The Impact of Land Information Management Systems on Environmental Planning in Informal Settlements in Nairobi, Kenya

Emmanuel Siakilo, Grephas Pancras Opata, and Leonard Simiyu Mulongo

University of Eldoret, Kenya

ABSTRACT: For a city to grow and develop in the long term, it cannot disregard its environment. An ad hoc approach to environmental issues is fragmentary, expensive and inefficient. For a city to be effective and efficient it must consciously integrate the environment particularly on the urban fringes into its planning and management mechanisms. This paper describes the impact that land ownership information management systems as applied by the various stakeholders have on the general environmental planning based on a study of informal settlements in Nairobi, Kenya. First, a survey was conducted using a questionnaire to get an insight into the current situation of the informal land development sector in the study area. Structured interviews were used at the settlement level to gain knowledge on the operations of land management and their impacts on environmental planning in the study area. Finally, focus group discussions were conducted with the village elders and headmen at the settlements to gain more insights on land ownership systems. Data for the study was analyzed descriptively using descriptive statistics. From the study, it was established that there is poor security of land information due to lack of back-ups in these settlements and information on land registration, registration of rights and rights holders is in itself insufficient and does not address environmental planning. It was thus recommended that Nairobi's Informal Settlements Coordinating Committee should be remodeled into a more effective and participatory framework with regard to collection and management of land information for environmental planning in informal settlements.

KEYWORDS: Impact, Land Information Management Systems, Environmental Planning, Informal Settlements, Nairobi Kenya.

1 BACKGROUND

Urban Environmental Planning is the process of facilitating decision-making to carry out development with due consideration given to the natural environmental, social, political, economic and governance factors and provides a holistic frame work to achieve sustainable outcomes. Environmental Planning concerns itself with the decision-making processes where they are required for managing relationships that exist within and between natural systems and human systems.

Environmental Planning endeavours to manage these processes in an effective, orderly, transparent and equitable manner for the benefit of all constituents within such systems for the present and for the future. Present day environmental planning practices are the result of continuous refinement and expansion of the scope of such decision making processes. Some of the main elements of present day environmental planning are: social and economic development, urban development, regional development, natural resource management, integrated land use infrastructure systems and governance frameworks [1].

LAND INFORMATION

Policy-makers, land administrators and individual citizens all have a need for land information and make significant use of spatial data on a day by day basis (Dale & McLaughlin, 1988). In both the public and private sector, land information is a prime requisite for decision-making. This assertion relies on the premise that information reduces

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uncertainty. The quality of information (i.e. completeness, accuracy, currency and fitness for use) is directly related to its value and the effectiveness of the decision-making process where it is used.

Land information comprises attribute, spatial and temporal information about land objects, land/property rights and the people who hold those rights. Attribute information may refer either to personal information about the legal subject(s) or the rights they hold, e.g. name, date of birth, address, personal/corporate identity number, group membership, marital/corporate status, description of rights, among others.

Spatial information refers to geographical information about land objects, e.g. area (size), boundary coordinates, elevation, land use/cover, among others. Temporal information may include information about the duration of rights in land, seasonal changes in permitted land use, and spatial changes over time, et cetera. Land information may be produced in form of paper or digital maps, databases, digital models (e.g. digital terrain models), written documents (e.g. certificates of ownership, lease, occupation, among others), images (e.g. satellite images, aerial photographs, among others).

The provision of land information is the responsibility of the land management administration organizations. Apart from the use of land information for decision making at the policy and/or management level, land information is also used in routine land administration activities e.g. dispute resolution and land transfer.
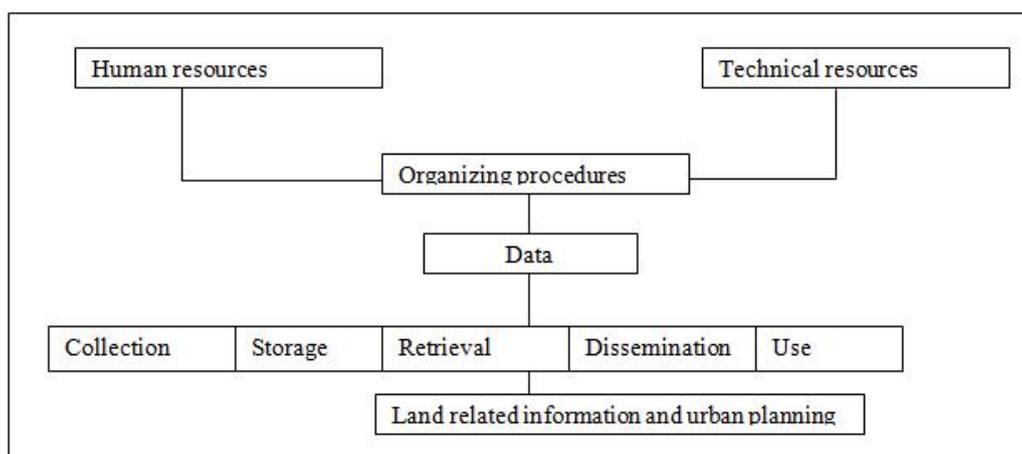
LAND INFORMATION SYSTEMS

