Land tenure administration and GIS: trends and challenges

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Abstract

The paper describes the current state of the GIS market and some of the major trends in land tenure administration. While GIS has become a multi-billion dollar market, the majority of land interests around the world are yet to be recorded. The paper describes some of the major land challenges, and briefly critiques some of the responses to them by international agencies. One focus area has been land governance. A second has been developing tools to improve tenure security such as the continuum of land rights model, the land administration domain model and the social tenure domain model. The two domain models have been registered as ISO standards. The paper argues that while these initiatives may make a major contribution to improving tenure security and land administration, they should be examined critically to see if they fit the local situation before they are implemented in a strictly functionalist manner. There are a number of strategies that may bring about a desired result, and standardised tools and procedures are not always the best response to a particular problem in uncertain situations.

Keywords

GIS market, governance, land governance, land tenure security, continuum of land rights

Introduction

The eight Millenium Development Goals, to which all 193 UN member states have committed to achieving by 2015 [22], have arguably been one driver of the global attention in land tenure security and land administration reform projects in recent years. Land tenure security is important in achieving all eight goals, and critical to the goals relating to extreme poverty alleviation, education, gender equality, environmental sustainability and global partnerships for development. The paper overviews the GIS market and briefly critiques a sample of the initiatives to improve land tenure administration.

There are a number of agents and agencies involved in improving land administration. To name a few, agencies such as UN-Habitat, UN-FAO, USAID, DFID, SIDA and GIZ are actively involved in land tenure security and land administration projects. Excluding projects that are exclusively urban, since 1990 the World Bank has financed 67 stand-alone land tenure projects, including 56 projects with land titling and/or land administration reform activities. Currently the bank is involved in 22 tenure projects of which 19 involve land administration reform. A number of NGOs focus exclusively on land tenure issues, and large corporations such as Thomson-Reuters have recently entered the land administration reform market.

The paper briefly covers the state of the GIS market and two topical land tenure administration issues; (1) governance, and (2) a sample of the tools used to improve land tenure security and land administration. I briefly cover trends in the GIS and associated technology market, followed by a description of some of the challenges relating to land governance and land tenure administration, and then critique a sample of land tools, the Continuum of Land Rights, the Land Administration Domain Model (LADM), and the Social Tenure Domain Model (STDM).

The GIS market and trends in GIS

Recent advances in technology available for land and natural resource management are astounding. “Big data”, vast data sets of a size that were unimaginable recently, coupled with advances in computer analysis capability, developments in positioning technology, surveillance technology, smart phones and the way societies are adapting to them are forcing government land and mapping institutions to rethink their roles. Data mining and analysis means we can uncover patterns and relationships that we could not do easily before. For example, we can construct social networks and identify who in the network has an interest in a piece of land to make customary land administration authorities more accountable. We may be able to link this to DNA analysis in future. We can identify patterns in land transactions that suggest fraud is occurring and who is involved in it. (Unfortunately, fraudsters are also using technology in more sophisticated ways). A recent development is the use of high powered gaming software engines for scenario simulation in land use, environment and development planning research.

Nowadays, geospatial information is a significant industry that serves numerous market segments. GIS have matured as a tool and an industry, and the GIS software industry is now dominated by six global players. Market estimates vary significantly, depending on how the market is defined. For example, Global Industry Analysts [8] predict that the global GIS market will reach $10,5-billion by 2015. Arc Advisory Group [3], limiting their market to software related services, estimate global GIS software related sales and services will grow to US$2,5-billion by 2017.
The more significant growth is in complementary technologies such as smartphones. McKinsey [17] predict that the personal location data market will create value (not sales) of US$800-billion and that 70% of cell phones will have satellite positioning capability by 2020. We can expect both GNSS reliability and precision to continue to improve steeply over the short term as more than 100 positioning satellites will soon be available [16].

National mapping agencies may have to change their business models dramatically [25]. A question that they have to address is why we need them at all when Google Maps, Open Maps (an Open Cadastre perhaps?) and similar products can do the job. That said, there are limitations to what can realistically be expected of participatory mapping, and we are beginning to experience crowd sourcing fatigue [16]. Security considerations aside, there are products and services that should be the domain of government agencies, such as geoid models and geodetic control data. We also need to understand what motivates people to participate in these participatory mapping initiatives and the biases that are built into the resulting data sets. In a recent workshop at the World Bank, one high ranking European mapping agency official noted that his organisation had not succeeded in getting people to participate in mapping activities. Activism, he observed, is one of the crowd-sourcing drawcards: “They want to challenge government, not be part of it”.

