

Geographical Information System Based Valuation Roll for Optimal Land Taxation in Nairobi City County

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Key words: Geographical Information System, Valuation Roll, Land Rates, Nairobi City County

SUMMARY

Land taxation, in the form of Land rates, forms the basis of sustainable and equitable revenue source to facilitate service delivery in Kenya's local Governments. These land taxes, which are payable annually, are based on the market value of land. The basis for this value is anchored legally in the valuation for rating act. This provides for preparation of valuation roll every ten years (Valuation Act, 2012). However, most local governments have not been able to prepare Valuation Roll regularly, for instance the roll in use in Nairobi City County was prepared in 1980.

Consequently so many properties have not been captured in the valuation and rating record and the values reflected on those captured dates back to 1980 denying the local government the enhanced revenue.

The primary input into a Valuation Roll is the spatial property information. Thus Geographical Information System provides a powerful tool for land value estimation and superior location variable relative to the traditional straight-line distance assumption (Efsreatios et-al, 2009).

This paper show how GIS will enable the Nairobi City County prepare Valuation Roll regularly as provided for in the law in a more economical and efficient way. The GIS will hold; adaptation of GIS database received from Survey of Kenya (SOK), production of digital base maps, collection of core valuation data of the properties in the county into a GIS based cadastral system, assessment of market unimproved site value of the properties, provision for continuous updates on changes in real estate and production of rate demand notes. This will not only result to equitable and optimal land taxation but also enhanced revenue needed for service delivery.

1.0 INTRODUCTION

Nairobi is the capital and largest city in Kenya. The city and its surrounding areas form the Nairobi City County (NCC) which extends to approximately 700 Sq Kms with a population of over three million people (Kenya Census, 2009). NCC is home for over 100 major international bodies and companies including the United Nations Environment Programme (UNEP), World Bank and headquarters for the UN in Africa & Middle East, the United Nations Office in Nairobi (UNON).

One of her major sources of finances for social infrastructure development and maintenance is property taxes in form of ‘Land Rates’. Land rates are calculated as a percentage of market value of the properties within the county, which are compiled together into a valuation Roll (Rating Act, 2012). Due to the time lapse between one Valuation Roll and the next, this percentage is varied over time, with the approval of the relevant authority to bridge the gap between the rates payable and the market value of land. Currently the rate stands at 17% of the 1980 market values, for the Nairobi City County, and there are proposals to increase this to 34% awaiting preparation of new Valuation Roll (Finance Act, 2013).

Valuation roll is a public legal document that consists of property information of all rateable properties within the boundaries of a rating authority produced according to legislation. Valuation roll preparation is governed by Valuation for Rating Act Cap- 266 laws of Kenya, which provides for preparation of Valuation Roll after every 10 years. However NCC last Valuation Roll was prepared in 1980. As a result, a number of properties are not captured in rating records; the properties are undervalued and under taxed. Geographic Information System (GIS) will not only make it more economical and efficient to prepare Valuation Roll but it will also ensure regular update of property database.

GIS is a computer based system that provides the capability to collect, manage, manipulate, analyze, and distribute information that is tied to a location, and it layers that information in a map-based environment to provide a better visual image of location, patterns and relationships. When such a platform is well managed and maintained it will minimize the complexity and cost of preparing Valuation Roll and bring about optimal and equitable land taxation (Michigan Govt., 2009).

2.0 OBJECTIVE

The main objective of this study was to demonstrate the need for a GIS based Valuation Roll and land rates billing system for optimal land taxation.

The study also sort to illustrate the key elements necessary for a GIS based Valuation Roll preparation

3.0 LITERATURE REVIEW

Geographical Information System Based Valuation Roll for Optimal Land Taxation in Nairobi City County, (6800)
Gyneth Magiri and Geoffry Cheruiyot (Kenya)

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Efficient and effective Valuation and subsequent taxation of land and its associated resources depends upon the availability of good land information (World Bank, 2013).

