In most cases it is not possible to formalize the use for all users. Individual families in the area might need to be resettled as part of the upgrading exercise. The information from inventory will then be used for a list of the beneficiaries. An example of GIS implemented in the informal settlement Chaisa, Lusaka is presented below. This settlement has once been upgraded and is therefore a rather straight forward example of formalizing land tenure.

If a GIS has been developed and an initial inventory has been carried out as described in 2.1 above, that GIS could be further developed for the purpose of formalizing land tenure. The two will then become separate processes in the same system.

2.4 GIS for inventory for the purpose of resettlement of areas which have to be evicted

The third example of situations when GIS can be used is in areas which are not suitable for transfer to formal tenure. It could be a whole settlement located in an area which is dangerous or designated for other use such as industry or part of the settlement which have to be evicted such as along railway lines and main roads. Pamoja Trust has collected data in a process called enumeration for the purpose of facilitating structured discussions between land owners and occupiers in eviction areas. The information has been entered in a Access-database but is not yet linked to the spatial data as a GIS.

If a GIS has been developed and an initial inventory has been carried out as described in 2.1 above, that GIS could be further developed for the purpose of resettlement of areas which have to be evicted. This will then also become separate process in the same system.

3. EXAMPLE OF GIS IMPLEMENTATION IN INFORMAL SETTLEMENTS

3.1 Urban Land Management Project at Lusaka (2000-2003)

3.1.1 Background

A study on Informal Land Tenure in Zambia was carried out as part of the joint project between Sida and Swedesurvey mentioned above (Benita Nordin 1998). The objective of the study was to describe and analyze the land tenure situation in informal settlements in Lusaka in general and in particular the Land Occupancy Rights, issued by the City Council of Lusaka for its usefulness as a simplified system for cadastral registration of informal settlement areas. One of the general applicable conclusions from the study was that "In any upgrading project it is very important that the question of security of tenure is tackled before water, roads or any other infrastructure is put in place". The report recommended that the occupancy license system should be used, that the occupancy license register should be computerizing and that part of the issuing procedure should be decentralized to the site offices in the areas. Lusaka City Council (LCC) decided to carry out a pilot programme to improve the security of tenure of residents in unplanned settlements in the year 2000 and signed an agreement with Sida for funding of the pilot project. Swedesurvey has provided technical advisory services to the project.

3.1.2 Project implementation

The objective of the project was to provide security of land tenure in unplanned settlements and had the following three components:

(i) **Community communication and participation** aimed at full involvement of the community in the project and promoting awareness on the importance of security of land tenure among residents;

(ii) **Surveying and Mapping** to establish a geographic database which will establish property owners and boundaries by linking spatial data (graphics) and attribute data; and

(iii) **Computerisation of the Lusaka City Council Deeds Registry** and improvement of the record keeping system – from settlement level up to the Council's head office where Title Deeds are issued.

One informal settlement, Chaisa, was chosen as the pilot area. The results of the three components have been used in an adjudication process in the pilot area during which the ownership of the structures was investigated and recorded in a computerised attribute register and on an orthophoto map at a scale of 1:1000.

3.1.3 Project implementation in Chaisa

Chaisa is located about six kilometres north from the city centre and has an area of about 72 hectares. The settlement has approximately 5,200 households and a population of 33,000. In 1987, the Minister of Local Government and Housing declared Chaisa as an Improvement Area, in accordance with the Housing (Statutory and Improvement Areas, 1974) Act.

Within Improvement Areas Occupancy Licenses are given as the security of tenure. The Council holds a Certificate of Title for the whole area for ninety-nine (99) years. An occupancy licence is prepared for a period of not more than thirty (30) years. The land is described as "the land under and immediate adjoining House (or Shop) Number (block/number) in (Improvement Area Name) Improvement Area". In unplanned areas the plot is not demarcated instead the house number is indicated on the layout plan.

Resident Development Committees (RDC) are formed in the settlements. The settlement is usually divided into zones, 2-3 persons are elected as zone representatives, from which candidates are nominated and the 15 members of the committee is elected.