The land tenure administration challenge

Notwithstanding, the advances in technology and the availability of geospatial information, the land challenge remains significant.

- Angel et al [1] predict that by 2030, the urban population in developing nations will increase to 4-billion. Very few cities have adequate plans for this growth that will result in adequate open space, functioning transportation systems and workable population densities.
- Currently, some 1,1-billion people live in slums worldwide [10]. For most, their tenure is insecure. Left unaddressed, social and political unrest likely.
- Since World War II, many large scale land titling and registration programmes have been implemented in developing countries on the basis that titles support land tenure security and stimulate economic activity as they facilitate access to credit. This theory received a major boost in de Soto’s [6] work, *The Mystery of Capital*. However, many titling projects have been ineffective [11, 18, 19]. What then are workable alternative strategic options?
- Some 30% of the land in the developing world is registered or on some form of official record [27]. In some African countries the figure is much lower; in Nigeria, for example, the figure is closer to 3% [4].
- There are 370-million indigenous peoples in 90 countries, and they occupy some of the most biologically diverse territory, which is under threat as traditional claims to it are often based on oral tradition rather than written records. They constitute 5% of the global population, 15% of the world’s poor and about one third of the 900-million classed as extremely poor [23]. Systems of law and records to improve tenure security for this group are poorly developed. We should be mindful that there are a number of different ways of achieving tenure security, especially when globalisation forces people to evolve along the lines of a neo-liberal modernisation paradigm. Pressuring people to conform to this is being branded the new colonialism. These societies are not relics of some by-gone age. They are continually evolving and their tenure systems and economic systems may take on a form that is very different from those of developed nations.
- Many conflicts between countries, within regions and within communities are articulated and mobilised around boundaries and access to natural resources such as minerals, timber, water and grazing. The root causes may have stronger links to political exclusion, social discrimination and economic marginalisation. However, land is a source of livelihood, identity, history and culture and so it can easily become a central object of conflict [26].
- Land is one sector where corruption is most widespread [22].
- Numerous institutions administer land in any particular jurisdiction. Getting them to cooperate and share information is an interesting challenge, a challenge which is best addressed through improving management and organisational development practice rather than grand organisational restructuring or introducing a new form of registration system.

There are tensions between strategies that seek to use land as an engine for economic growth and development and the human rights notions of justice and fairness where the vulnerable may have their land interests and livelihood extinguished under the guise of development and progress. People who are most vulnerable in broader communities are the poor, minorities, and those who are not in the inner elite circle in customary societies as land is sold or people are driven off land for commercial agriculture, mining, commercial development and residential development. Within households, women, the elderly, extended family members and children are at the greatest risk of being evicted or having the house sold underneath them in the event of divorce or separation. The law, and the tools that give procedural effect to real property law, i.e. registration and cadastral surveying, can be an instrument of justice and fairness in protecting these rights. The law can also be a force of injustice, causing people to have their land interests extinguished or causing people to be evicted from land that they may have occupied for generations.
Governance and land governance

Unsurprisingly, the notions of governance and land governance and transparency have assumed increasing prominence in development speak. The notion “governance” rather than “good government” has only been around recently. One outcome of the Washington Consensus on development was that good governance should make markets work better and drive institutional reform [20].

An economic reason for the interest in governance in developing nations has been the spectacular growth in investment in developing countries, and the risks to investors of their assets in those countries [2]. Of interest to us are the World Governance Indicators (WGI), the Land Governance Assessment Framework and the Voluntary Guidelines on Land Governance.

World Bank Worldwide Governance Indicators (WGI)

The WGI, first formulated in 1996, capture six indicators that are aggregated from some 300 sub-indicators and variables. The most recent incarnation comprises: i) Voice and accountability, ii) Political stability and lack of violence, iii) Government effectiveness, iv) Regulatory quality, v) Rule of law, and vi) Control of corruption. The people who developed the indicators submit that there is a strong empirical support for a causal relationship between better governance and better development outcomes [13]. The metrics are based on measures of perceptions of governance quality in different countries. These include polls of experts, country ratings by risk rating agencies, and cross-country surveys of residents by international organisations and NGOs [13].

