

Formalizing Land Administration through E-Governance Mechanism in Sri Lanka

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How to cite this paper: Rupasinghe, K.A.B.S. (2021) Formalizing Land Administration through E-Governance Mechanism in Sri Lanka. *Intelligent Information Management*, 13, 214-231.

<https://doi.org/10.4236/iim.2021.134012>

Received: June 15, 2021

Accepted: July 27, 2021

Published: July 30, 2021

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Abstract

This paper proposes a comprehensive and practical approach to implement a land administration act in Sri Lanka followed by setting up a Land Administration Commission (LAC), which is a separate entity to maintain a Land Administration Database Management System in support of the land information collected and maintained by stakeholders who deal with matters related to land and its decision-making under e-governance concept. Also, It describes the operations of the four core functions: land tenure, land valuation, land use, and land development in land administration under a single sustainable national land policy, underpinned by spatial information under the e-Governance mechanism. Further, the paper identifies the stakeholders and their main responsibilities in each of the four core functions with the current issues in sharing information across stakeholders. Finally, the paper describes setting up a Land administration entity thereby empowering the LAC and introduces spatial information layers at different resolution levels in a centralized land administration spatial database to keep track of all land transactions carried out by each stakeholder. This approach will enable the top-level decision-making authority (the central level) to manage all land-related activities under one platform to contribute towards the sustainable land development of the country. It is proposed to implement this approach as a pilot activity in the district of Colombo and expand it in the entire country gradually with its output.

Keywords

E-Governance, Land Administration, Cadastre, Land Information System, Parcel Fabric, Federated Database, Spatial Data, Data Interoperability, Digital Terrain Model, Base Imagery

1. Introduction

The challenges of modern land administration systems are presented in the roles

of land administration in formalizing land markets, implementing and understanding regulations and restrictions, and changing the nature of ownership. Land administration is very much essential to help secure property rights, in particular, efficient land markets and effective land use management. The universal idea of establishing Land Administration Systems (LAS) is to determine the infrastructures for the implementation of land policies and land management strategies in support of sustainable development [1]. And no sustainable or equitable development will happen without the proper land governance to support it. Arguably, sound land governance is the key to achieving sustainable development, yet it is driven by inefficiency in most of the countries, and a good land administration system must, therefore, be developed to be transparent, efficient, and be a strong, reliable basis for supporting sustainable economic development. The operations of the four core functions: land tenure, land valuation, land use, and land development are the key in land administration and should be driven by a single sustainable land policy, underpinned by spatial information. Land administration informs the “how”, the “what”, the “who”, the “when” and the “where” of the four core functions [2].

The new land management paradigm allows for the practical implementation of sustainable land policies: better land tenure and valuation systems should continue to generate economic wealth through land transfer and taxation; better tenure systems should strengthen social cohesion through the provision of tenure security; finally, integrated land use and land development systems should limit environmental degradation of land for the benefit of the wider community. An effective Land administration system, therefore, needs to be the foundation for both land governance and management in an effective, transparent and unified way.

E-government is considered to be the application and utilization of technologies such as the Internet, wide area networks, and mobile computing to improve the processes of governance, functions and the basic public services [3]. Several authors have discussed the application of e-governance for land administration [3] [4] [5] [6] [7]. However, the importance of having a proper institutional arrangement and a legal framework to manage and coordinate land information access, and services handled by different authorities under e-government initiatives have been not addressed at length in the literature. As discussed in [8], the Cadaster (Parcel-based Land Information System) should be the core technical engine, which has the capacity to control and manage land through the core four functions discussed above with spatial integrity and unique identification of every land parcel. Much attention has not so far been paid to incorporate Cadastre as a base layer in e-land administration systems. Facilitating an e-governance platform would allow the operations of the four above-mentioned core functions to interact with each other to realize a spatially enabled land management paradigm. It would safeguard the availability and access to land information and services, enabling land transactions between parties and participation of stakehold-

ers in public decisions, and supporting electronic legal and economic transactions and participation [9].

2. Background

The total land area of Sri Lanka is 65,610 square kilometres and 82 percent is state lands while balance being private land. The Thirteenth Amendment to the Constitution introduced in 1987 to devolve certain powers of the government to the Provincial Councils (PCs) within the framework of Sri Lanka's unitary Constitution has special provisions regarding a national policy formulation on the use of State land [10]. The State gained ownership of large amounts of lands by virtue of enactments such as the State Lands Encroachments Ordinance No. 12 of 1840 and the Land Settlement Ordinance No. 20 of 1931. Furthermore, the Land Reform Law No. 1 of 1972 made a ceiling on the extent of agricultural lands that were privately owned and vested all excess lands with the Land Reform Commission. Land administration and management in Sri Lanka is governed by more than 39 statutory laws [11].