At the commencement of the project it was estimated that about 10% of the households had Occupancy Licenses.

Before the adjudication process was carried out in the area, a participatory research assessment was carried out with the objective to document diverse views of the residents on security of tenure and consequently identify constraints and solutions to obtaining security of tenure.

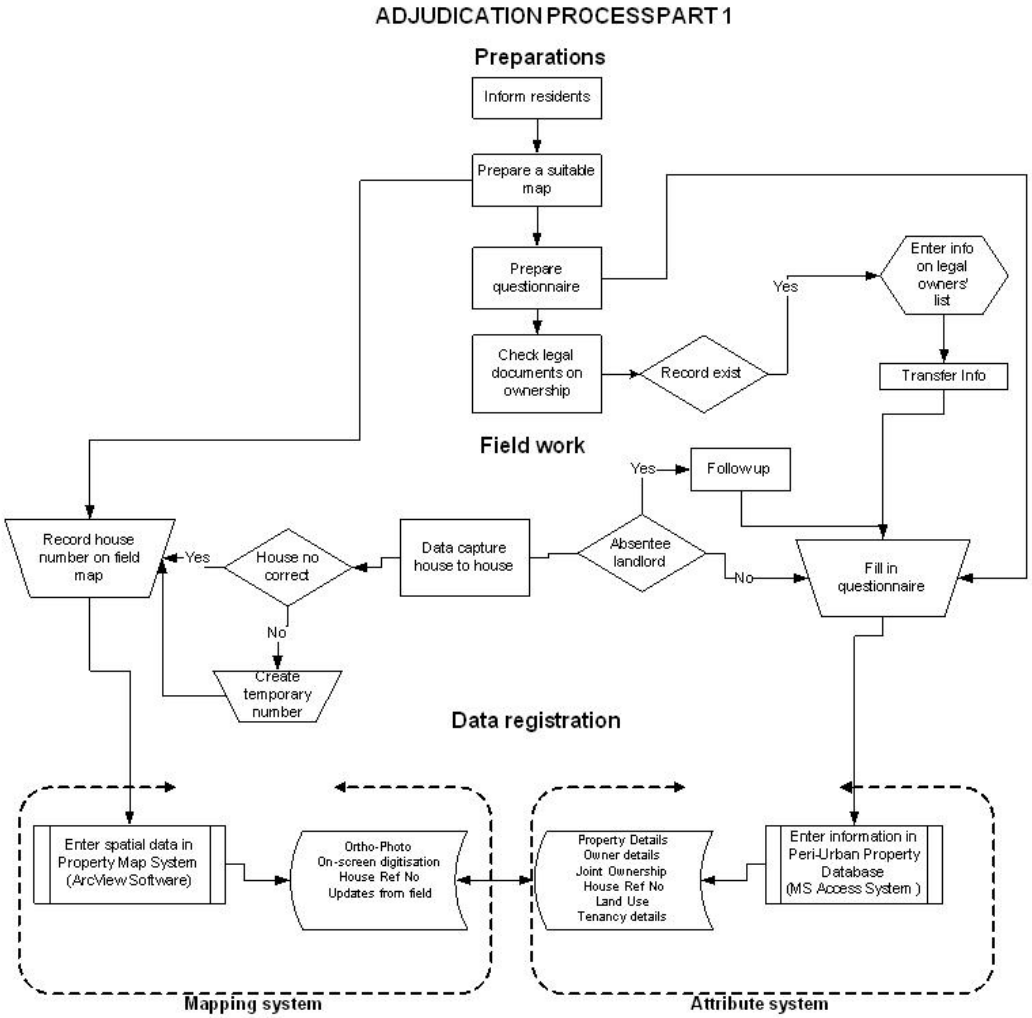
After the research a two-days workshop was held in Chaisa were all key stakeholder were invited. The results of the research were presented and a project working group was formed, comprising of council officials and resident representative. It was also agreed that the most effective way to disseminate information about the programme in the settlement would be through drama performances using a local drama group, leaflets, posters and meetings in the settlement.