This can be achieved through an Integrated County Information System (ICIS) that is supported by geo-spatial database into which all information about a property is collected from all sources and compiled (World Bank, 2013). The system should be designed and operated in a holistic way, so that all information about a rateable owner or their bills and properties is maintained in a reliable way. All land sales and transfers (including subdivisions), as well as all building permits, erections and completions, are included. Hence the system provides an up-to-date and effective property valuation roll for all properties within the NCC. The inclusion of all sales will permit an up-to-date way of maintaining the underpinning market valuation model (Dale et-al, 1988).

This should be a centralised, web-based, role-based multi-user system, where all users have their own login and roles to access and modify various parts of the system.

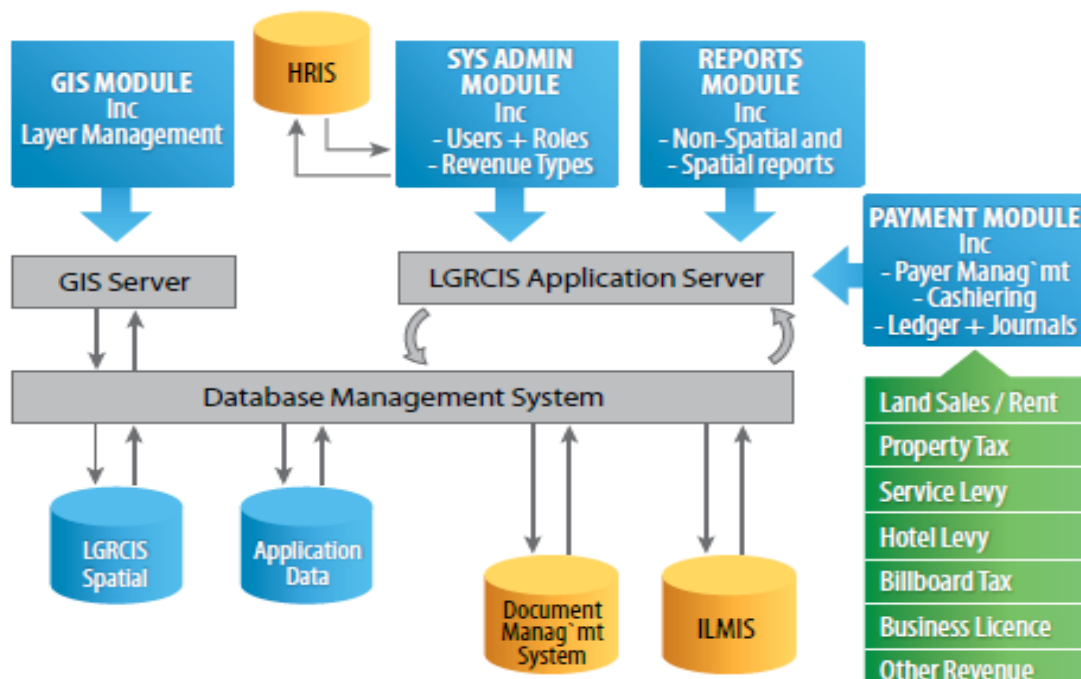


Figure1: Integrated County Information System (World Bank, 2013)

3.1 Using GIS in land valuation process

The value of property reflects its capacity to fulfill a function. With regard to commercial and residential property, functional qualities may include: Location of the property (Street frontage, Distance from education services, distance from local/foreign Government installations); nearby development and infrastructure (Electricity, Water, Roads); Physical

attributes (size, shape, age and condition). All these factors are included in a GIS based cadaster system (Yomralioglu, 2004).

