

Geographical Information Infrastructure Applications in Urban Land Management in Tanzania: A Strategy to Enhance Communities' Decision Making in Land Regularization Process in Informal Settlements

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Key words: Community Involvement, GIS Infrastructure, Land Regularization, Informal Settlements, Securing Tenure

SUMMARY

Community involvement in land regularization process as an urban land management entity in securing tenure decisions process integrations with Geographical Information System (GIS) has long been recognized and discussed in national and international fora for land administration improvement in informal settlements. The challenges emanating from the discussions among others include limited application of GIS tools to create habitable human shelter in the context of urban environmental change, ineffective use of GIS technology in decision making at local level, lack of updating the index numbers to reflect migratory trends in urban areas and inadequate recording of changes of housing ownership in informal settlements seems unmet (De soto, 1996, Alfonsin, 1997). This paper contributes to this evolving debate focusing on how local community participated in land regularization process and effectively used geographical information system in improving land development and management in their neighborhoods which was designated as hazard lands by 1978 Dar es Salaam master plan, the case of Ubungo Darajani in Dar es Salaam city. Specifically, explores policy and legislation environments potential for enhancing GIS applications in Land Regularization, explore information requirement in land regularization process and output reached, documents process involved in developing GIS Infrastructure in Land regularization process. Equally importance, explore software-enablement, data structure formulation and information collected towards enhancing GIS utility for Community decision making and establish strategy for effective use of GIS infrastructure in land regularization potential for effective land management.

The study shows that that unless land development and management activities ongoing in informal settlements are closely monitored and regulated as the settlement grow, it will be costly-socially and economically to retrofit if GIS application in coordinating, controlling and monitoring land is minimal among interested stakeholders taking decision in the process of land management.

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1. INTRODUCTION

Community involvement and use of Geographical Information System (GIS) infrastructure in urban land management have been perceived as a viable strategy to enhance communities' decision making in land regularization process for sustainable development in developing countries' informal settlements (Kombe, 1995; Alfonsin, 1997; De Soto, 2000). Community involvement concept widely discussed (Pretty et al, 2000; Berman, 1997). In this context conceived as a process of inclusion of landholders, tenants, private sectors, government and donor community in planning, and guiding, controlling land development for sustainable settlement development. GIS Infrastructure is widely discussed (Agenda 21-Chapter 40). In this context refers to a process of using combination of tools (computers hardware and software), data (spatial and non-spatial) and people/users (i.e decision makers, managers, technicians, operators and public) in urban planning and management. Land regularization refers to processes and procedures related to land use planning, cadastral surveying and land registration which are geared towards directing and guiding land development and enhancing security of tenure in informal settlements. Informal settlement paradigm has been thoroughly discussed by Nurul Amin (1997). Informal settlement in this context conceived as settlement that inhabitants do not enjoy rights to an adequate standard of living and legal rights to access occupation and use land. As such occupation and use of lands are exposed to risks of being evicted due to lack of security of tenure. Informal settlements are also characterized by inadequate access to basic urban services, informal agreement in land transaction and haphazardly housing development. Security of tenure refers to agreement between actors on the access, use and owning land property. It is governed and regulated by legal and administrative framework under written and unwritten norms. A person is secured when he/she is protected from involuntary removal from their land and land ownership occupies. Further, land management discussed also widely (Mabugunje, 1992) in this context refers to a process of effective and efficient land development facilitation, control and tenure security to create a habitable, safe and competitive city. The linkage of GIS infrastructure in land regularization process for effective urban land management in informal settlement is important potential for understanding ways of improving policy formulation and practical gap for country development.

The study is important as it exposes to human dimension challenges on need for effective decision making in participatory planning approaches. It depicts also, to the growing critique of the indispensable role of grassroots institutions have to play in urban land management, in a situation where public resources capacities are declining and inadequate for meeting problems arising from rapid urbanizing settlements.