Drama performances were carried out in each zone before undertaking the adjudication exercise in the field. The messages about occupancy licences and the evils of property grabbing were presented to the residents through the drama. During the performances as well as during the fieldwork, information leaflets in both English and local language were handed out.

All existing Chaisa files in the Deeds Registry at the Council office were data captured into the new developed computerized register. The attribute data from the field was also entered but was kept separately and the records were compared.

Initially aerial photographs and a mosaic from the 1997 aerial photography was used. In October, 2001, a new aerial photography of Chaisa was undertaken. From this recent photography a digital orthophoto was prepared in scale 1:1000, which was used in ArcView 3.2. At this scale it is possible to clearly identify all the structures, roads, utility features and landmarks in the settlement. The digital orthophoto map was used for on-screen digitisation in an ArcView database, in order to make polygons defining the structures on the ground. The aerial photography from October 2001 was used in the fieldwork and for making updates in the digitised map. The house numbers and other complementary information gathered in the field was entered on the digitised map in the ArcView database.

The adjudication process carried out is illustrated in the figure below:



The field team comprised three officers, one taking care of the map and making sure that the same number appears on the structure as in the attribute data, one capturing the attribute data by filling the questionnaire, one RDC member introducing the team to residents and investigating the number of persons in the households. Normally the field work was carried out in the morning. In the afternoon the captured data was fed into the attribute database and onto the map. The same officer, who captured the data in the field, entered that data into the data bases. The adjudication process part 1 was completed by the end of year 2002.

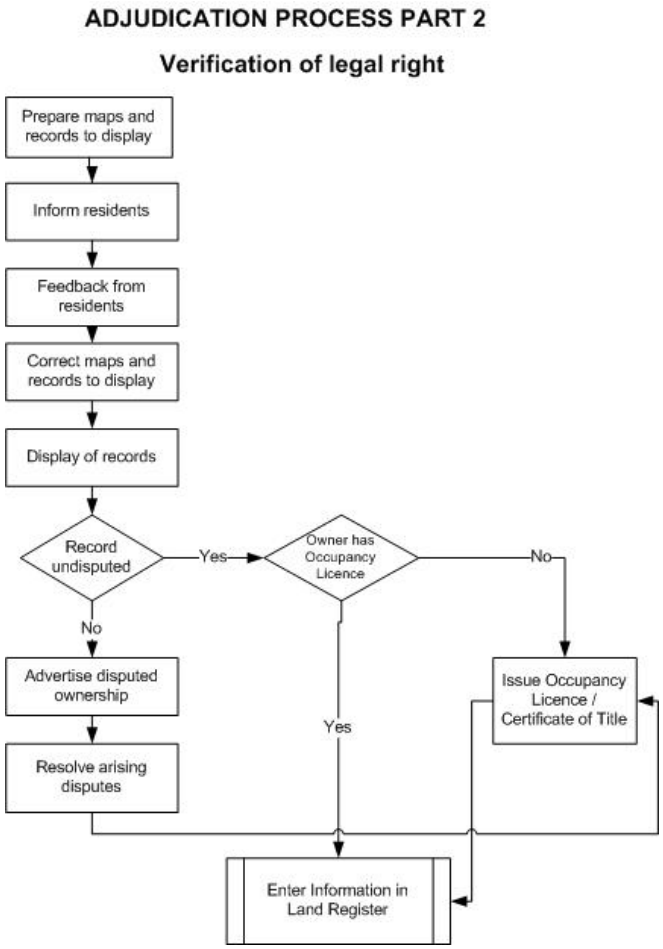
Part of the work of issuance of Occupancy Licences was decentralised. The residents can now apply for Occupancy Licence at the site office, where an officer from the Peri-Urban Section is assisting the applicants. The officer then takes the applications to Civic Centre, where the application is processed. When the Occupancy Licence has been signed by the official the same officer brings it back to the site office, where the applicant is signing. By the end of the project about 40% of the owners have been issued licenses.