An information system may be defined as a combination of human and technical resources, together with a set of organizing procedures, which produces information in support of some managerial requirements [2]. Such a system has mechanisms for collecting, storing, maintaining, processing data and retrieving and disseminating information that can be used for decision-making.

Land information systems (LIS) are the interaction between people, data, technology and procedures that controls the flow of land-related information in organizations to support production and service delivery. The purpose of a land administration system (e.g. improving tenure security, basis for land taxation, implementing land use control, among others) will determine the type, format, amount and quality of land information that the system will collect, maintain and distribute, i.e. the design of the land information system.

The intended function of the LIS (strategic planning, management control, operational control) will also determine the focus and the type of the information system. Figure 1 shows the elements of a land information system.

Land information systems may be manual or computerized. The advantages of computerized systems are:

- Less storage of data due to physical compaction of data
- Easier and quicker access and manipulation of data
- Easier analyses (e.g. Layering) using geo-referencing tools
- Data integration (e.g. Merging attribute and graphical datasets)
- Data sharing using networks between distributed databases

Figure 1. Elements of a land information system [2]

The design of a land information system will determine its effectiveness. Some of the important considerations for the design of a LIS are:

- The requirements of the users and stakeholders
- Flexibility to accommodate anticipated future developments
- Data sharing mechanisms, i.e. Using standardized data models and software formats

A land information system can be evaluated according to various criteria:

- User satisfaction
- Affordability of products and services
- Responsiveness to the information needs of its users
- System accessibility and availability
- Information dissemination (mode and reliability)
- Data usability and relevance
- Efficiency of data capture, maintenance and processing
- Data completeness, currency, consistency and accuracy (integrity)
- Quality of data protection, e.g. Legal rights of access, intellectual property rights
- Physical safety of data, i.e. Data back-up, warehousing, storage/archiving
- Availability of both data and service metadata e.g. Data quality labelling
- SDI readiness
- Level of data conversion (including availability of conversion information)
- Standardization of database structure and contents
- Administrative issues
- Data redundancy, e.g. Through duplication of data collection
- Sustainability, e.g. Capacity building in technical expertise, change management on restructuring/re-engineering

LAND INFORMATION MANAGEMENT

Land information is a public good. It needs to be properly managed just like other resources. Land information management strategies are concerned with the effective management of the land information resource to achieve specific objectives and to improve decision making. These objectives may include improvements in cadastral coverage, data content, data reliability, data access, integration of data, among others. These improvements can, in turn, contribute to the achievement of cadastre and land registration goals, e.g. better cadastral coverage, improved security of tenure, among others. Land information management tasks at any level include:

- Determining the internal and external requirements of land-related information products and services
- Examining how the land information is actually used in decision making
- Strategic planning (priorities, goals, strategies, action, performance evaluation and monitoring) institutional aspects
- Continuously improving the land information system (e.g. Re-engineering)

STATEMENT OF THE PROBLEM

Urban areas throughout the developing world are experiencing a problem in the provision of adequate and serviced land to meet the demands of their rapidly expanding urban populations. As a result, low income groups who are mostly unable to afford land are forced to crowd in already existing congested settlements, creating slum conditions.