1.1 Evolving debate on community involvement and use of information system in decision making process

Incorporating local community into urban land management activities including land regularization is an alternative to the more alternative tradition exclusionary planning approaches i.e. master plan (Amstrong, 1987 and Majani 2000). Implementing land regularization activities through participatory approach and use of Geographical information infrastructure has become so common in the last decades that it has been mainstreamed in the policy and practice (Kessy,2004; Smith, 1997). It has also, touted as a strategy for enhancing community decision-making process in urban informal settlements infrastructure service provision (Kombe, 1995; Magigi, 2004). Information flows among actors, financial availability, government and legal support, spirit to volunteer in local community development initiatives and training of local communities on land development and management are also critical elements in success for local community involvement in land management activities (Amos, 1986). However, urban planning cycles which is seen to have limited potential in delivering intended results based on social norms noted difficult to meet community needs (Berman, 1997; Smith, 1997 and Kombe et al, 2000). Wit (1998) and Kreibich et al, (2002) observe that political interest may frustrate local community norms and procedures guiding and controlling land development in informal neighborhood, especially in neighborhoods with low population, which might not attract politicians. All this shows the importance of community connectedness in implementation their intended activities and needs and therefore the social capital theory noted important to understand the context including adequate of information flows and its accessibility (Jacobs, 1961; Putnam, 1993; Robert, 1994).

Other contributors to the debate observe outdated policy and legislative environment as a constraints to enable community taking decision in their development (Topfer, 2002; Clarke,1994; Kombe et al, (2000). This observed resulting in squatter settlements and informal land development activities mushrooming. Citing cities including Dar es Salaam, Harare, Lusaka, Lagos, Gaborone, Namibia Abuja and Lagos among other towns in Sub-Saharan Africa (UNDP, 1998). These underline the need for local authorities to strengthen community involvement efforts especially in informal land management and get acquainted with GIS tools for effective data base management while ensuring users accessibility to information.

Tanzania on its part has taken some measures in policy reforms to ensure community involvement in land regularization. It also, established GIS units (EMIS) in district and municipal authorities to integrate information base derived from different actors to be accessible for different uses. However, it seems facing financial constraints in implementing this strategy. On the other, policy and legislations supporting local community involvement in upgrading, land legalization, housing and other urban infrastructure service provision are in place. Policy and legislation in place in Tanzania include Town and Country Planning Ordinance (CAP 378) of 1956 revised in 1961 section 13, 18, 32 and 35-44, Land Act of 1999 section 56-60, Land Policy of 1995, Human Settlement Development Policy of 2000 and

Physical Planning Act of 2003. These are main instruments regulating urban planning and management. They are also, critical in promoting community decision making in urban development.

Dar es Salaam city as a fast urbanizing city in south of Sub-Saharan Africa has been impacted with increasing environmental risks resulting from rapidly growing informal settlements with abundant investment in housing, which comprise dead capitals. The latter limits residents from accessing financial betterment (World Bank, 2002; Kombe, 2000). In 2003 the city was approximated to have more than 105 informal settlements, from 15 in 1980's (World Bank, 2002; Mgweno, 1999). The increasing number of informal settlements is a result from *inter alia* ineffective/poor urban planning approaches i. e. master planning. Ubungo Darajani is unique case in local urban planning in Tanzania, where landholders relying on their own resources, without external financial support have been able to initiate and accomplish process of plan making up to a stage of land surveying and mobilised funds for land registration with use of Geographical information systems infrastructure. A number of other local communities have also tried to improve level of services in their settlements. Some have been able to construct roads, improve water supply and solid waste management. Others have prepared detailed land use plans. However, Ubungo Darajani residents have been able to prepare detailed plan and execute joint cadastral survey covering with aid of geographical information infrastructure that helped in taking decision in their development. In most other informal settlements surveying of individual plots or part of the settlements is the common practice but disjointed.

2. METHODOLOGY

2.1 Case study area

Ubungo Darajani is one of the unplanned settlements in Kinondoni Municipality in the city of Dar es salaam. It is located 9 kilometers from the city center. It is a low land area, experiencing flooding and covers 26 hectares. The settlement has a total of 849 households and 4,245 people, in which 2,420 are women and the rest are men (URT, 2003). Among 849 households, 269 comprised landholders and the rest are tenants (Map 1).