The responsibility of policy formulation for state land is given to the National Land Commission (NLC) by the Constitution. However, there has been no provision for the NLC to deal with private lands. Powers over the policy making on state land is vested in the centre even though certain powers have been devolved to the PCs (local level), thereby the PCs are expected to work within policy when making Statutes [10].

Failure to appoint the NLC so far, has failed to develop a comprehensive national policy on land as envisaged by the Thirteenth Amendment in the country. At present, the main agencies purporting to engage in land governance on land are the Ministry of Lands and Land Development, the Land Commissioner General's Department and the Presidential Secretariat. As such, many Ministerial Circulars are published formulating land policies. This has created a situation where Provincial administration to obtain instructions from the Land Ministry and Land Use Policy Planning Department under the Ministry identified as the central level.

Presently, land tenure activities (handling of property rights-land registration and cadastre) of the country are handled by four main government stakeholders; Survey Department, Department of Land Settlement, Land Commissioner General's Department, and Registrar General's Department. Land registration provides an official recording of property rights and Cadastre is a systematic inventory comprising of property information, sometimes with its graphical representation based on a parcel boundary survey [12]. The main responsibility of the survey department is to survey state/private lands and prepare statutory plans for various land grants. The main task of the Department of Land Settlement (LSD) is to decide the ownership of land whether it is state or private with the investigation of documents called adjudication. Issuing grants under long-term permits, temporary deeds for temples and, release, lease, and transfer of state

lands necessary for government departments, statutory boards, and Local government authorities are the main functions of the Land Commissioner General's Department. Finally, the primary focus of the Registrar General's Department is to register documents such as deeds and titles to convey property ownership of private lands.

Land valuation is the process of assessing property value handled by the Valuation Department. The Valuation Department provides services to Government and semi-government institutions including Provincial Councils and Local Authorities, in the sphere of Valuation and Property Management. Valuations of properties, which are compulsorily acquired under Land Acquisition Act No. 9 of 1950, and preparation of valuations for the payment of compensation for the private lands which are acquired compulsorily for public purposes under the provisions of the Land Acquisition Act are two major functions of the Land valuation department. It also carries out assessment and re-assessment of properties in local authorities of the country for levying of Local Rates (Local Taxation) and also assists such Local Authorities in the determination of objections made in respect of such assessments by aggrieved taxpayers. Another important activity is the assessment of land value for levying stamp duty in the transfer of ownership of immovable properties by way of deed registration.

Land use describes what land is composed of and has been used for. Land use of the country is subject to change by both natural causes and man-made activities. Land use activities are managed by the Land use Policy Planning Department (LUPPD), which is responsible for mapping the current land use, identifying land use issues, suggesting measures to address the issues, and preparing comprehensive land use plans at the village and divisional levels by maintaining a land data bank. Land use Policy Planning Department addresses land use problems at the district and divisional levels.

Land development is the process of improving existing lands and inland water bodies, as administered by Sri Lanka Land Development Corporation (LDC). Its efforts will ensure to reclaim land to ensure flood-free habitat and develop every development area and create and maintain polluted free inland water bodies. The corporation also undertakes consultancy work for drainage design and landfilling works in the country. Apart from that, the Land Reform Commission also takes part in improving the productivity of lands in excess of the ceiling, vested in it under Land Reform Law of 1972. One of its functions is to provide lands for the investments identified as productive and protection of such lands. Local authorities such as Municipalities, Urban Councils and Pradeshiya Sabhas under the Urban Development Authority Act of 2007 regulate the development of lands to control land degradation by way of various man-made activities such as illegal constructions, non-systematic blocking out of lands, cutting and removal of earth, etc.

3. Problem Scope

Although the aforesaid four core functions on land are interconnected and in-

terrelated, there is no proper interaction between information sharing among stakeholder institutions with the support of information communication technology, which helps deal with such functions on the same land parcel quite efficiently. One simple example is the difficulty to answer a query efficiently to trace out the amount of tax collected by a respective provincial council in terms of stamp duty from each land parcel, which changes ownership by way of sale, registered by a deed of transfer in the relevant land registry. The necessity of this information may be to identify lands, which have been undervalued at the time of the execution of the deed, because of the reason that presently, a deed can be executed on any piece of land without prior determination and approval of stamp duties based on its market value. The main reason for finding it difficult to answer the above land query quickly is that heterogeneous land inventories or databases maintained by the Provincial Council and the respective land registry are not harmonized and linked systematically to retrieve expected results to the query. Another high-level query that might not be able to be answered presently would be the existing ratio between state and private lands with their spatial distribution on an administrative area basis in the country though details required to answer the query are maintained in separate databases by the relevant stakeholders. This emphasizes that integration between databases maintained by different stakeholders is essential to share or exchange data to find out answers to intense decision-making issues. In other words, this is due to lack of data interoperability among relevant stakeholders. Data interoperability is expressed by [13] as the sharing of information across different levels. This is achieved by way of harmonizing data, resolving heterogeneity between datasets or databases maintained by different institutions in terms of semantics, data schemas, and software syntax in exchanging data. Semantics relates to the definition of objects; for example, what criteria you use to define a highway or expressway. Data schemas relate to data structures; how data (both textual data and spatial data) are structured or organized in a database. Syntax relates to the compatibility of data formats of different software used to process and compile data.

