

Establishment of a Computerised Cadastral Records System for Trinidad and Tobago West Indies

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ABSTRACT

The cadastral records in Trinidad and Tobago consist of index maps and section sheets held on various media, at several scales, in different projection systems and at different sites. Several sets of cadastral records exist that are separately maintained and updated. The result is that there is no single reliable source of current survey information relating to property boundaries. The situation is exacerbated by a legal framework that supports a dual system for recording property transactions comprising of registration of Deeds under the Common Law, and Registration of Title under the Real Property Ordinance.

The Government of the Republic of Trinidad and Tobago, under an Inter American Development Bank (IDB) funded loan, initiated the development of a computerised cadastral records system in January 1996 with the purpose of reorganising and computerising the indexing of the cadastral and land records managed by the Lands and Surveys Division, Ministry of Housing and Settlements.

Upon completion of the project, the New Records Management Strategy (NRMS) is expected to make more efficient the workflow of land related activities within the Lands and Surveys Division and provide a computerised indexing system that would support searches and queries of the cadastral records. However, the project is very much delayed and is currently incomplete.

This paper details the historical development of the cadastral system in Trinidad and Tobago, the genesis of the cadastral records management project and the current status of the project. A conclusion is drawn as to the institutional, political and societal reasons for the current inability to achieve a favourable outcome to the project.

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1. INTRODUCTION

The Republic of Trinidad and Tobago consists of 5100 sq kms of land and has a population of approximately 1.3 million. It also has control of an economic exclusion zone of more than 70,000 sq kms of sea. The country has rich oil and natural gas reserves, forest and a potentially rich agriculture sector. However, the problems of uncontrolled development, squatting, the destruction of the forests, quarrying, and the underdevelopment of the land resources are evident.

The institutions responsible for these vast resources are unable to perform their land management functions efficiently because of the lack of availability, currency and comprehensiveness of land data (Opadeyi 1995).

2. BACKGROUND

Trinidad land and cadastral records have a history going back to 1783 starting from the time of Christopher Columbus's landing in 1498, taking possession of the island in the name of the King of Spain. The island then became a colony of Spain from 1498 until 1797 when the British came into possession. Trinidad and Tobago became an independent country on August 31, 1962.

Under Spanish rule, Spain introduced criminal, civil laws including property laws in the colony (Wylie 1986). A complex system was developed (legislature, Courts of Law, etc) to formulate procedures, regulations and enforcement to uphold claims to title and rights to and means of identifying parcels of land. Under the European systems of land tenure, individuals could own land and ownership must have an origin. All land originated from the sovereign and the sequence of title transfers from the sovereign to the present was the claim to title of ownership. This concept, however, was alien to the local Amerindian - in fact their land tenure was a communal form of tenure.

In 1783 Spain introduced the "Libro Becerro de Poblacion" (the register of Population) the official registry book, for the recording of Crown Grants and simple social data of the grantee, in response to the Colony's incentives to attract foreign immigrants. One of the incentives was the grant of 30 acres of lands for every white male settler plus an additional half of the original amount for each slave he brought to the colony (Besson and Brereton 1985).

The population drive, officially called the "The Royal Cedula of Population" created an influx of people from the other Caribbean islands and Europe and therefore, forced the

Colonial Governor to introduce land management systems for the distribution of Crown Lands. The governor in 1787 created the following:

- Three administrative districts headed by a Commissioner of Population;
- The first set of rules for cadastral surveying.

The Commissioners were responsible for the survey of each plantation that was granted in their district, verifying all litigation past and present and ensuring that land was not to be alienated without their consent. These three administrative districts were further divided into twenty-eight (28) quarters under commandants who were assistants to the Commissioner. These quarters would eventually be renamed Wards and would play an important part in the administration of land (Brereton 1985).

In establishing the boundaries for Crown Grants, much title depended on vague description or rough sketches as recorded in the “Libro Becerro de Poblacion” the official real property register. Retracement surveys were also made difficult as the regulations and procedures in the demarcation of property boundaries did not require any form of survey controls or regulations for the compulsory linkage of neighbouring surveys. This led to confusion and the problem of relocation of boundaries without any form of certainty, as boundary lines became overgrown with dense vegetation in a very short time.

British influence started from the time of conquest in 1797 and did recognise existing valid land titles granted by the Spanish. After 73 years of conquest, Britain improved the land surveying rules and regulations.

