

A Methodology For The Enhancement Of Tenure Security In The Informal Settlements In Kenya

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Abstract: A major challenge facing African today is the growth of urban informal settlements. From a government perspective, management of the proliferation of informal settlements implies planning and control of the location in which these settlements spring up, improving the social and economic conditions in the informal settlements and ensuring that the residents and neighboring communities enjoy social justice. Of primary importance is the improvement of land tenure security for residents of the informal settlements. Addressing these objectives requires current, accurate, social and spatial information. The greatest challenge however that is the informal settlements are complex, dynamic social systems which experience continuous change.

Mapping and documentation of rights in the informal settlement therefore requires accurate and up-to date spatial information which incorporates the dynamic nature of the settlements. For a long time, a system for documenting and processing the database for informal settlements has been lacking. Several methods have been proposed by various authors [Barry and Ruther, 2001; Nordin, 2004; Nordin and Osterberg, 2000] among others. One major missing denominator has been the lack of a pro-poor system for documenting the spatial and non-spatial attributes for comprehensive planning and tenure regularization. Recently, the Social Tenure Domain Model (STDM) has proved useful in fulfilling these mandates. A study was therefore set up in a selected informal settlement in Nairobi to test the suitability of the STDM in procuring the spatial information attributes and database development for the enhancement of tenure security in the informal settlements.

Preliminary results show that (i) to carry out socio-economic survey with questionnaires in the informal

settlements, all the stakeholders with interest in the informal settlements should be involved right from the beginning. These include; elected political leaders, County technical and administrative officials, social workers who are familiar with the ground situation in the informal settlements, and the resident community members; (ii) inclusion of the local youth in the enumeration exercise assists to track the movements of the beneficiaries; (iii) parents of the youth gain confidence in the project when their children are employed to administer the questionnaires; and (iv) that when computers are kept within the informal settlements and all the data collected are keyed in by the local youth, the communities gain more confidence in the project and support its implementation more enthusiastically.

In carrying out mapping of the structures, the following observations were made; (i) high spatial resolution aerial photographs (at scales of 1:10,000 or higher) are adequate for mapping of structures in the informal settlements, (ii) satellite imagery with a spatial resolution of 40cm or lower are not suitable for mapping of the structures in the informal settlements due to lack of adequate resolution to pick the tiny structures, (iii) Social Data Domain Model (STDM) developed by Lemmen [2012] is a suitable database for presentation of the spatial and attribute data in the informal settlements.

Keywords: *Informal Settlements, Security of Tenure, STDM*

I. INTRODUCTION

The Government of Kenya has taken initiatives for the development of infrastructure as well as improvement of the environment in the informal settlements with a view to improving the quality of the life. Kenya National Housing policy (2003), Kenya Vision 2030 and Poverty Reduction strategic paper address and recognize the up gradation of informal settlements as a significant part of shelter development. Apart from this, Government of Kenya also introduced the Kenya Slum Upgrading Program (2004) and Kenya Informal Settlement Improvement Project (KISIP) in 2011 to raise the quality of life and enhance the tenure security of the inhabitants residing in these informal settlements in the urban areas of Kenya.

To achieve these objectives, the GoK secured funds from the World Bank, the Swedish International Development Cooperation Agency (SIDA), and the French Development Agency (AFD) to finance the activities of KISIP. The anticipated KISIP project has four main components; (i) strengthening Institutions and Project Management, (ii) enhancing Tenure Security, (iii) investing in settlements restructuring and infrastructure; and (iv) planning for urban Growth. While it was relatively easy to achieve objectives (i) (iii), and (iv), it was difficult to realize objective iv as the government did not have any prior experience with tenure security enhancement procedures.

A study was therefore undertaken in a representative site in the city of Nairobi to develop and test a methodology for the provision of security of tenure for the informal settlements in Kenya.

II. OBJECTIVES OF THE RESEARCH

The main objectives of this research are to develop a Land Information Management System for informal settlements in Kenya to support registration of structures for security of tenure.

A. THE STUDY AREA

Mashimoni village is located in Nairobi city on the east along Juja road. The land was owned by an Asian but when he left the land was taken over by the Air Force which was used for their shooting practice sessions. When they stopped using the area people started inhabiting the area. The size of the settlement is about 5acres and there has never been any eviction threat. It has a population of 4000 people with around 2000 households and the ratio of children to adults is 1:3 according to a Nairobi inventory on slums.