In the following we present some of the factor which influences the value of the land in the city of Nairobi:

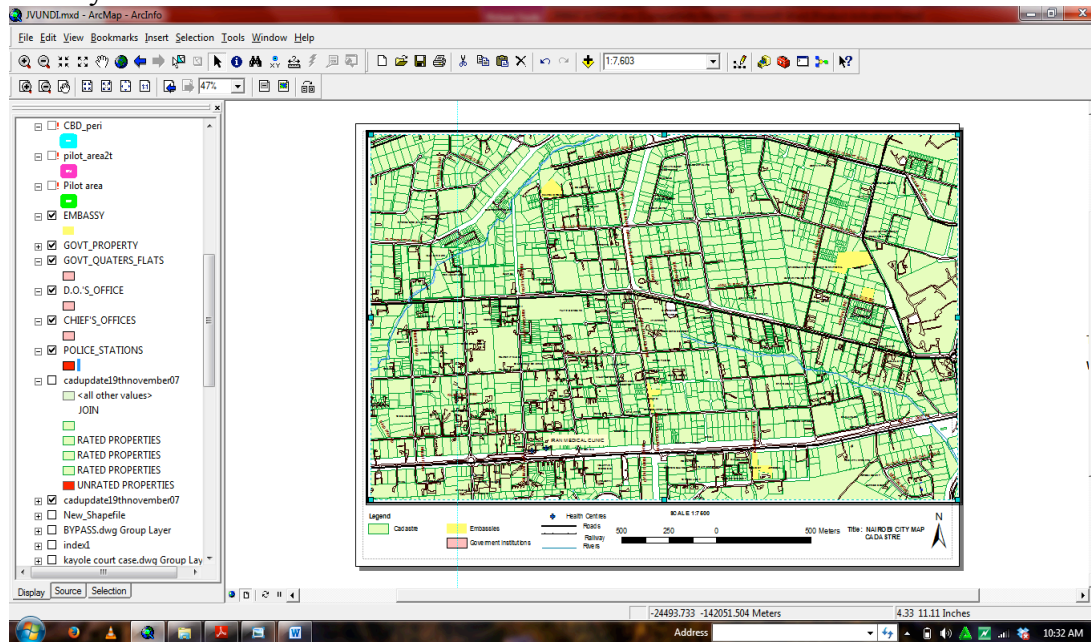


Figure 2: Functional qualities that affect value of properties (Survey of Kenya, 2013)..

3.2 Valuation Roll preparations

Each entry in the valuation Roll includes the names and address of the rateable owner, location of the property, serial number, map number, Land Registration (LR) number, size of the plot, valuation book number, and Market Value of the property. Although the law allows the rating authority to use either improved Site value (ISV) or unimproved site value (USV) (Valuation for Rating Act, 2012) .NCC mainly uses USV. This encourages development and discourages holding of unimproved land for speculation purposes. (Henry, 1879)

3.3 Market Value of land

For the purposes of Valuation Roll, the law defines market Value as the sum which the freehold in possession free from encumbrances is expected to realise at the time of valuation if offered for sale on such reasonable terms and conditions as a bonafide seller might be expected to impose with due regard not only to that particular land but also to other land of similar class, character or position and other comparative factors (Valuation for Rating Act, 2012). Therefore the method of valuation adopted for valuation roll purposes is market sales comparison.

Using the sales comparison method, information regarding sales of similar vacant land is collected, verified, analyzed, and adjusted to give an indication of value of the property being appraised. In analyzing data, it is important for an assessing officer to compare the characteristics of sold parcels such as location, highest and best use, size, etc. This allows the vacant land sales to be grouped based on similar characteristics and the assessing officer may then assign land values derived from the grouping to subject properties sharing similar characteristics with the group (World Bank, 2013)

In mass valuation situation like that of Valuation Roll, it is practically impossible to visit each and every plot physically to ascertain their special character, however with GIS, one can see most spatial characters relevant in value variations to avoid many complains that arise in valuation courts for example existence of way leaves, swamps, slopes extra.

3.4 Land Valuation Factors

Land value factors are many and diverse due to heterogeneity nature of land with valuation being the process of identifying and quantifying these “value factors”. The result should be an informed opinion of value based on an assessment of those factors considered relevant to the value of the subject property (Wyatt, 1997).