2.2 Criteria for study area selection

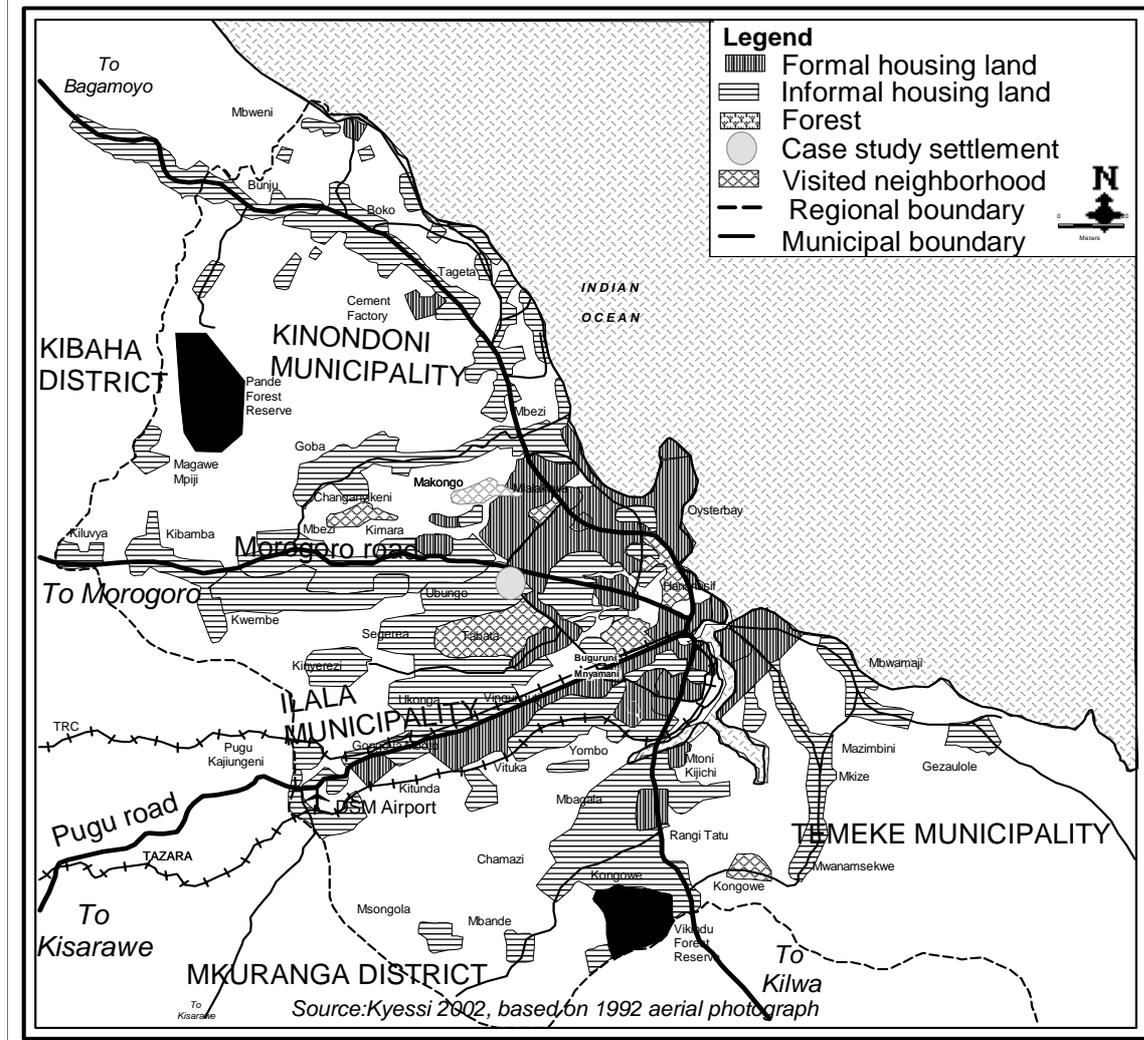
The selection of the settlement guided by the following factors:

- The community has been involved in land use planning and cadastral survey for a period of 7 years, i.e. since 1997
- It is one of the cases where members charted strategies to subsidise those who could not raise sufficient funds to contribute in financing the process.
- It has cases/projects to demonstrate how residents managed to develop and sustain trust among themselves, create relational and connectedness and use oportunities offered by the policy changes in land development to towards securing tenure.
- Availability of information and manageable size in terms of area and population

- Settlement growth in terms of housing development potential to illustrate linkages between urbanisation and urban governance. Further, lack of lawful titles to most of the landholders