Services available are: water which is piped and there are 50 water points owned by individuals throughout the settlement who sell it at Ksh 2 per 20litre jerry can; there are 8 public toilets which are charged at Ksh 2 per visit and the sewer system used is that of the Air force; drainage is poor and is made up of terraces along the pathways where water is also disposed; and electricity connection is illegal though the area has electricity. Access to the area is through Juja road as

the External road and Mau Mau as the internal road. The village does not have any health centers and the residents visit the neighboring villages to get healthcare.

Majority of the people in the settlement are casual laborers and others are in the small scale jua kali sector. In governance and administration, the settlement has elders who work hand in hand with the area chief for effective leadership in the area. There are local CBO'S in the area and Muungano wa Wanavijiji is well known in the area. Below is the location of Mashimoni village in Nairobi and its aerial appearance on the ground.



Figure 1: The location of Mashimoni in Nairobi city, Source: google map, KISIP.

The UTM coordinates of the Study area are:

X	Y	Point
261984.37	9860463.36	mm1
262055.36	9860239.00	mm2
262216.42	9860278.50	mm3
262158.87	9860408.87	mm4
262164.42	9860418.38	mm5
262138.01	9860453.87	mm6
262126.85	9860487.48	mm7

262100.43	9860534.03	mm8
262065.93	9860510.99	mm9
262035.22	9860493.93	mm10

B. MATERIALS AND METHODS

Materials used in the research included, orthorectified aerial image, handheld GPS, questionnaires and a digital camera. Initially there was a proposal to satellite image – Landsat – to digitize structures, however, it proved difficult to accurately digitize visible structures due to clarity challenges and hence leading to acquisition of an orthorectified aerial image of 10cm resolution. A handheld GPS of 40cm accuracy was used to mark the boundaries of the study area. Questionnaires used were developed using a draft enumeration form developed by GLTN to capture persons and household data. Photos of persons enumerated were captured using the digital camera.

III. METHODOLOGY

The methodology adopted consisted of the following steps: (i) community mobilization and sensitization of the stakeholders; (ii) identification and preparation of base maps of the existing structures in the study area; (iii) socio-economic survey of the inhabitants, mapping of the settlements attributes and integration of the spatial and non-spatial attributes in a geo-spatial database; (iv) preparation of the physical development plan for the study area; (v) cadastral survey of the structures from the approved physical plans and submission of the plans for authentication by the Director of Survey for issuance of titles.

A. COMMUNITY MOBILIZATION AND SENSITIZATION OF STAKEHOLDERS

Several focused group discussions were held with all the stakeholders both in the office of the Nairobi County Government and at the study site. Apart from the County Government Officials and the elected political leaders, there were also the social workers who have spent a considerable time with the local communities at the study. This group was found particularly useful as they carried out field mobilization and sensitization of the community at the study site.

The consultant team took time to explain to the FGD the main objectives of the project, the expected products and benefits to the recipient communities and their role in the whole exercise. Questions and answers were dealt with on the spot. It was emphasized at these forums that the SECs were important in the implementation of the project and the upgrading exercise. It was also emphasized that this project would benefit the resident community and their support was crucial for the success or failure of the project. Some of the benefits that would accrue from the project included; issuance of title deeds of the structures to the residents, facilitation for organized planning activities of the settlement and the financial benefits that would follow the enhanced tenure system among others.

The next level of mobilization involved stakeholder identification and analysis. This task involved identification and selection of key stakeholders that would affect or be affected by this project, in attempt to ensuring a participatory survey and planning process. A deliberate choice of the key stakeholders and an inclusive representation was ensured. These stakeholders were also incorporated as part of the project during the entire planning process. Thus, the selected stakeholders included: Plots Owners or Tenants, Community representatives/groups, existing Non Governmental Organizations (NGOs), and Community Based Organizations (CBOs), Religious Organizations, youth groups, Settlement Executive Officers (SECs) and elected political leaders.

B. IDENTIFICATION AND PREPARATION OF BASE MAPS OF EXISTING STRUCTURES

In order to prepare the base maps of the study area, the KISIP together with the local community leaders identified the boundary of the study area and fixed the corner beacons with hand-held GPS the UTM coordinate system (1960 Arc Datum). This perimeter formed the basis for definition of the study area. Due to the small size of the structures, high spatial aerial photographs were acquired and used to digitize the roof layout of the structures [Fig 1.2] on ArcGIS platform at the Technical University of Kenya. The Final year Land Administration students undertook the digitization exercise as part of their practical training.