In spite of these survey regulations, cadastral surveys were carried out without the country having a national network to control the cadastral work. This caused many errors to be introduced into cadastral records. A national trigonometrical control survey was therefore absolutely necessary to establish a proper framework in order to produce proper cadastral surveys and to build accurate cadastral maps. The Director of Public Works, Mr. W. Wrightson, then put recommendations forward in 1900 and the first trigonometrical survey of Trinidad was started in 1901. This project dragged on for many years until the 1970's.

3. THE CADASTRAL SYSTEM

The cadastral system in Trinidad and Tobago is comprised of the tenure records and the cadastral survey records. The historical development and current status of each is described here.

3.1 Tenure Records

The impact of English law saw the introduction of private conveyance and then deed registration. The English practice and tradition influenced the local practice of indexing record information to the name of the owner rather than to the identifier of the land. The deeds were bound and the bound book labelled.

Deed description was often casual and it was not necessary by law that the deed be accompanied by a cadastral survey. Location of property on the ground was difficult to ascertain and therefore not able to be entered on Index Maps known as Ward Sheets. There was virtually no assurance of the fixed position of boundaries.

In August 1889 the British introduced a type of Torren's system called the Real Property Ordinance (RPO). The RPO provided that from its date of inception all lands granted from the Crown must come under its provisions and be treated as registered land in which the Crown guaranteed title. In addition, a licensed Land Surveyor had to survey all lands under the RPO.

3.1.1 Land Settlement by African Ex-Slaves

The social matrix of Trinidad was changed with the introduction of African slaves who were brought into the island as a source of labour for the sugar plantations. After the emancipation in 1840, a new dimension of land tenure was developed. Land tenure had evolved to attract ex-slave labour. Estate owners developed a system called "tenancy at will" whereby the labour resident on the estate was obliged to work for that estate and no other on pain of immediate eviction from the cottage and ground that were conditionally rent free. This type of tenure had no formal contract, but a mere understanding that the rent-free resident was dependent on at least a few days labour per week (Brereton 1985).

Acquisition of Crown Land was made inaccessible to ex-slaves by legal means in order to keep ex-slaves on the plantations. The ex-slaves rebelled against these restrictions and since there was an abundance of open Crown land they used their freedom of choice to squat on such lands and also on abandoned sugar estates (Blouet 1971).

Squatting was a solution for those who wanted to be free from being hired labour and this was the start of a new type of land tenure. This was really a reflection of the African culture, who like the Amerindians, tended to see land almost as an extension of their social systems where one had rights to use land in accordance with their kinship. The Europeans on the other hand believed that the land must belong to someone and that it was proper to express this ownership in legal and contractual terms.

3.1.2 Land Settlement by East Indian Indentured Labour

Indentured labour was imported from India to support the agriculture-based economy after all other incentives failed to attract the ex-African slaves back to the estates. At the termination of their contracts, many east Indians received ten acres of Crown Land in commutation of all claims to free return passage to India. The Indians were settled in planned and surveyed villages.

4. CADASTRAL SURVEY RECORDS

The development of the cadastral map has its genesis during the latter part of Spanish rule and improved under the British with the plotting of individual surveys on a base map. This

was done without survey controls and was a source of confusion as Crown Grants under Spanish and British rules became numerous.

Up until 1904 the only cadastral maps showing location of individual parcels that were available were unwieldy cadastral sheets of various sizes that were developed under Spanish and British occupations. Under British occupation the cadastral maps were plotted at a scale of twelve (12) chains to one (1) inch (1: 9504). Each of these sheets was designed to cover a division of the colony called a Ward (which was created under “The Royal Cedula of Population”) hence the new name Ward Sheets. They were constructed by the continuous plotting of new boundary surveys on to former boundary surveys, without any form of control. The maps so produced were of questionable quality and accuracy, because each bad survey would have a chain reaction on the position location of other property surveys that followed. The building of such index maps created overlaps and gaps as each uncontrolled survey was plotted on the Ward Map. It was therefore up to the draughtsman to use his skills to give an appearance of order in the finished map.

The deficiencies of the cadastral maps were recognised by the colonial government and in 1923 the government saw the need for proper cadastral maps and that the colony should proceed in developing a new cadastral map based on a rectangular co-ordinate system with reference to a central meridian. It was decided that the Cassini Projection should be used for developing the new cadastral maps with a suitable sheet system based on a grid for the whole colony.