Table 1: Land Valuation Factors

<p>1.Location of the property</p> <ul style="list-style-type: none"> _ Street frontage _ Distance from nuisance/noise _ Distance to city center _ Dist. to educational services <p>2.Highest and best user:</p> <ul style="list-style-type: none"> _ Permitted No. of floors _ Permitted construction area _ Permitted user <p>3.Nearby development and infrastructure</p> <ul style="list-style-type: none"> _ Electricity _ Water _ Roads 	<ul style="list-style-type: none"> _ Shopping center _ Schools health centers <p>4.Land character</p> <ul style="list-style-type: none"> _ Size _ Shape _ Topography _ Soil condition <p>5.Social-Economic factors</p> <ul style="list-style-type: none"> _ Inflation/federation _ Micro and macro economic changes _ Supply and demand _ Political changes
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Each land valuation factors does not have same effect on the total value. For instance, land parcel size can have a different magnitude of effect to the soil condition. To determine the significance of these factors for a land parcel, they need to be expressed mathematically so that the effect of each valuation factor can be determined for the complete land parcel. To do so, each of the ‘value factors’ that affects a given parcel need to be assigned a “weight”. The weight so assigned must be derived from market survey (Yomralioglu et-al, 1993b).

Once the ‘value factors’ are assigned weight then land value is delivered as a weighted average of the market value factors as follows (Yomralioglu et-al , 2004).

$$V_i = \text{AREA}_i * \sum_{i=1}^n (P_i * W_i)$$

where;

V: Total nominal asset value of a land parcel

Area: Land parcel size (or pixel size)

P: Factor value

W: Factor weight

n: Total number of factors

Any ‘movement’ on any of the value factors means ‘movement’ of Land value. GIS provides a technological platform on which to base such an analysis and an initial stage is the spatial representation of property information in the form of value maps (Wyatt, 1995).

Land value maps are a graphical presentation of land values for an entire assessment unit (i.e., an entire City County). A graphical display of land values enables the assessor to explain and defend the results of her land value analyses to taxpayers. Constructing land value maps also helps keep the assessor informed of land value changes or patterns in the assessment jurisdiction. Significant information which might not otherwise be noticed often becomes apparent when land value information is presented graphically.

Using GIS a combination of land valuation factors can be spatially analyzed to give market value of properties in mass county valuation.

3.5 Land Rates

The current land rates billing system, involves getting land rating data from valuation offices and then entering it into rating system manually. This process is slow, cumbersome, tedious, and resource-consumptive process, prone to mistakes and irregularities (Namibia Gov., 2010).

GIS system allows for data exchanges between the land valuation system and the land rates calculations and billing system. This reduces leakage and gives a more robust system for billing, payment, reconciliation extra.

4.0 METHODOLOGY

4.1 Design

The study was a retrospective case series

4.2 Location

The Study was carried out at the Nairobi City County

4.3 Sample Size

The Nairobi City County is divided into 22 zones for valuation purposes, zones A to H, J to N and P to X.

For the purposes of this study data from Zone G, T and U was used since the spatial data for the areas was readily available. The data for the rest of the county need to be acquired from SOK.

4.4 Data Design and Analysis

Cadastral information was acquired from SOK database whereas property ownership details and property sales data was obtained from the ministry of lands that deals with registration of titles.

Validation and analysis of the cadastral data existing in NCC was done against the current data obtained from SOK to establish any gaps in the data such as parcel amalgamations, subdivisions and change of users.

Property sales data was analysed and inserted into the ArcMap, which are then used to come up with a fair rate base for a given zone.

5.0 PROJECT RESULTS

5.1 Unrated properties identification

When the cadastral information from SOK was analysed against the NCC Valuation Roll data a total of 494 plots were missing from the NCC records.