These informal settlements are home to increasingly large proportions of the urban population in the city of Nairobi in Kenya. As embraced in Kenya vision 2030 document of October 2007 [3], Kenya needs to strengthen her institutional capacity to collect data on land use, not just for urban and physical planning but also for environmental analysis and policy making. Only three urban centers (50 per cent of Nairobi, Kisumu and Kitale), according to this document, have land use data and the study site is not part of the 50 per cent mentioned in Nairobi.

The capacity to undertake land cover mapping is weak and therefore assessment and monitoring of strategic environmental resources remains a challenge. A general lack of land information and inappropriate land information

management are major constraints to the achievement of effective urban land management in both formal and informal areas in Kenya. There are gaps in land-related data and information collected by a wide range of government and non-government agencies and the difficulty in maintaining it and distributing it to stakeholders.

Besides, there is little effort to understand existing informal land ownership systems and their potential role in the environmental planning of these settlements in Kenya. The mandates of the actors in the informal land development sector have not been clarified and they do not use the land information that they collect and maintain to integrate informal settlement in the formal urban planning process.

In Kenya, the ever increasing poor state in informal settlements arises not from the annual population explosion that is exacerbated by high rural-urban migration every year, but majorly from the ineffective handling of land ownership information and information on infrastructural services in such areas. Without effective land information management based on accurate survey in these settlements that are keenly monitored and evaluated by planners on land issues, acceptable conducive living conditions will be so elusive a concept in these settlements in Kenya.

2   MATERIALS AND METHODS

A survey of the current situation of informal settlements in Nairobi was carried out during the fieldwork period. A questionnaire was the main tool used for this survey. The key informants for the purposes of the survey were drawn from the Directorate of City Planning, Ministry of Lands and Housing, NEMA headquarters office, NCC, Shelter Forum – a consortium of civil society organizations involved in land and shelter policy   research and advocacy, Amani Housing Trust – a trust set up by the Catholic Archdiocese of Nairobi to implement and operate a slum upgrading programme, Kazi na Jasho Self Help Group – a Community-Based Organization (CBO) working under the provincial administration to offer voluntary services in environmental conservation, security and social advocacy, Pamoja Trust – a Non-Governmental Organization (NGO) working with Community-Based Organizations to find solutions to land tenure and shelter problems for the urban poor, Kibra Land Committee and EMS Associates – private planning land consultants.

The distribution of the questionnaires was done by hand to the respective offices and respondents given two weeks to complete them. From the survey, 15 stakeholder organizations involved in the collection of land information were identified and questionnaires issued. Out of the 15 questionnaires distributed to key informants, 9 were completed and received back from the following individuals.

Interviews were used as the main method of data collection at settlement level. The interviews were used to gain in-depth insights into the operations of the land information management system in the individual settlements. The interview method was effective. It had a high response rate and follow-up questions and verification of unclear issues could be done "on the spot". The main sources of secondary data were:

1. Official policy documents
2. Government of Kenya (GoK) national reports
3. Informal settlement project reports
4. Prior research work (theses, case studies, journal articles, etc)
5. Legislation

The data collected in this study was mainly of qualitative nature and was therefore analyzed qualitatively using descriptive analysis and presented in tabular and graphical form.

3   RESULTS AND DISCUSSION

Despite land information being in custody of the different stakeholders in the three informal settlements studied, little effort has been made to use this information in bringing environmental planning on board in these settlements. Besides, in some cases there is incomplete registration information, poor security of land information due to lack of back-ups, inflexible rules when requesting for access to such information as well as political interference.

Information on land registration, registration of rights and rights holders is in itself insufficient and does not address environmental planning in these settlements. As a result, these settlements are operating with inadequate infrastructural facilities and therefore the residents are living in deplorable conditions.

Residents of Lindi village in Kibera, for instance, live adjacent to a railway line as indicated in Figure 2. With the information on plot locations, this scenario should not have been allowed to exist because of the hazard it may cause to the habitants.

Figure 2. Locations of Settlements in Kibera

SANITATION

Sixty per cent of the population in Kibera, Mathare 4A and Mukuru kwa Njenga share pit latrines with approximately fifty others. Besides, the few toilet facilities available are not conveniently located, are unclean and using them at night poses a security risk. From the respondents' sentiments, children are especially vulnerable to inadequate toilets because they may lack access to household keys which unlock the community toilets.