In 1970, Trinidad and Tobago was serviced by 140 Ward Sheets at the scale of 1:9504 and seventeen (17) Section Sheets at the scales of 1:1250 and 1:2500 on the Cassini Projection. A comprehensive mapping programme including new aerial photography gradually replaced the old ward sheets with the new map series based on the Universal Traverse Mercator Projection (UTM). The UTM map series, 191 in all, are on the scale of 1:10,000, and for the densely populated and developed areas 1:1250 and 1:2500.

5 THE CADASTRAL REFORM

5.1 Project Genesis

In the early 1990’s, after more than 20 years without complete revision, the topographic mapping was proving inadequate for supporting the cadastral database. Intensive development went unrecorded in both the topographic data and the cadastral data. The cadastral survey records were bound and stored in chronological order without geographic indexing, making search and retrieval very time consuming and tedious. The cadastral records consisted of ward index maps and section sheets held on various media, at several scales, in different projection systems and at different sites. Several sets of cadastral records existed which were separately maintained and updated. Many of the older copies were very badly damaged by repeated handling and inadequate storage mechanisms. There existed a variety of records, including an estimated 600,000 survey plans, many of which were held by the Land Registry and were not incorporated into the ward index maps. The result was that there was no reliable single source of up to date survey information relating to property boundaries.

The situation was compounded by a legal framework that supported a dual system of recording property transactions; registration of Deeds under the Old Law, and registration of Title under the Real Property Ordinance (Opadeyi and McLaughlin 1996).

In this context, the Government of Trinidad and Tobago, approached the Inter American Development Bank (IDB) for assistance to reform its land tenure system. The IDB supported an Investment Sector Reform Programme that aimed at the rationalisation of the land tenure system and included elements of legal reform and institutional reform. As part of the institutional reform, the strategic institutions of the Lands and Surveys Division and the Registrar General's Department were proposed to be strengthened.

As a precursor to the development of a National Land Information System, the Government together with the IDB financed a six-month project in Land Records Management, which was aimed at reorganising and indexing the existing land records managed by the Lands and Surveys Division. Kadaster of the Netherlands carried out the project, during the period 1 January 1996 to 15 June 1996.

5.2 Project Structure

The project was required to:

- Analyse the underlying problems of the existing systems for the management of cadastral records, and the cataloguing, storage and management of survey records;
- Design new systems that would facilitate computerisation incorporating a unique parcel referencing number system that would enable the records to be filed and searched by geographic location and provide for archiving duplicate copies of all records.

The project was also required to initiate the introduction of the new system through a pre-implementation project, develop specifications for the hardware/software procurement, assist with tenders and evaluations, and also develop training and standard operations manuals (Baldwin and Reyes 1996^a).

To meet the objectives of the Land Records Management Project, the activities that are carried out by Lands and Surveys Division in support of their cadastral functions were identified. These activities included the following:

- Management, storage, retrieval and updating of the cadastral records.
- Processing of applications concerned with changes to the land records.

In implementing the Land Records Management Project, a four step strategic plan was developed. The plan involved the following:

The project required that all survey information, including those held by the Land Registry of the office of the Registrar General, be indexed and referenced, and also developed a mechanism to establish the Lands and Surveys Division's access to the records held by the Registrar General.

From the analysis of the operation of the Lands and Surveys Division and the Land Registry Department of the office of the Registrar General, a New Records Management System based upon the usage of a geographic location (**UPRN**) was developed. A new indexing system based upon a Survey Plan Identifier (**SPID**) and Survey Plan Index Record (**SPIR**) for physical storage and computer based retrieval and the processing of applications was also developed. These systems were expected to greatly improve the efficiency of the workflow of the Division (Baldwin and Reyes 1996^d).

The computerised index that was developed from the project allowed query, search and retrieval of survey information based on a number of primary keys, including UPRN, location, name, Book/Folio reference, ward and settlement, date and where relevant, Deed number or other reference. The index supported subdivision and included parent/child parcel references. This would allow for the computerised generation of title chains, made possible where the parent / child survey plans were known. This is a direct benefit to the Land Registry. Strategies were also developed to overcome the problems of lack of geographic location information, historic parcels and assignment of new UPRN.