Table 2: showing the number of unrated properties

Zone	No. of plots in VR	No. of plots in GIS database	Difference
G	9472	9622	150
T	7342	7458	116
U	1319	1547	228
TOTAL	18,133	18,627	494

The spatial location and details of some of the properties that were in SOK database but not in that of NCC, hence not rated, were as follows:

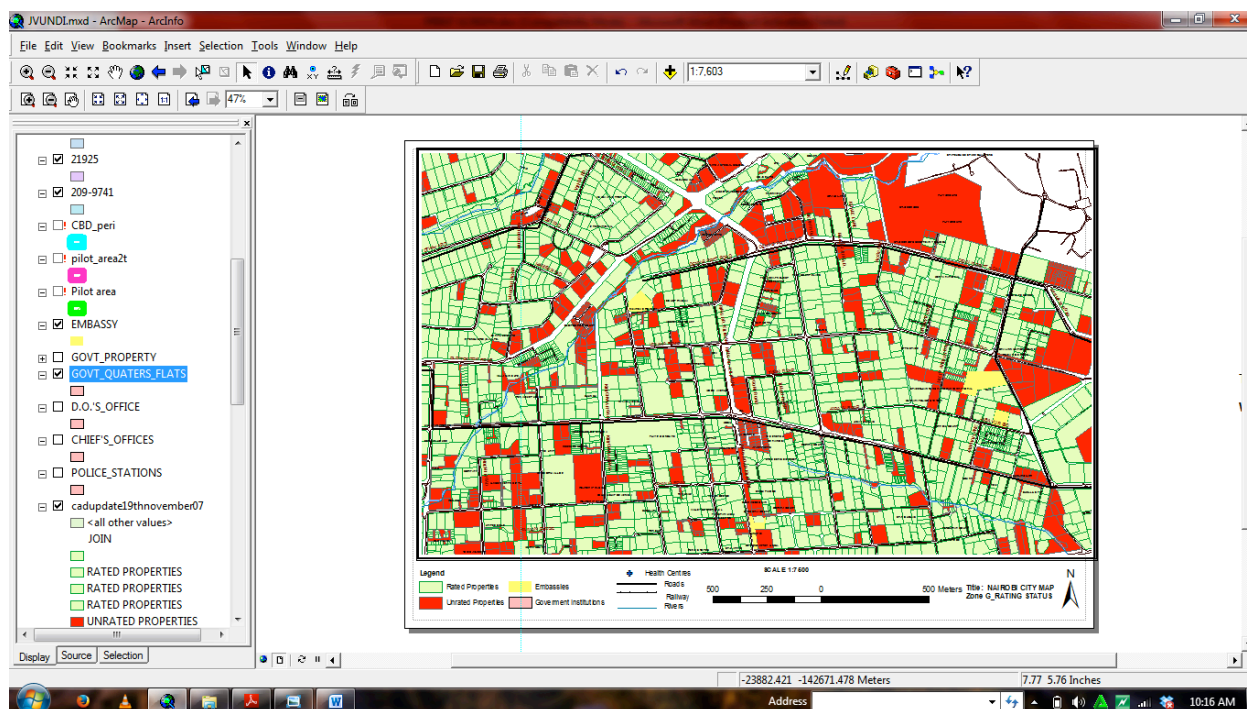


Figure 3: The plots highlighted in red were not rated (Survey of Kenya, 2013)

The reason why these properties are not rated is because the data needed, although it is available in various public institutions; must be accessed, collected and analyzed for use. This process is not only costly but also very lengthy hence the need for a more efficient system.

5.2 Details of the unrated properties

Details necessary for insertion of a property into a valuation roll were obtained from the ministry of lands offices. A sample of some of the properties is shown below; ownership details were not recorded here for privacy purposes

Table 3: Details of some of the unrated properties

LR Number	Serial Number	USV 1980	Plot Size (Ha)	Ownership details
209/149990/12	G/1481/10	207,500	0.2757	X
2/709	G/4622	719,500	0.4455	X
7158/603	T/1031/1/1	258,000.00	0.495	X
7785/1381	T/1697/5/G/46	117,500.00	0.2182	X
12239/24	T/1697/5/G/47	117,500.00	0.2182	X

119/1354	U/8733	298,500	0.0308	x
74/402	U/783/7	296,500.00	0.0287	x

These details were recorded into a GIS based parcel valuation data page and any property particulars can be searched using either LR number or serial number. The page of which would appear as below. As is clearly demonstrated access and update is made easy.