3.1.4 Recommendation for the future

A second part of the adjudication was suggested in the project, but since the process was not in line with the current legislation it was not possible to implement. It was also found that the legislation for Housing (Statutory and Improvement Areas) 1974 Act had not been adjusted to the changes of the country's policy. A legal consultant was therefore engaged to assess the relevant laws on land tenure in peri-urban areas. The report from the consultancy (Patrick Matibini, 2003) gives recommendation on the measures to be put in place in the legalisation to facilitate the adjudication process:

- If the process is dealt with administratively it is likely to be less lengthy and costly than if it is conducted judicially;
- For the adjudication process to be successful there is need to give the exercise extensive publicity, through advertisements in the newspapers, radio, local meetings, public notices and drama groups.
- The council need to consider whether or not the grant of an occupancy licence should continue to be subject to payment of outstanding service charges arrears since the insistence on payment of outstanding services charges has strongly discouraged applications for occupancy licences

The suggested second part of the adjudication process is illustrated below:



During the implementation of the project it became evident that information about land, such as land rights, ownership, zoning, is scattered in a number of different places in the council. The situation causes considerable duplication of work as the same information is kept in different offices and keeping the all registers up-to-date can be an impossible task.

A feasibility study for the preparation of an out-line for a city-wide land information system was therefore carried out towards the end of the project.

The report suggests priorities for the introduction of a land information system for Lusaka. The two first steps proposed are to develop a digitized register index map for Lusaka and to enhance the existing computerized attribute system developed in the project.

4. COMMENTS ON DEVELOPMENT OF GIS FOR INFORMAL SETTLEMENTS

4.1 Lack of spatial data

In the introduction a GIS was defined as an integrated system of users, data hardware and software, where the data is in the focus. One of the big challenges concerning the development of a GIS for informal settlement is the lack of data. In most cases the cadastral index maps do not include the building structures within informal settlement for the simple reason that they are not part of the formal system. When the resources are limited the settlements are not a priority area for mapping in a city. The basic source of spatial (geographical) information must therefore be orthophotos or/and satellite images. The changes on the ground are usually fast and it is therefore important to have fairly recent pictures. The information needs to be verified on the ground and changes recorded. Print-outs of the ortho-photo or satellite image can serve as field maps. Simple survey using steel tapes can be used for new buildings and other details that are missing in the picture.

4.2 Unique identifiers for geo-reference

The object/s to use for geo-reference needs to be clarified in order create unique identifiers. The name of the settlement could be the highest level and divisions within it such as blocks or villages the second level and the plot/house number the third level. In the Peri-Urban system used in Chaisa the identifier consists of settlement name, block number and house number.

The three levels are entered in three different fields in the database and the system is creating a house code which is used for the linking of the attribute database to the spatial database.

What looks as one building structure on the orthophoto can in reality be several building but because they are close to each other they look like one. In Chaisa, the original one-roomed house had often been extended with more rooms with separate doors from outside, which are rented out to give income to the house-owner. One building is therefore often the home of several household and each home should therefore be given a separate number. This is done by adding A, B C etc to the original house number.

Settlement name	Block number	Plot/House number	Unique identification
Chaisa	242	11	0032420011
Chaisa	242	11B	0032420011B

The unique identification number is noted on the field map.

4.3 Lack of attribute data

There are usually few written records that can be used as the attribute data in informal settlements and the information has therefore to be collected using questionnaires. What information is needed depends on the purpose of the inventory. In Chaisa the purpose was formalization of land tenure for the owners of the structures. Information for identification of the owner, on land use and holding of occupancy license was collected. Since one of the aims also was to promote joint ownership, a question of willingness to apply for joint ownership was included.

If the purpose of the inventory instead is resettlement, information about the building structure, time of occupation, distances to workplace etc. need to be collected. If the use is other than residential addition information is needed for those other uses.