A number of other settlements which were selected but did not meet these criteria. These include Hannasifu, Makongo, Changanyikeni, Tabata, Mlalakuwa, Kongowe and Buguruni (Map 1)

Map 1: Formal and Informal Neighborhoods in Dar Es Salaam City



2.3 Study system

The population of Ubungo Darajani neighborhood is largely comprised people from various tribal backgrounds, with diverse social, cultural, economic and ethnic beliefs. These include the *Chagga*, *Waarusha*, *Matumbi*, *Zaramo*, *Kurya*, *Jita*, etc. The mixed social set-up seems to have created conducive metropolitan environment, which in turn, has helped in land regularization process. The presence of tribe groups, religious groups, women credit solidarity

groups have constituted important source for implementing local development activities including land regularization.

The major economic and income generation activities carried out in the settlement include gardening, along Ubungo Kibangu river, business activities such as retail shops, garages, hotels and restaurants, petty trading, animal and poultry keeping. Additional subsistence activities include off-farm activities such as carpentry and the sale of the processed building wood. The study revealed that that 60% of the landholders were employed in formal sector while 40% were in informal sector.

2.4 Field methods and data collection

The data were collected through structured questionnaire with some open and closed ended questions, aerial map analysis, resource mapping, PRA tools, observations and desk search were employed. A total of 90 respondents were interviewed including 10 respondents from local government authorities of Temeke, Ilala and Kinondoni Municipality including: Urban planning and environment(2), Land valuation(2), Engineering(2) departments. Others include four (4) Government Ministries officials: Ministry of Natural Resource and Tourism and Ministry of Lands and Human Settlements Development (particularly planning, valuation and policy sections). And, 80 landholders, tenants, private sectors and tribal groups members were interviewed. Among the 90 respondents, 40 were female and 50 male. In addition, local community feelings and perceptions were taken as direct quotes and recorded to qualify the arguments.

Kiswahili language was used to conduct the interviews. Data collected were analyzed using Statistical Package for Social Science (SPSS) and Map info Software. Throughout the analysis, data were differentiated regarding actors' roles and responsibility in land regularization process in understanding the decision-making process in view of integrating geographical information and user interface demands. However, descriptive statistics namely, averages and percentages were used to summarize the information collected.

3. RESULTS AND DISCUSSION

3.1 Policy and legislative environment

The community's desire to undertake land regularization in Tanzania supported by section 60(1)(e) of the Land Act of 1999 no.4. Section 57 (2)(a-i) of the Act stipulates important criteria to take into account if an area, has to be declared a regularization area. These include:

- The area should be substantially built;
- Substantial number of landholders in the area lacks apparent lawful title to their use and occupation of land
- Land is occupied under customary tenure;
- The area is ripe for development i.e. has been declared by the responsible authority;
- Landholders have lived in the area for substantial period of time; and
- Existence of a substantial number of residents who have invested in their houses

- Substantial number of people and community organization within the area wish to participate in the scheme of regularization

The Ubungo Darajani met a number of these provisions and in principle qualified to use this opportunities for land regularization.

The Land Act is supported with other polices, legislation and other government circulars in place in Tanzania including Town and Country Planning Ordinance of 1956 revised in 1961 section 24,29, 31 and 35 – 44, Land Policy of 1995 section 6.4.1 and 6.8.1 and Human settlement policy item 4.1.4.2 provide for local community involvement in managing urban land development. On the other hand, Government Notice number 3, dated 7th January 1994 outlined thirteen main functions of Subward leaders; the main function that indirectly related to land management is to maintain residence registers, to protect the welfare of the settlers and their properties

The enactment of Information and Communication Technology (ICT) Policy of 2002 in Tanzania put in place the need to every sector to use Computer technology potential for national development. This policy, *inter alia*, acts as a strategy to empower the Land Act of 1999 and other related supporting policy and Act on the use of GIS infrastructure potential for urban land development and management in creating habitable and competing cities in Tanzania.