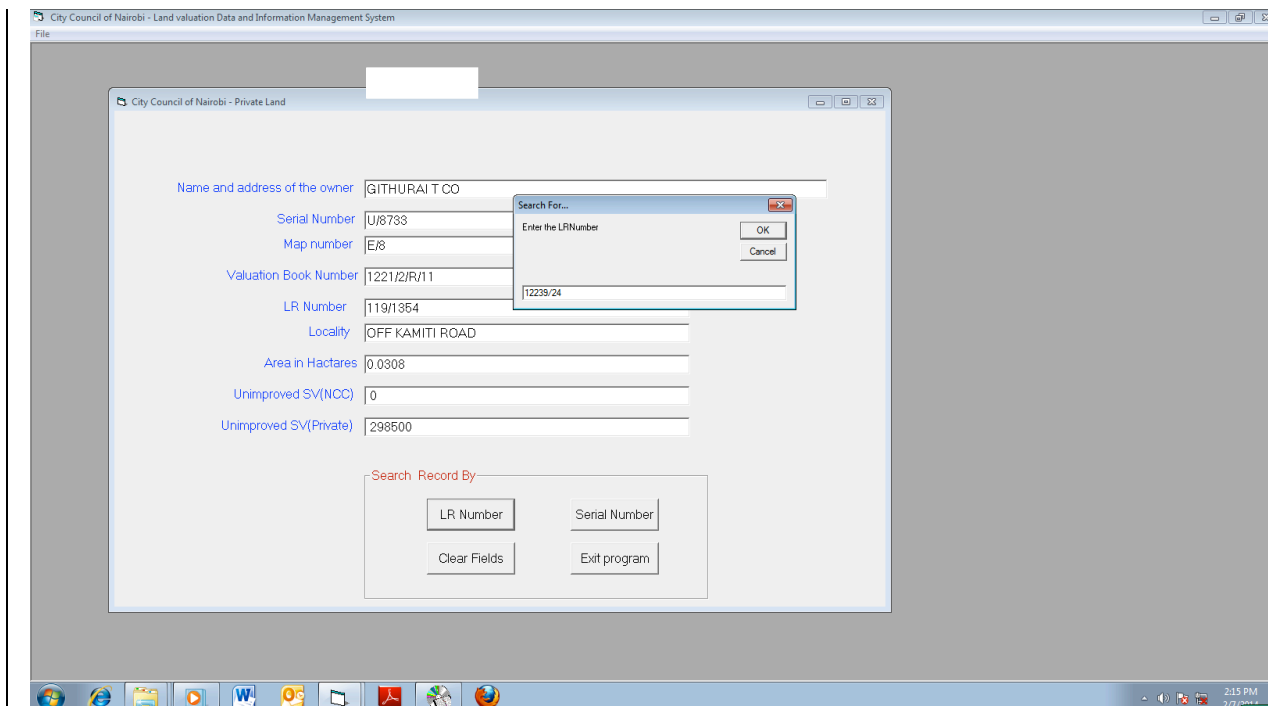


Figure 4: Parcel valuation data page (with search option) (NCC, 2013)

5.3 Rates billing system

The GIS system allows for data exchanges between land valuation system and the land rates calculation and billing system. This reduces leakage and gives a more robust system for billing, payment, reconciliation and any other purposes as deemed necessary.

Rates bill for a particular property can then be searched using either LR number or serial number.