When investigating land information, which is composed of both text data and spatial data (survey diagram of a land parcel) maintained in different stakeholders as mentioned above, integration of the information using common parameters such as parcel identification number, assessment number, name of the landowner for exchanging related information that requires for efficient and effective land administration and management is not straightforward since the use of this information in relevant heterogeneous databases is not harmonized. Data structures including data fields, domain types, database management software may not be the same. To make land information shared for effective decision making, an interoperable land administration system has to be realized [14], and this can be achieved through data migration and matching procedures by way of introducing land information standardization based on a unified land information classification and structuring. However, it is a time-consuming task involv-

ing revision of existing data structures and adopted workflows with high-level synergy and interaction among relevant stakeholders.

The system of registration of documents was introduced by the Land Registration Ordinance No. 08 of 1863. However, by the Registration of Titles to Land Ordinance No. 05 of 1877, Wellawatta, Kirullapane and Dehiwala were declared as special registration area where a survey plan made by a licensed surveyor under the supervision of the Survey Department was required to proceed to the registration of title to a land. According to the registration of document ordinance of 1927, Prevention of Fraud Ordinance of 1980 and Notary Ordinance of 1907 land ownership of private lands can be transferred without its graphical representation (survey plan) and exact extent by a deed registration except in special registration area [15]. Deed registration is only a piece of evidence to a particular land transaction by a legal document rather than a title to a property with its proper identification in relation to a plan. Land transactions can happen due to various reasons such as change of ownership, subdivision of a land parcel, amalgamation of several land parcels, exchange of land parcels, etc. Depending on the type of transaction, various types of deeds are registered. For example, for change of ownership by a gift, a deed of gift is written; and if the change is by sale, a deed of transfer is written; if the land is subdivided to be conveyed to the inherited members of the owner, a deed of partition is written. However, though it is not mandatory, most of the lands are referred to the survey plan and ownership is registered in a deed with the description of the plan and extent of the land with information regarding the right of access to the land. Presently, it is the responsibility of the owner or the person who is to buy private land to get the survey done and a legal plan prepared accordingly to make a land transaction. These lands are surveyed by registered licensed surveyors. Survey plans made by registered licensed surveyors are not maintained by the Survey Department. Furthermore, lands thus surveyed are not compulsory to be connected to the national reference framework and therefore, an extra effort is needed if these lands are to be integrated to make a parcel fabric as described by [16] since there is no systematic arrangement of such lands maintaining automatic adjacency relations between boundaries on the same reference framework adopted by the Survey Department of Sri Lanka.

Survey Department has a leading role in the creation of parcel-based land information since it has a rich record of all state lands and private lands acquired for various development activities. In addition, information on private lands already surveyed under the “BIMSAVIYA” programme for the issuance of titles repealing deed registration under Registration of Title Act No. 21 of 1998 in the country is available with the Survey Department. Titles have already been issued to some of the lands already surveyed although there is no automated mechanism yet to link and visualize these land parcels with title registration information maintained by the Title Registration Department. The main reason is the difficulty to integrate the Land Information System (LIS) Database of the Survey

Department and the Land Registration Database of the Title Registration Department due to data interoperability issues discussed above. It should be mentioned that in areas where private lands are still not surveyed under the “BIM-SAVIYA” title registration programme, registration of deeds takes place.

When considering transactions of private lands, making a parcel fabric of lands surveyed according to the title registration act under the “Bimsaviya” programme under the supervision of the Survey Department is very straightforward. Adding plans of private lands surveyed by registered licensed surveyors without the supervision of the Survey Department to the same parcel fabric is challenging but possible. However, land ownership transfers without a survey plan by a deed cannot be represented in this parcel fabric since land parcels are not graphically available.