As is to be expected with such a global initiative, which can influence investment decisions relating to particular countries and the demands that donors place on development programmes, the indicators, the manner in which the indicators may be applied and the methodology to develop them have been meticulously scrutinised.

A number of observers are harshly critical of the indicators. The validity of the indicators themselves, the measures used to develop the scores pertaining to them, how they are measured, how they are interpreted, and how they are applied are questioned. In particular, a number of critics argue that measuring perceptions of governance is inaccurate. Moreover, the system is too sensitive to make useful development decisions. Apparently changes in the indicators and metrics used to measure them have resulted in large swings in the results. Moreover, in the early days of the initiative, the indicators were used to drive a neo-liberal development ideology that lean government leads to better government and the notion that traditional governance institutions (i.e. customary leadership) in developing nations are inferior to modern forms. Good governance and lean government, the theory goes, drive economic development [20].

Empirical evidence, however, indicates that improved governance may be consequent to economic development rather than antecedent to it. Recent examples are China, Vietnam and Cambodia. Many developed countries did not develop good governance or their economies in terms of such a simplistic model either. Development may be better served by strategies that strive for economic development in spite of weak government [20]. It is also notable that some developed economies with lean government have poorly developed land administration systems.

It is obvious that improved governance should lead to improved human rights and a more stable base for economic activity. It is naïve, however, to promote governance as a driver of economic development in the same way that land titling programmes were advocated based on overly simplistic economic theory. Nowadays, development agencies tend to be more pragmatic in their approach.

Land Governance Assessment Framework (LGAF)

The LGAF is a diagnostic tool to assist in designing land policy reform and the sequencing of interventions at the local level. It is a World Bank initiative, developed with contributions and critique from people in numerous international agencies. Similar in structure to the WGI, it comprises five thematic areas at the top of the hierarchy. These include, (i) Legal and institutional framework, (ii) Land use planning, management, and taxation, (iii) Management of public land, (iv) Public provision of land information, and (v) Dispute resolution and conflict management. Two additional modules on large scale land acquisitions and forestry are being developed [5].

A total of 21 indicators have been allocated to these five thematic areas. Each indicator has between two and six dimensions, and there are a total of 80 dimensions to an evaluation. The dimension is measured by a definitive statement such as “2.ii. Most individual properties in rural areas are formally registered”. Panels of experts discuss the statement and agree on a score for each dimension on a four point scale. The scores are then aggregated as an estimate for the indicator, and in turn may provide direction for policy intervention in the thematic area [5].

The methodology creates a distinction between rule based and outcome based indicators. Rule based indicators examine if the critical institutions are in place. Outcome based indicators measure citizens’ and/or experts perceptions of the
implementation of the rules. They argue that it is good practice to measure both of these. They also argue for (a) standardisation to allow comparison between countries, (b) the use of quantitative measures to eliminate subjectivity, (c) comprehensive coverage of relevant issues that should lead to policy prescriptions that are actionable, and (d) cost effectiveness in creating a useable product [5].

The LGAF may be a powerful tool in improving land governance. It has been developed with inputs and critique from some of the best minds in the land sector worldwide. It was piloted in five countries, and then applied in a number of others. South Africa has been strongly active as one of the first countries to participate.

The same criticisms about measurement and methodology that have been levelled at the WGI arguably also apply to LGAF. It is also not clear why cross country land governance analysis is useful or meaningful. From my observations as an external assessor, putting together panels of experts and getting people to participate can be very difficult. Moreover, getting a representative sample of people representing the spectrum of development philosophies is difficult, and so there is the danger that results are likely to be biased by the development philosophy of the people who dominate the land sector in a jurisdiction. How these biases are incorporated into cross country or cross case analysis is not clear. One challenge is to get government representation. If the government avoids participation, which most officials would be wont to do given they are participating in self-criticism, it can then reject the scores and avoid action based on the assessment.

Lastly, what is missing is a measurement of media independence, quality of reporting, and level of reportage on local land issues. Media quality is a critical part of governance.

The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security

The voluntary guidelines are a UN-Food and Agricultural Organization (UN-FAO) initiative. The primary goals are to promote food security, and the interconnected systems of sustainable livelihoods, social stability, housing security, rural development, environmental protection, and sustainable social and economic development. While the guidelines have broad application, they have a strong human rights emphasis, i.e. justice and fairness, and they emphasise the interests of the vulnerable and marginalised [24]. In contrast to LGAF which evaluates governance, the guidelines provide strategies to improve governance.