Figure 1.2: Digitized structures within the boundary of the settlement on a photographic background,

The digitized maps were then printed out with the photographic background to support field identification of the structures. The students together with the youth of the

community used the digitized structure maps to identify the households and marked each with a unique structure number. The same number was marked onto the digital map as a reference for subsequent database development [Fig. 1.2]. It was noted that the digitized maps show only the outline roof of the structures while on the ground, it was found that several households may be occupy one single roof. Therefore the ground mapping exercise was found useful for ascertainment of the true location of type of the structure.

C. SOCIO-ECONOMIC SURVEY AND MAPPING OF STRUCTURE ATTRIBUTES

In carrying out the socio-economic surveys, structured questionnaires were used to collect both attribute data about the household occupants and the structure. The youth from the study area were deployed for capturing the questionnaire data. This was found useful as the youth know the occupants of the housing structures and are aware of the changes taking place in the settlements. For each questionnaire, the structure number was marked at the top of each questionnaire then the enumerator captured all the attributes of the households.

The information included; name of the house hold owner, the national identification number, and the photograph of the structure owner, his /her finger print and whether the occupant is a tenant or landlord. Apart from the structure owner details, the use and type of structure were also captured complete with the digital photograph of the structure. The details of all the household members were also captured during the questionnaire survey. All the attribute and spatial data were then input into excel sheet from which all the data were up-loaded into STDM software.

House Number	Surname	Other names	Gender	ID	Age	Education level	Occupation	Marital status	Tenure relation	Share	Household Relationship	Witness
MMN10/A/001A	AIPCEA	Pst. Micheal	Male	1325422	40	Secondary	Pastor	married	Structure owner	100	Head	Chief
MMN10/A/003A	MUENI	Scholastica	Female	1325423	35	Secondary	Hawker	married	Structure owner	100	Head	Chief
MMN10/A/020A	OMUKHONGO	Moses	Male	1325424	41	Secondary	Hawker	married	Structure owner	100	Head	Chief
MMN10/A/035A	NDONDO	Charles Muthaka	Male	1325425	36	Secondary	Hawker	married	Structure owner	100	Head	Chief
MMN10/A/037A	A.I.C ZION CHURCH	Pst. Njoroge	Male	1325426	25	Secondary	Pastor	married	Structure owner	100	Head	Chief
MMN10/A/042A	MUIRURI	Josphene Wanjiku	Female	1325427	32	Secondary	casual labourer	married	Structure owner	100	Head	Chief
MMN10/A/051A	GACHUKI	Josphat	Male	1325428	32	Secondary	casual labourer	married	Structure owner	100	Head	Chief
MMN10/A/044A	MAKAU	Joseph	Male	1325429	32	Secondary	casual labourer	married	Structure owner	100	Head	Chief
MMN10/A/045A	NDERI	Mary Gathoni	Female	1325430	32	Secondary	casual labourer	married	Structure owner	100	Head	Chief
MMN10/A/87E	NGENDO	Patncia	Female	1325431	32	Secondary	casual labourer	married	Structure owner	100	Head	Chief

Table 2: Persons data

IV. RESULTS (OUTPUT)

A. DIGITIZED STRUCTURES

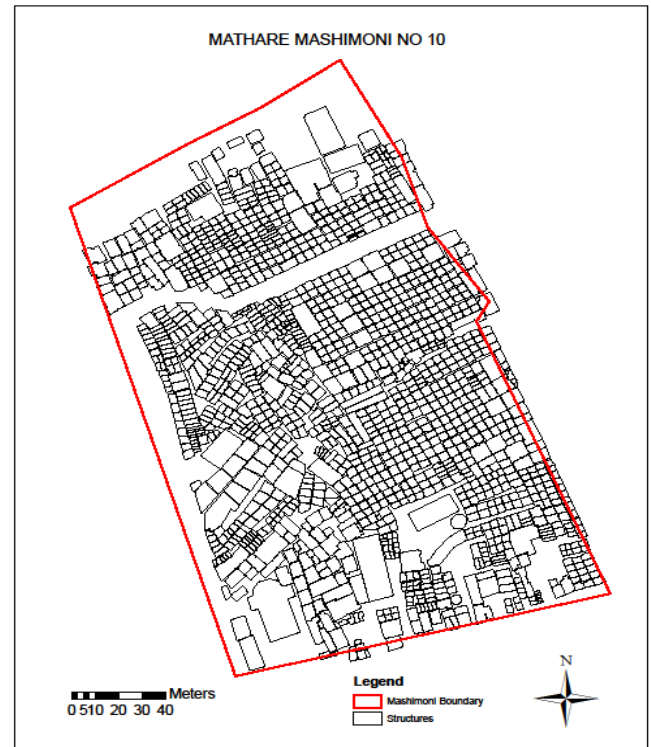


Figure 1.5: Digitized structures, Source: Own QGIS screen shot

They were produced upon digitizing the structures on the orthorectified aerial image using Quantum GIS. The structures were then labeled with structure numbers as shown below.