4.4 Unique identifiers for occupiers

The occupier of the building is in most cases not the owner of the structure and in those cases both the information of the owner and the tenant should be collected if possible. If the purpose of the inventory is resettlement it is wise to record the household head, all the members of the household and their relation to the household head. This is done in the enumeration process developed by Pamoja Trust[1].

It is necessary to have unique identification of the persons. The following information was collected in Chaisa:

Person identification information		
Surname First name (Middle name)	National Registration Card (NRC) No	Sex
Phiri David	218679/11	M

The NRC No gives the unique identity of the person. All efforts should be made to get such a unique identifier. If it is not available the person could be identified by adding information like relation to another person, age, thumb print and photo. In those cases a number (counter) in the system can be added to ensure a unique identity. That is also useful during the data collection if it is suspected that there are duplicate ID numbers.

For the purpose of search it is advisable to have different fields in the database for surname, first name and middle name.

4.5 The quality of the data

The questionnaire has to be developed in such a way that the question is easily understood and answers become clear. Multi-choice questions are a good. The following can serve as an good example:

Distance to work place?

□ Less than 1 km	□ More than 5 km
□ 1 km – 3 km	□ I work here
□ 3 km – 5 km	

Source: *Enumeration form from Pamoja Trust*

[1] Pamoja Trust is a non-governmental Kenyan organization working in informal settlement.

The answers should be entered in the database by a system using codes in order to speed up the keying-in process and to avoid unnecessary errors.

In order to get good quality data it is important to work with the community. The whole data collection exercise is dependant on the cooperation of the residents. Because of the insecurity of land tenure in the informal settlements the residents are suspicious. Rumours spread easily and can make the exercise difficult and the residents have to be involved at an early stage. At least one respected person from the community should be part of the field team. Thanks to the emphasis on awareness campaigns etc. the field teams could avoid to spend time on explaining the purpose of the inventory.

The data also needs to be verified. In Chaisa the verification of the field data against the existing records on land tenure was done as part of the data collection process. Another verification procedure is suggested in the second part of the adjudication process through display of the maps and the records in the area for the residents to check and rectify.

Pamoja Trust has worked a process of verification of the data they have collected. After the data has been entered in the Access-database print-outs with the data for each household are made and given out to every house hold. The data is then analyzed with the community at a level of 20 to 50 households. The process seems to have worked out well.

The system for entering the data collected in attribute database should also have inbuilt checks to make sure that combinations of data are reasonable and that data entered into the different database fields have the correct format.

4.6 Database design and data collection

The database design is fundamental for any system development. The database should be a relational database and the design of the database and the development of the questionnaire for the data collection in the field should be an integrated process. If the database consists of many related tables future changes in the system becomes easier. The process and the system should be tested in a small scale before it is implemented to allow for changes.

4.7 The data conversion exercise

The size of the data conversion exercise is often underestimated. Since there usually is difficult to find information on the number of households, structures etc. estimations have to be made on the number of records to be collected. It is even more difficult to estimate how long time each processes will take. For the Urban Land Management Programme in Lusaka the following estimates have been done based on the experiences from the pilot in Chaisa. The number of houses in un-planned areas was estimated to 140,000 in Lusaka. If one field team will capture 100 houses a week it will take 24 years to capture the data. Six teams will be then be needed to finish the exercise in 4 years.

4.8 Processes of requiring security of tenure need to be changed

4.8.1 Applicant driven and cumbersome processes

The processes of requiring a legal document for security of tenure are applicant-driven. The procedures are complicated, cumbersome and time-consuming and made for professionals. The applicant is often only told the next step not the whole procedure. There are for example fees that should be paid at different stages, which the applicant is not aware of. The consequences are:

- The adjudication process could not be completed due to lack of legal status
- Users are discourage to apply
- In many cases the legal process is not completed
- Costly and time-consuming procedure for the applicant
- Difficult to follow-up for handling officers and the management
- The workload for the handling officers becomes impossible to handle
- Corrupt practices

4.8.2 Processes not in accordance with legislation

Although policies and practices have changed, the legislation has not been up-dated. The consequences are:

- The processes are inconsistent, the different handling officers develop their own processes
- Since the legislation is not followed reinforcement becomes difficult
- The general public mistrust the institutions and their staff

4.8.3 System development built on processes

The system development of a modern land management is built on processes. Since the processes today are not efficient it is important to develop the processes also as part of the development. Legislation has also to be updated.