A Technical Support Group (TSG) was created from the Land Records Management Project, to give support for further development of the project and affiliates, and also to prepare for the other stages of the Land Records Management Project the computerisation of the spatial data and its formation of the base layer of the proposed national Land Information System (Baldwin and Reyes 1996^c). This should have provided for institutional acceptance of and participation in the maintenance of the system and for capacity building of institutional personnel.

The TSG was charged with defining the content of the large-scale topographic maps and cadastral layers, specifying the detailed transfer format, recommending appropriate cost effective digitising procedures and reviewing the technology options for the establishment of a digital spatial data resource for use by other agencies and ministries.

6. PROJECT IMPLEMENTATION

A simple prototype relational DBMS was developed using PARADOX 7 DBMS using a set of tables and data entry forms. It was a prototype developed in order to design an appropriate database model, test the model, and provide simple routines for the entry of data, editing of data, generation of reports and response to queries. It was not intended to be a turnkey system with workflow management functionality and controlled access embedded in the application.

The system has no theoretical limit in terms of the number of entries. Paradox 7 was selected as the DBMS on the basis of ease of development capability, performance with large data sets, ability to provide an upgrade path (compatible with other industry standard DBMS) to a multi-user environment. In developing the prototype, a conscious attempt was made to keep the development as open and flexible as possible, e.g. use of dictionaries for data entry that are themselves DBMS tables (and hence easily changeable).

The system is open, in that the Paradox Shell is used to manage the application, which consists of a number of defined tables and forms. The TSG has complete freedom to modify

the data structure, generate subsets (e.g. Public Access Index Register - PAIR - which links Land Registry and Lands and Surveys, listings), and introduce appropriate reporting.

The development phase allowed for Data Loading of the NRMS and an opportunity for testing of the prototype system, prior to the move to the multi-user DBMS.

Data Loading was carried out through the data capture form. This form loads the master table and establishes the link between the Survey Order File, the Real Property Ordinance references, survey plans to bring lands under the RPO, and the oldlaw file. The key-link between these files is the SPID number, which forms a unique key.

Essentially the system fulfils two functions:

- 1) Management and organisation of the SPIR data which describes the individual lot contained on a survey plan; the various identifiers used by Lands and Surveys and the Land Registry; the parent, child and neighbour references, and the location data (including UPRN).
- 2) Creating a computerised index to the NRMS working archive, which is organised according to SPID. The system is designed to respond to queries concerning individual lots, and will report all lots that are known matching to a search criterion. In this manner, a survey plan can be located, given only the information that it was carried out by Surveyor "A" in year "B" in county "C" and ward "D".

During the short term, the principal application will be the data loading and management of the SPIR data. It is only when a significant proportion of the records have been loaded that the advantages of the computer based indexing system will become apparent, as the system becomes able to supply information in response to particular enquiries.

7. CURRENT STATUS

The LRMP was developed to put in place a system that would efficiently manage the existing Cadastral and Survey records held by the Lands and Surveys Division inkeeping with the Division's medium term requirement for digital technology and objective for the development of a National Land Information System. The project expectation was that the quality of the records storage would be improved; the UPRN would be introduced and promoted nationally by the publication of the Public Access Index Register (PAIR) which links Land Registry and Lands and Surveys; all survey plans would be accessible within the New Records Management System and computer based indexing and search and retrieval would be supported. Three years ago the Division moved from PARADOX to ORACLE 8 RDBMS for the management of the cadastral and State land records. To date, there are approximately only about 15,000 entries of the cadastral records entered in PARADOX. This entry was ceased in order to move over to ORACLE 8. There are approximately about 600,000 records and 30,000 State land records managed by the Lands and Surveys Division.

8. CONCLUSION

The reasons for the inability of the project to attain its stated objectives run parallel to the experiences in many developing countries (Mhlanga and Greenway 1999). These reasons include:

- The potentially lengthy duration of the project made for technology overrun and a waning of interest on the part of the institution and the political directorate.
- A lack of a political authority to champion the cause.
- Poor recruitment, training, remuneration and promotion policies within the institution leading to lack of retention of staff and consequent loss of institutional memory, and to low staff motivation.
- Lack of continuous monitoring and evaluation process built into the project to keep the project on track.

9. SUMMARY

The history of Trinidad and Tobago has resulted in a disorganised system of recording land tenure and cadastral survey data. A government initiated and IDB funded land records management project implemented in 1996 has failed to significantly organise the land information data into a structured system. Reasons for this project failure include technology overrun and the waning of interest in the outcome.

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BIOGRAPHICAL NOTES

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