House Number	How many people Live here	How long have you lived here	Where did you live Before coming Here	Why did you decide to settle in Mathare	Tenure status	Monthly income	Daily expenditure	Financial Savings	Daily transport cost	Any disability
MMN10/A/001A	2	10	rural	affordable	Structure owner	5000	150	in the house	50	0
MMN10/A/003A	1	5	another settlement	job opportunity	Structure owner	5000	150	bank	30	0
MMN10/A/020A	3	20	another settlement	affordable	Structure owner	5000	150	mpeesa	100	0
MMN10/A/035A	1	5	rural	affordable	Structure owner	5000	150	sacco	20	0
MMN10/A/037A	5	12	rural	affordable	Structure owner	5000	150	sacco	0	0
MMN10/A/042A	8	30	rural	affordable	Structure owner	5000	150	sacco	0	0
MMN10/A/051A	2	5	rural	affordable	Structure owner	5000	150	sacco	0	0
MMN10/A/044A	1	8	rural	affordable	Structure owner	5000	150	sacco	0	0
MMN10/A/045A	3	9	rural	affordable	Structure owner	5000	150	sacco	0	0
MMN10/A/87E	4	6	rural	affordable	Structure owner	5000	150	sacco	0	0

Table 1: Household data



Figure 1.6: A section of labeled digitized structures, source own

B. THE REGISTRY INDEX MAP

Digitized structures would be used to develop a registry index map for the settlement [Fig 1.5] during the regularization process. The map shows the limit of rights for each structure.

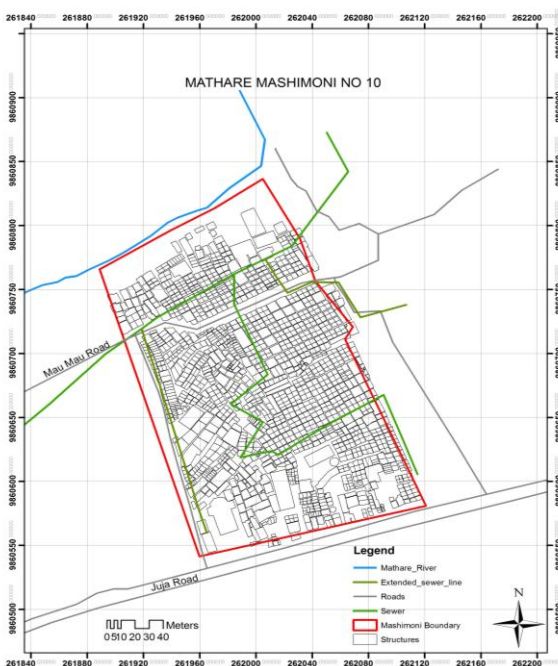


Figure 1.7: Digitized Structures, sewer line, roads & Mathare River to be used for planning, Source: own

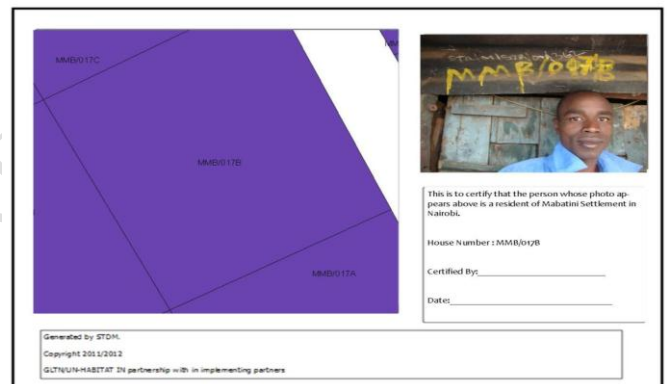
C. THE STDM DATABASE

Upon the population of spatial and attribute data into the STDM framework, relations of each are stored in the STDM database within the PostgreSQL. Figure 1.8 shows a relation of natural persons.