The computerized system should have a monitoring system that makes the processes transparent. It should be easy to find information on where in the process an application has reach, how long the processes take, how many applications each officer has completed etc. When the applicant hands in the application he/she should be informed about the whole process and about what is required of him/her. Once entered, the system should keep track of how far the application has reached to assist the handling officer. The applicant should trust that his/her application is processed without him/her contacting the handling officer.

4.8.4 Up-to-date records

One of the big challenges is to keep the data up-to-date. Even if the current tenure is formalized but future changes of ownership are not recorded, the records will soon be out of date. In Chaisa it was found that one of the main reasons for the residents not to apply for occupancy license was that they had to pay debts on rates even for previous house owners. Such obstacles have to be sorted out and the residents need to be motivated to register in the formal system. The information should be available at a decentralized level and the community engaged in the updating process.

4.9 GIS for informal settlements – part of the formal system

The aim of the development of GIS for the purpose of land management in informal settlement should be to make it part of the formal land management system. For development purposes it might be necessary to develop pilot systems and carry out pilot projects, but it is important for the development of the urban areas in cities in developing countries that the areas with informal land tenure is brought into the formal land management system.

REFERENCES

Kaufmann, Jurg, 1999. *Cadastre 2014: A tool to make land administration more effective?*
Lusaka City Council Land Tenure Initiative, 2001. *Chaisa Workshop Report, June 2001*
Lusaka City Council Land Tenure Initiative, 2002. *Chaisa Workshop Report, May 2002*
Lusaka City Council Land Tenure Initiative, 2003. *Final Report Urban Land Management Programme.*
Lusaka City Council Land Tenure Initiative. *User Manual of the Peri-Urban system at Lusaka City Council*
Lusaka City Council Land Tenure Initiative. *User Manual of the ArcView system at Lusaka City Council*
Lusaka City Council Land Tenure Initiative. *Adjudication Manual for Chaisa*
Matibini Patrick, 2003. *Lusaka CityCouncil LandTenure Initiative – A Legal Assessment*
Nordin, Benita, 1998. *Informal Land Tenure in Lusaka, Zambia*
Nordin, Benita & Osterberg, Tommy, 2000. *Urban Growth and Cadastral Development*
Persson, Thord. *The Per-Urban Computerised System – Technical Manual*
Persson, Thord & Ostberg, Torbjorn, 2003. *Proposal Land Information System for Lusaka City Council.*
Riverine Consulting, 2001. *A Participatory Research Assessment of Primary Stakeholders Views on Occupancy Licences in Unplanned Settlements: The Case of Chaisa Compound*.
Interview with Jack Makau, Pamoja Trust (a non-governmental Kenyan organization)

BIOGRAPHICAL NOTES

Benita Nordin (M.Sc. Land Surveying) is employed by Swedesurvey and is currently stationed in Nairobi. She has worked with the development of land and geoinformation systems focusing on the use of the different systems for land administration. Mrs Nordin was stationed in Zambia for six years working with the development of the land information system. In addition she has conducted several short-term assignments regarding development of land administration systems in Uganda, Rwanda, China, Nepal and Zambia. She has participated in two Swedesurvey – Sida joint development projects, Urban Growth and Cadastral Development and Women's Access to Land.

CONTACTS

Mrs Benita Nordin
Swedesurvey
P.O. Box 6014-00100
Nairobi
KENYA
Tel. +254-20-2710703, +254-721-938678
Fax +46-26-651819 (in Sweden)
Email:benita.nordin@swedesurvey.se
Web site: www.swedesurvey.se