3.2 The major information requirement in land regularization process

Settlement upgrading and land legalization towards improvement of infrastructure services and securing tenure respectively as per Land Act of 1999 section 56-60 are summarized hereunder;

- A written report document describing the settlement profile entailing socio-economic data, land occupation and land ownership register
- Land negotiation and agreement forms
- Brief document exploring series of landholders meetings held, housing development status, individual dislocation property and costs. Detailed land use plan approved by responsible authority
- Surveyed plan approved by responsible authority
- Detailed Infrastructure plans approved by responsible authority
- Land registration document (title deeds)

3.3 Community led land regularization, information flows and collective decision making processes

3.3.1 Local community involvement decision making initiatives processes in initial stage

Ubungo Darajani community embarked on land regularization (Upgrading and land legalization) process in order to improve infrastructure facilities and services, preventing

haphazard housing development and encroachment on roads and improving their security of land tenure. However, improving security of tenure (land legalization) was the first priority according to the landholders' decision made in 1997. Land regularization initiation in this settlement took duration of two years. It involved establishing contacts with local authority, consultations with various institutions for support. Retired civil servant in initiation stage catalyzed the process. Some of them had started surveying their plots but failed due to prohibitive costs. Some been had swindled by unregistered surveyors, these factors created solidarity among the settlement because they had faced common problem.

During this initiation stage, a total of 14 general meetings were recorded in which mechanism of participatory decision making were built within the settlement through the use of general meeting and use of ten cell leaders. However, during this period University College of Lands and Architectural Studies (UCLAS) was engaged as consultants to elaborate on the regularization process and provide legal guidance. Respondents argued in initiating meetings that the process of regularization was too bureaucratic; therefore they did to seek UCLAS support.

3.3.2 Land use (layout) planning phase

In late 1998 the Ubungu Darajani Community Organization (UDASEDA) approached UCLAS with a view to seek their support in preparing a regularization plan. Before contacting UCLAS, the community organization had consulted local authority (i.e Kinondoni municipality) seeking its support in preparing land use plan, cadastral survey and processing of titles for landholders. The council referred the community organization to the Ministry of Lands and Human Settlements Development (MLHSD). From the interviews with Kinondoni municipality officials, it was revealed that the local authority was hesitant to give the community a go ahead because there were unclear issues regarding regularization policy and approach. This includes unclarity regarding the appropriate standards to be adopted, budget and how to handle compensations issues. On the other hand, the municipality had to refer the community to the MLHSD in order to comply with Land Act of 1999 no. 4 section 58(1) which states

“The Minister may, of his own motion or at the request of urban authority or a village council within an urban or peri-urban area, either direct the Commissioner to consider, or appoint an inquiry under section 18 to consider the question of whether any area to which section 60 to 64 declared to be an area of regularization”.

When the MLHSD received the proposal, it asked the community to follow-up a reply after some weeks. After a month the Ministry endorsed the community request, but verbally advised them to contact UCLAS however promised its support the community endeavor. In a way, the MLHSD endorsed the community request informally i.e. verbally and not in writing because it was hesitant to commit itself (in writing) as it was not sure whether the community will be able to mobilize resource for carrying out regularization plan –i.e. plan preparation and its subsequent implementation including paying compensation in accordance with Land Act of 1999 provision. The community thus contacted UCLAS and a contract to engage it was drawn. Among other things, the contract required the consultant to produce regularization

plan (detailed layout plan) as one of the outcomes¹. Other phases, which were considered but not included in the agreement, are cadastral survey and land registration.

In approaching the land use planning, UCLAS undertook the following activities: field reconnaissance, conducted general assembly (meeting) where the regularization process was explained and clarified to the community members. Also, preparation of base maps, forms for negotiation and property registration were prepared together with identification of areas for community facilities such as major roads and other public services. Other activities include plot demarcation through negotiations and layout planning. Submission of the layout plan to the local authority scrutiny, endorsement and presentation to the Ministry for Lands approval was also done by UCLAS. UCLAS was also involved in making follow-ups in collaboration with the community organization leaders in a total of 64 trips were made. The preparation and approval of the detailed layout plan in the second stage took duration of 3.5 years. One wonders why land use planning took such a long period (i.e. 3.5 years) despite presence of institutions and experts available within the same area of jurisdiction.