id	first_name	last_name	gender	photo	mobile	gid	identity	age	occupation	education	occ_age	tenure	relati	household	re	wtire
1	ABDULLAHI	IBRAHIM	Male		094533	294513	26	16	Child	Primary	0	0	Others	Child	Yes	
2	ABDULLAHI	BETTY	Female			294569		16	Child	Primary	0	0	Others	Child	Yes	
3	PUNGO	DENIS	Male			294617		13	Child	Primary	0	0	Others	Child	Yes	
4	NARUTO	LITSA	Female			294619		10	Child	Primary	0	0	Others	Child	Yes	
5	BABRYE	PHOHA	Female			294619		10	Child	Primary	0	0	Others	Child	Yes	
6	WAFULA	ARABAB	Male			294620		27	Self-employed	Primary	0	0	Others	Child	Yes	
7	NWRAFU	ADWA	Female			294621		16	Student	Secondary	0	0	Others	Other		
8	NAIGES	BABBA	Female			294622		25	Unemployed	Secondary	0	0	Child of the user	Child	Yes	
9	NWRAFU	BESA	Female			294623		23	Student	College/University	0	0	Child of the user	Child	Yes	
10	BUDJEE	ALI	Male			294624		26	Self-employed	Primary	0	0	Others	Other		
11	NWRODO	ABDULLAH	Male			294625		18	Student	Secondary	0	0	Others	Other		
12	GEOMGO	C	Male			294626		40	Self-employed	Primary	0	0	Others	Husband		
13	NWAKOBE	CAROLINE	Female			294627		20	Unemployed	Secondary	0	0	Others	Other		
14	NWANGA	GOSFET	Male			294628		22	Self-employed	Secondary	0	0	Others	Other		
15	NWANGA	ROSE	Female			294629		68	Self-employed	Primary	0	0	Others	Friend		
16	NWAGNE	ROBENAH	Female			294630		35	Self-employed	Primary	0	0	Others	Other		
17	WAFULA	MUSA	Male			294631		23	Self-employed	Secondary	0	0	Others	Partner		
18	DATENA	ISRA	Male			294632		2	Child	0	0	0	Child of the user	Child	Yes	
19	DATENA	MUHAMMAD	Male			294633		15	Child	0	0	0	Child of the user	Child	Yes	
20	DATENA	ZILA	Female			294634		22	Self-employed	Secondary	0	0	Child of the user	Wife	Yes	
21	GREY	EMMA	Female			294635		30	Self-employed	High	0	0	Individual own	Wife	Yes	
22	KACITH	ALICE	Male			294636		23	Child	0	0	0	Child of the user	Child	Yes	
23	NWOSA	PETER	Male			294637		15	Child	Primary	0	0	Child of the user	Child	Yes	
24	NWAFUSA	ABIRAHY	Female			294638		13	Child	Secondary	0	0	Child of the user	Child	Yes	
25	WAFULA	MWAZIET	Female			294639		18	Casual labour	Primary	0	0	Others	Child	Yes	

Figure 1.8: Shows a table of natural persons in the STDM database, Source: Own from PostgreSQL database

D. CERTIFICATE OF OCCUPATION



V. DISCUSSION OF RESULTS

The STDM was found suitable for this survey for the following reasons:

- ✓ The concept of STDM which now puts together the enumeration and mapping data into a form that can be used by different users and information updated regularly fills the gap that has been there for a long time. The concept was developed by Global Land Tool Network (GLTN) and prototype done by ITC, University of Twente.
- The concept has been tried both in Ethiopia and Uganda for rural and urban areas respectively. It is therefore important that Kenya having participated very actively in the piloting in the two countries, to test the concept locally and specifically to various informal settlements that the government have longed to regularize under a communal tenure.
- ✓ Therefore the improvement of the enumeration and mapping process through STDM becomes a vital model that will not only organize data for tenure purposes but

also aid other development projects within informal settlements.

- ✓ It also provides a framework for keeping and updating such information, which has been the biggest challenge in most of the enumerations done.
- ✓ The cost of licenses have also been limiting sharing and updating of the spatial data, with the usage of open source software such as QGIS and Postgress then brings a paradigm shift in the mapping industry.
- ✓ The STDM tool has not only proved to be applicable in informal settlements but also forms the basis for digitization of land records which has been a dream for Kenya. This can result into production of digital titles. The tool is currently being tested in Mathare Mashimoni and has proven to be a great in terms of participation, user friendliness and affordability.
- ✓ Relational database as initially designed by Dr. Gordon Wayumba has been improved to object oriented database under STDM hence the concept vital for land information management. The database generated can be queried and different information required for different purposes produced. Supporting documents such as photos, letters, and receipts can be attached for authenticity and final a document of complete entry auto generated.

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