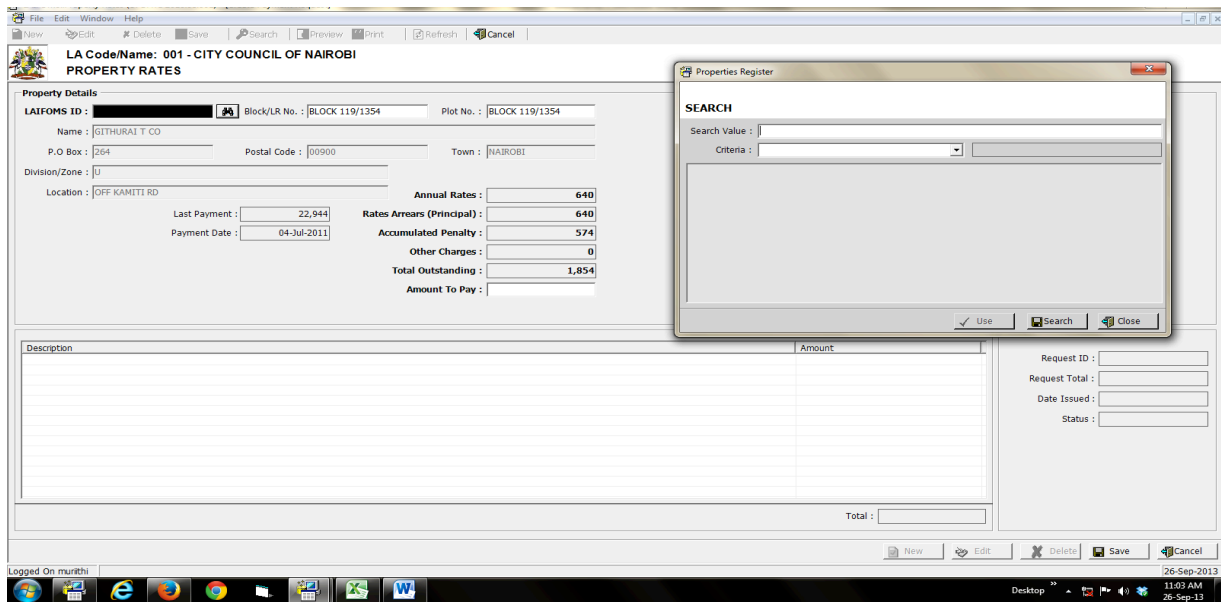


Figure 5: A parcel Rates demand page (NCC, 2013)

5.4 Property sales tracking

Recent sales for properties within NCC were obtained and inserted into Arc maps. These maps are then used to track changes in land sales, changes in ownership and other factors that affect value of land over time. Therefore the preparation of VR becomes very easy and cost effective, when it falls due, since all the data needed is readily available in a GIS database.

The properties highlighted in red in figure 6 below, were sold recently and an identity form is used to specify various attributes of the plot such as the selling price, date of sale, location, best user, development status among others.