The main principles are that states should recognise, respect and safeguard legitimate tenure rights and promote and facilitate the enjoyment of these rights. It should provide access to justice, and strive to prevent tenure disputes, violent conflicts and opportunities for corruption. Non-state actors (including business enterprises) have a responsibility to respect human rights and legitimate tenure rights [24].

The guidelines have been work-shopped through consultation and negotiation in various forums around the world since 2009, and have been accepted and/or endorsed by a number of international agencies [24]. They are not enforceable law in that states are encouraged to develop strategies to address the objectives implicit in the principles above. The opening chapters read like a land tenure constitution, but countries can only be persuaded to follow them through international pressure and possibly through conditions linked to international finance for development projects.

The guidelines do complement the LGAF and the activities of a number of advocacy, activist and watchdog initiatives on land governance. These include the International Land Commission, representing 116 organisations in 50 countries which promotes secure and equitable access and control over land. It has developed the Land Portal to share land information. Other players are the focus on Land in Africa (FOLA), Oxfam which focuses on poverty alleviation, the Huairou commission which focuses on women’s interests, and the Land Matrix. The Land Matrix is a watchdog initiative that promotes transparency in major land acquisitions and monitors large scale land acquisitions by foreign organisations. It is of particular importance in Africa where much of the land is still under customary administration, and large scale mining and agricultural developments frequently involve questionable administrative practices and often extinguish the rights of people outside the customary leadership power clique.

Land tools

Continuum of land rights

The continuum model portrayed in Fig. 1 was developed by UN-Habitat and is now widely accepted by many land agencies, including the International Federation of Surveyors (FIG). Rather than a binary concept of land being titled or untitled, a range of different forms may be recognised and documented, and landholders should be able to move from one tenure form to another. The model serves as a template to coordinate what may be multilayered, perhaps disconnected sets of legislation [9]. It may also be seen as an evolving bundle of rights model, where landholders may acquire more “sticks in the bundle” over time.
The strong South African influence in the model, dating back to the land surveying profession’s exploration of different options for surveying and registration prior to 1994, is evident as it models peri-urban cases and housing delivery very well [7]. City officials issue licences and permits, often on an ad hoc basis, due to pressure on the land and to ensure fairness in the housing delivery process (e.g. to mitigate attempts at queue jumping). In parts of South Africa, cities are expanding onto customary land and people are moving into cities from former customary areas and so the customary systems transform rapidly, and the tenure system may evolve from customary to ownership.

There are a number of criticisms of the model. Firstly, as with any theoretical model, the contexts and conditions under which it applies should be specified. It does not apply to all situations, at least not in the form presented in Fig. 1. It should be adapted to local circumstances and in some cases perhaps rejected outright. Secondly, it is strongly state administration oriented and the notion of informal tenure being one that is not recorded in the state system is problematic. Many tenure forms are not state administered, but transactions in land still involve what the people involved in them would consider formal processes. Parts of the USA where private conveyancing endures serve as an example in a highly developed property market. In developing countries, accessing land in an informal settlement, for example, tends to include a number of formal processes involving the local political hierarchy. Thirdly, in many situations around the world, such as some Pacific islands and parts of West Africa, the customary system is at the top of the tenure hierarchy and state administration ties in with them. Lastly, the model may be interpreted to imply that customary systems may, or perhaps should, evolve into individual freehold. The directional arrow from the informal pole to the formal may be interpreted to imply that people should modernise and adopt cultural norms and tenure forms that fit in with the dominant global society.

Land Administration Domain Model (LADM)

The LADM is an FIG initiative, driven in the main by a group of academics and land professionals in the Netherlands. It was published as an ISO standard in late 2012 [12]. Its primary purpose is to enable land administration information from different sources to be combined coherently. It attempts to create semantic consistency (as far as this is possible) and serves as a reference model for information related components of land administration. The model comprises five packages: parties (people and juristic persons); the set of legal rights, responsibilities and restrictions; spatial units (e.g. parcels, 3D, point and linear features); spatial sources (e.g. surveying) and spatial representation (geometry and topology) [12, 15].

The LADM has had far reaching impacts in that a number of countries have applied it to their land administration designs. It underpins the Open Source Cadastre and Registration Software (SOLA), a freeware land registration package developed by the UN-FAO which is targeted to provide low cost computerised registration.

The advantages of a standard model and standardised semantics are numerous. If adopted, the model can underpin spatial data infrastructures as data can be shared more freely across organisations if they are in a standardised format.