3.3.3 Cadastre Surveying

After the layout plan was approved by the MLHSD in November 2002, local leaders convened a general assembly involving all landholders to inform them about the approval of the detailed layout plan and commencement of the second phase, which comprise cadastral survey. The meeting endorsed the progress and directed the community spokesman to identify a surveyor who could help to survey their area. In order to strengthen the community organization, new committee members were elected to assist the old committee. The Community Land Development Committee (CLDC) in collaboration with UDASEDA leaders was given overall in charge of the process of carrying out cadastral survey and title preparation.

In an attempt to start the surveying work, UDASEDA and local leaders consulted the local authority aforesaid, which directed them to contact UCLAS. The surveying department at UCLAS submitted an estimate showing that the cadastral survey of 26 hectares would cost TShs. 21 million equivalent to 19,500 USD. Another surveyor in Morogoro (a city in Tanzania) quoted TShs. 28 million equivalent to 26,000 USD.

The CLDC leaders informed the community about the cost quoted by the surveyors in a general assembly. The general assembly resolved that the committee should approach the MLHSD for help. On learning about this, the MLHSD referred them to Survey Consults, a private firm which agreed to undertake the work, at much cheaper charge.

After visiting the site the consultant (Survey Consults) asked the community organization leaders to submit to them an approved layout plans for costing purposes. The cost for cadastral survey by the firm was TShs. 4,090,000/= equivalent to 3,800 USD for 237 plots. This excludes the 32 plots already surveyed. In order to be in position to start the work the firm (Survey Consults) asked the community to seek survey instructions from Kinondoni Municipality. The letter was written by the community representatives to this effect, the

¹ The cost of its preparation amounted to TShs. 1,260,000/= equivalent to 1,167 USD

processing of the survey instruction by Kinondoni Municipality took nine months, i.e. from February to October 2003. Following the issuance of the survey instruction, from November 2003 to February 2004, the community mobilised and collected funds for implementation. At this stage the Councillor and the Member of Parliament (MP) stepped in to help sensitise the community to contribute in cash in order to implement the plan.

Fig 1: Land regularization outputs



3.4 Process involved in developing GIS Infrastructure in Land Regularization process

As describe in the community led regularization process and the output reached. Towards integrating GIS Infrastructure application in the process potential for enhancing community decision-making, activities performed includes;

- Identify type of information for planning and management needed in land regularization. The community itself consulted local authority and central government as aforesaid. The consulting firm i.e. UCLAS prepared aerial maps and their sources, computer device for map digitization to facilitate project execution
- Determine the source of information, seeking institutional collaboration and present the regularization procedure and data structure system needed i.e the use of computer to produce the output rather than using manual which was common in last five decades used in urban planning practice in Tanzania. In this case Ministry for lands, Local government, local leaders were consulted to have a collaborative planning team
- Determining level of detail important for project execution while meeting country's policy in place. In this case preliminary data collection through reconnaissance, settlement profile, available infrastructure facility and meeting within the settlement ere collected and held.
- Establish and organize information in GIS tool i.e. computer to establish data base to different user interface. In this respect Microsoft word and Map Info software were used to process, retrieval and store the data collected from the community
- Landholders property mapping in computer including inserting plot boundary demarcated

3.5 Computer software-enablement and data structure formulation and information collection

- In this case, the use of Map/Info software was paramount in helping local residents to determine their plots and boundary adjudication and demarcation. Major process involved summarized:
 - Collect all data include map, understanding source, grid setting and use digitizer for digitizing
 - Setting layers in computed whereby each land use identified were mapped and differentiated by layers using color
 - Set data structure for each layer in which planners in this case UCLAS in consultation with local community consultaion determine allocation of public utilities and facilities in their settlement. In this case mapping help to determine infrastructure facility and utility location or accuracy. This also depicted type of data formed in the data structure depend on demand of the user in using the information collected
 - The data were stored in both MS-Word access and Map/Info software for retrieval at UCLAS, in which hard copy were sent to the local authority for endorsement and MLHSD for Lands for approval

3.6 How Geographical information enhances community decision making in land regularization process: *bridging the information Gap*

- Presentation of maps digitized in hard copy to local community for scrutinisation and amendment
- Mapping of land use conflicting areas in maps to allow community involvement in conflict mediation and resolution
- Plot digitization using Map/Info software and therefore establish public and private properties
- Use of Map/Info and Microsoft word infrastructure software for data base management formulation
- Accessibility of map information within the settlement whereby each landholder determine his plot within the project area after map display in UDASEDA offices
- Recording of population/migration trends within the settlement to determine settlement growth trends potential for migration analysis, service demands and settlement planning needs and land development control