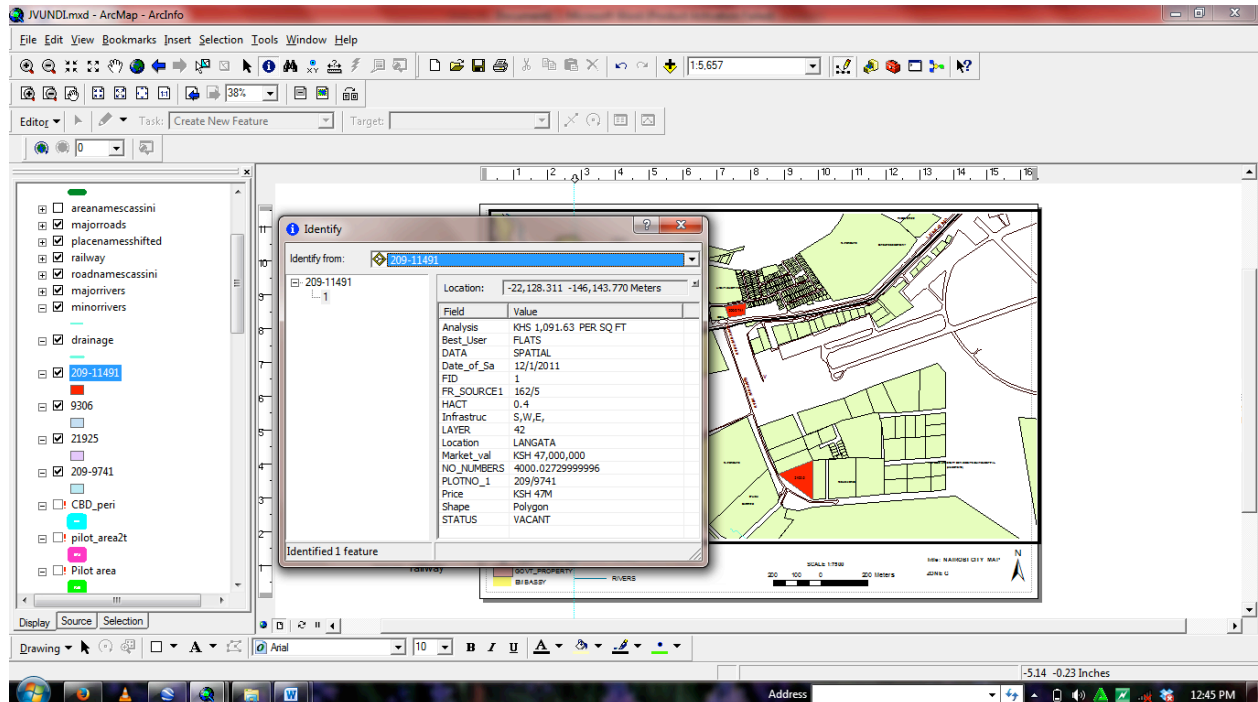


Figure 6: GIS based sales tracking map (SOK, 2013)

6.0 DISCUSSION

As clearly demonstrated the current mode of preparing Valuation Roll and land rate billing does not capture all the eligible owners of ratable properties. This results in some land owners not being billed and therefore the county ends up losing revenue.

GIS is able to aid in capturing up to date changes in land ownerships, new land registrations, amalgamations, subdivisions and any other changes relating to land that affect its value and rating status. In addition storage and retrieval of properties and ownership details is simplified hence a realized eases in payment.

The overall result is an enhanced revenue base and better service delivery as the county gathers more funds for the overall good.

Although this may be a subject of another study, circumstantial evidence shows that if information is easily available, land owners find it easier to pay their rates. This is achievable via GIS. Service delivery becomes easier as more funds are raised from the land taxes. This makes the county dwellers happier and hence more compliant.

7.0 CONCLUSIONS AND RECOMMENDATIONS

From this study it is evident that GIS based Valuation Roll can bring about efficiency, accuracy and consistency in the determination of market value of land for land taxation purposes. During the study it was observed that all the data necessary for carrying out valuation for rating purposes on all ratable properties within NCC was available but in different public institutions in fragmented manner. GIS database therefore presents a dynamic environment for handling such multiple data.

GIS based mass county valuation and taxation is the way to go and GIS modules for Data management, Sales data analysis, Valuation Factors analysis, Valuation and reconciliation, Objection and appeals treatment, Valuation roll and land rates billing system need to be developed.

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BIOGRAPHICAL NOTES

Gyneth Magiri is the Deputy Chief Valuer in the County Planning, Land and Housing Sector. She holds master's degree in Business Administration (MBA) and a Bachelors degree in Land Economics (B.A. L.E) both from the University of Nairobi. She Hold a diploma in Valuation and Estate Management and is a Full member of Institution of Surveyors of Kenya (ISK).She has undertaken courses on Infrastructure Financing and Management from the University of Botswana and KTH Sweden and a course in Geographical Information System (GIS). She is championing the World Bank sponsored project of establishing a GIS based valuation Roll for the Nairobi City County.

Cheruiyot Geoffrey is a GIS expert in the County Planning, Land and Housing Sector. He hold's a bachelor's degree in Survey Engineering from the University of Nairobi. He has undertaken courses in GIS. He holds a higher diploma in the GIS. He is an associate member of Institution of Surveyors of Kenya (ISK).He is in charge of GIS implementation in the NCC.

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