With few toilets and pit latrines, there has also been a continued growth of "flying toilets". The reality behind these flying toilets is the inaccessibility of toilet facilities especially during late hours due to uneven distribution and lack of convenience resulting to insecurity. Most toilets and pit latrines are owned and managed by community groups and also individual businessmen who charge Ksh 5 per person per every visit.

The residents complain that this figure is high for them since their earnings are low.

WASTE MANAGEMENT

The study found out that there are inadequate garbage collection systems in the study sites. Due to this inadequacy, solid wastes have grown into heaps of mountains over the years with most of it being washed into water points during the rainy season further contaminating underground water. Tons of solid wastes are generated every month in these settlements and there are no solid waste dumping sites and no recycling plants. Any open space in these settlements forms a dump site.

Uncollected solid waste is one of these settlements most visible environmental problems. Waste collection services are provided only sporadically to low-income areas because of poor accessibility and very high waste generation which cannot be handled with available vehicles and equipment. The municipal services seem to fail most strikingly in garbage collection and disposal. Such a site in is shown in Mashimoni village of Kibera informal settlement in Figure 3.

Figure 3. Waste disposal in Mashimoni village (Kibera)

ENERGY AVAILABILITY

From the findings, residents of these three informal settlements rely almost exclusively on firewood and charcoal. Mostly women and girls have to walk for distances to look for firewood. Charcoal is often prepared for commercial purposes. Entire trees are being carbonized and sold in sacks to the poor in urban areas. More than 70% of the households in these settlements lack electricity.

Provision of energy is controlled by government owned firms which have not been able to set power transmission points in many parts of these settlements. In addition, the cost of electricity is quite high. This overreliance on firewood and charcoal has further degraded the environment that you can hardly see any vegetation in these settlements.

PROVISION OF HOUSING

From the study, 70% of the structures in the study sites are mud walled and thatched with corrugated iron sheets or entirely made of iron sheets. A household in these settlements comprises of seven members on average and costs between Kshs 300-Kshs 1000 per month.

The local authorities usually issue temporary occupation licenses to the owners. Around 10% of the residents in these settlements own the structures and sub-let them to the remaining 90%. The structures are owned by informal owners who are recognized by the tenants, but they have no legal ownership. The tenants pay a monthly micro-lease to the owners. Most residential units are single rooms approximately 10 by 10 feet in size. They offer little ventilation, security or privacy. Figure 4 displays the physical layout of some of these structures in Kibera.

Figure 4. Physical layout in Kibra Nubian village (Kibera)

WATER SUPPLY

The residents of these three informal settlements have three main concerns with water: access, cost and quality. They complain about the limited access to water points, which are located far from their houses. Besides, some landlords ration water such that it is only available on specific days of the week and at specific times.

This is a limitation, especially for people who have children and who require high amounts of water. However, for those who have access particularly in Mathare 4A, they decry the high cost of buying water in the informal settlements. They pay between Ksh 5-Ksh 15 per every twenty litre container. This is costly especially relative to the slum residents' income levels.

The study also established that some dwellers of these settlements use sewerage water for bathing and washing. This was particularly reported in Kambi Muru village of Kibera informal settlement. In fact, the Kenya government in 2007 admitted that sustainable access to water dropped to as low as 20 per cent in the settlements of the urban poor where half of the urban population lives [4]. This is a tragic situation given that the population in these settlements keeps rising every year.

4   CONCLUSION AND RECOMMENDATIONS

Negligence by the Kenya government to use land information to improve informal settlements and at least to provide the minimum support on basic requirements and services has led to unimaginable suffering to informal residents. This is coupled with the fact that the government fails to recognize the growth and proliferation of informal settlements and thus excludes them from the rest of the city's development plan.

The government and UN-Habitat development plan for some informal settlements like Kibera settlement upgrading is a good gesture but falls short of a comprehensive plan to recognize the settlements and to invest in improving the living conditions. Finally, there is an absence of a city land information development strategy to inform urban, physical and environmental planning particularly for the study informal settlements.

From the above conclusions, it is recommended that the government should develop a city land information strategy to inform urban, physical and environmental planning particularly for the informal settlements. The government should also work towards combining physical, economic and environmental planning in its development plan. Moreover, a regulatory framework and action plan should be put in place to ensure equitable and pro-poor access to urban resources and services. Apart from that, further research is necessary to establish whether environmental planning can be effective where regularization of informal settlements is ongoing.

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