3.7 Organizational hurdles and unique parcel index numbers in implementing land regularization process at local level

Land regularization process accompanied with a lot of land dispute conflicts. In resolving these conflicts the community established a task force to deal with conflicts and other land disputes that emerged during the process. The task force comprised Subward leaders, ten cell-leaders, community champion/representatives, and experts from UCLAS who gave technical advice. Subward leader issued letters to be sent to parties in conflict and their ten cell leaders who also informed the neighbors. The letters were signed by the Subward leader to show that the committee has given mandate. Conflict resolution process involved invitation of parties to the conflict in a meeting where parties presented their position to the committee and through negotiations and involvement of friends and relatives of the disputants/parties in conflict; three conflicts were resolved out of the court. The major constraints reported by respondents include some landholders going against community agreements and sue local leaders in the court by preparation and implementing land regularization and therefore affects their property without following legal procedure. However, in this case local authority noted to be silent to facilitate the community in the court of law.

3.8 Major Constraints in Using GIS Infrastructure in Land Regularization Process in the Case

The study observed the following constraints:

- Poor training of local actors involving in land regularization including map interpretation, use of hatching in mapping
- Bureaucratic procedure in endorsing and approval of layout plans required by country policy and legislation

- No specific time put in place to show which time important for settlement being regularized. For example is it when the settlement is at infancy, intermediate or mature growth stage
- Lack of central data bank where plans approved by the Ministry can be stored and retrieval to meet different user interface
- Continuous land parceling of land without reflecting the plans approved. This has been a practice even in other informal settlement in the city where land use plans were prepared by local authority and approved by the ministry for lands. This seems to result from poor legislative enforcement
- High cost in terms of tools used such as computer software, hiring GPS during surveying which noted needs high community involvement in resource mobilization
- Difficult in privatizing planning practice functions to enable as well reducing cost to residents in terms of and use planning and agencies with capacity to implement plans
- Poor monitoring of Land regularization output by the locals authority after approval leading to continuing parcelling of land demarcated.
- Policy and Acts in Tanzania supporting land regularization aforesaid are silent on controlling land development in informal settlements through land regularization process. For example, there is no provision that shows what happens a settler who decides to go against or ignore community land development agreement (consensus) or norms i.e. say to for instance to keep three to four metres frontage open without building or permanent structure or questions the mandate of local community leader to manage land development in informal settlements.

3.9 Aspects of community involvement, which have been connected to the idea of social potential for the success of the case

Some of the factors led to successful integration of GIS infrastructure application in land regularization process in the case study were:

- Commitment of actors in land development matters including securing tenure
- Embracing mechanism for participatory decision making process including general assembly
- Existence of strong community organization and links with other local institutions
- Acquired formal educational background to local leaders
- Deployment of grassroots leaders- (ten cell) and social groups
- Economic ability to contribute
- Proximity to and availability of technical support
- High proportion of land owning settlers
- Formulation of community task force in land conflict resolution
- Existence of (locally enforced) norms to facilitate and safeguard community decision making input and outputs in land regularization

3.10 Strategy for effective use of GIS infrastructure in land regularization process

The study observes that the use of GIS tools for effective land regularization need;

- To identify training needs for GIS infrastructure to different stakeholder benefiting or affected in land regularization process
- Determining community affordability level observed important slogan to understand economic capacity of landholders and devise earlier warning means of sharing cost among affected
- Hire an office within the project area where regularization process takes place. This is important for data triangulation and making information accessible to different users. However computer tools will be placed in the area for the entire work and monitoring process.
- Involvement of different actors affected, benefiting as well with institutional mandate to implement the land regularization outputs
- Decentralizing the power of declaration and implementation of regularization process and implementation

4. CONCLUSION

The study concludes that unless land development and management activities ongoing in informal settlements are closely monitored and regulated as the settlement grow, it will be costly-socially and economically to retrofit if GIS application in coordinating, controlling and monitoring land is minimal among interested stakeholders taking decision in the process of land management.

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