They can also diminish data protectionism within and between organisations as standards force managers to create and store information in shareable format. However, the notion of being able to create standard terms across jurisdictions for land administration is perhaps utopian, as both the creators of the system [15] and South Africans who have attempted apply the model have discovered [21]. A further issue I have noted is a tendency to apply the model in a strictly functionalist manner. I see a number of grant proposals to apply the LADM to a particular situation without examining the strategic context of the situation. ISO standards such as the LADM are tools which may or may not contribute to achieving some desired state in the future. They are merely one of a number of strategic options that should be considered.

Fig. 1: Continuum of land rights.
The Social Tenure Domain Model (STDM)

The Social Tenure Domain Model (STDM) is a software model under development by UN-Habitat in Nairobi with input from a number of partners, including FIG, GLTN and the University of Twente.

The STDM is a specialisation of the Land Administration Domain Model (LADM), and it too is an ISO standard. It retains the LADM core classes person/party and spatial unit, and recasts the rights, restrictions and responsibilities relationship as social tenure. Lemmen et al [14] argue that it is possible to merge formal and informal tenure systems in STDM by introducing lookup tables and keywords to represent different kinds of social tenure relations such as ownership, apartment rights, possessory rights, Waqf (Islamic law), occupation interest, and other similar rights and interests. Thus it ties in with the continuum model.

The simple form of the STDM design is a major strongpoint, as simplicity should lead to a system that is easy to use. In workshops I have attended people involved in land tenure administration projects have indicated that having standards has proved to be very useful. One way of looking at the STDM is it is similar in concept to a rudimentary deeds system, a library of documents that are not checked by a third party (e.g. the registrar of deeds) for accuracy or consistency, where indexing is done by both people and parcels or spatial units. A major advantage of deeds systems is their flexibility. Deeds can be created that handle a number of complex issues, which many Torrens type title systems are not capable of.

My main criticism is that setting the STDM as an ISO standard is premature. It is a prescription, but it is yet to be supported empirically. As with any information system, it carries the same risk of not being used after the first records are created, in similar fashion to land registration systems that fall into disuse. Similar to the LADM, there is a risk of a functionalist rather than strategic approach being adopted to land problems. Being an ISO standard, the STDM may be specified in project documents without checking if it is suited to the problem context. As noted above, we should always allow for the possibility that a tenure form may emerge in a particular situation that is completely different to what we have now.

A further question is why two UN agencies are developing land tenure information software. Even though they have different target markets, SOLA targets registration and the STDM situations where registration is ill suited to the local situation, if they are both working off the same standard, then it should be possible to incorporate all the required functionality into one system.

Concluding remarks

To conclude, GIS is now a major industry, and spatial information is acknowledged as a major value item. Technology developments now mean that the tools and skills to collect a significant amount of spatial data, or to collect data to check existing data, are available to the general public. Consequently, the traditional roles of professional surveyors, national mapping agencies and similar institutions are being challenged more and more. That said, there is a long history of training people who have a basic education to do field surveying using step by step instructions. However, the professional and institutional components of spatial information and the purposes that they serve incorporate far more than the taking of observations. In spite of the vast amounts of spatial data available and the comprehensive coverage of the earth by high resolution imagery, the majority of land tenure relationships are not recorded, and land tenure administration remains a significant human rights and economic development issue. The challenge is to model and record these relationships in a manner that best suits the needs of people on the ground.
Underlining that information is only a small component of the land tenure administration problem, one recent trend is an increasing emphasis on governance at the general level and on land specifically in recent years. Hopefully the criticism aimed at these initiatives should improve the different tools and guidelines that are being developed, rather than being seen as negative. Improving governance is certainly not bad for development, but evaluative frameworks and tools should be applied meaningfully and be cognisant of local, micro-level conditions!

Another trend has been the development of tools to improve land tenure security. These include examining tenure systems on a continuum as opposed to a binary classification of land is (1) registered or (2) not registered. There has also been a move to develop standards for land administration data modelling and data sharing. While these may make a significant contribution, they too should be examined critically to check if they suit the local circumstances. Grand theories have had little success in developing tenure security, and problem situations should be examined at the local level before any solution is adopted for a particular problem. For many land tenure security cases, the notion of a nautical chart, where many of the factors are uncontrollable and there are many possible alternatives to achieving the end result is a far better metaphor than a road map.

References


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