State lands in Sri Lanka are alienated to settlers in government-initiated colonies on annual permits for the systematic development of such lands under the Land Development Ordinance (LDO) of 1935. So far, various deeds and grants; for example, Swarnabhoomi—a type of deed and Jayabhoomi—a type of grant, have been provided to lands developed on permits over a period under the provisions of this ordinance by the government. However, these permits, deeds, and grants have restrictions on the outright sale, transfer of lands, and keeping the land as security to obtain loans, leases or mortgages, imposed by the conditions in LDO. Apart from this, the Survey Department makes statutory plans for lands for various purposes such as vesting to government agencies, long-term leases, etc. Adding such lands to parcel fabric is not difficult either as such surveys are connected to the national reference framework. However, state lands given under permits for development do not have proper survey plans and their records are maintained by the Land Commissioner Department. And Jayabhoomi grants given for state lands are similar to registering a land transaction without a survey plan by a deed, hence no such parcels are graphically represented with the correct extent.

When considering state and private land transactions, there are lands still registered without a graphical representation (survey plan), hence a complete parcel fabric cannot be realized to visually represent all land parcels graphically with their dimensions. As discussed, the mode of transaction of state lands is by ways of issuing licenses, issuing permits, leases, vesting, grants, or sales provisioned by various acts and ordinances such as Temple Land Registration Ordinance of 1857, Land Development Ordinance of 1935, State Land Ordinance of 1949, Land Reform Act of 1972, Land Grants Special Provision Act of 1979, etc. Whereas mode of transaction of private lands is by declaration with prescriptive rights, will, gift, sell, lease, exchange, and mortgage and evidence for a particular transaction is by way of executing a deed under the Document Ordinance of 1928 or a title under the Registration of Title Act of 1998 in areas title registration is already declared. A difficulty also prevails to collect information of state and private lands based on administrative units since in some areas of the North Central Province and

Eastern Province of the country, Grama Niladhari Division boundaries (GNDBs), which is the smallest administrative unit covering a few villages are still not finalized.

4. Objective

The overall objective is to survey and establish, implement and maintain a cost-effective online parcel-based land administration system to efficiently handle and manage state and private lands based on administrative units to generate revenue and effective decision making for the sustainable development of the country. Following specific objectives can be identified to fulfil the overall objective mentioned above.

1) Defining, determining, delimiting (fixing), and solving disputes regarding administrative boundaries and local authority limits in liaising with the State Ministry of Home Affairs and the State Ministry of Provincial Councils and Local Government Affairs of Sri Lanka.

2) Establishing and maintaining a comprehensive land administration database with information of both state and private lands with immediate reference of each land parcel to the smallest administrative unit—Grama Niladhari Division (GND), and the relevant local authority of Sri Lanka.

3) To regulate land transactions through relevant stakeholder compliance under one-stop-shop approach and enhance land property security through the land registry.

4) Introducing new policies, rules, and regulations and revising the existing ones whenever appropriate for preservation, utilization, sale, improvement, and development of lands in liaising with government stakeholders and authorities, which presently deal with land matters.

5) Acting as a coordinating, monitoring, and solution providing entity for any type of land transaction to increase efficiency, transparency, and sustainability of land allocation (state and private).

6) Acting as a clearinghouse, linking with land information maintained by government stakeholders and individuals, to improving the availability of land information of land for investors, development purposes, and decision making.

5. Methodology

A holistic land information service, that allows users of all relevant Ministries and Agencies to carry out their day-to-day business processes efficiently and effectively, in a digital manner, using a unified federated database approach is proposed [17] [18]. This forms a vital part of the National Spatial Data Infrastructure (NSDI). The users' day-to-day business activities will automatically update the federated database when updating all related databases without requiring frequent mass data capture and conversion. This will eventually present a complete, self-updating, efficient, transparent, and accessible one-stop-shop for all stakeholders and the general public to retrieve necessary parcel-based land

information in tri-languages; Sinhala and Tamil (official languages in Sri Lanka), and English (link language), irrespective of their location.

Figure 1 depicts the proposed model of land administration in Sri Lanka. In this approach, the main government stakeholders should directly link with the Land Administration entity, which should be established as a separate entity, more appropriately the NLC as provisioned by the thirteenth amendment to the constitution described in Section 2. Each stakeholder should update the relevant information on a particular land transaction once finalized within its system boundaries, allowing automatic propagation of authorized information to the Land Administration Database, which is more appropriately termed as Land Administration Federated Database (LAFDB) since it should be set up as a centralized unit. This updated information would help track the present status of the land transaction process in each involving stakeholder or institution. It is appropriate to link databases of all stakeholders who should share land information effectively with each other to fulfil their activities and accomplish expected output and targets. For example, automated interaction between the LIS database of the Survey Department and the Land Registry Database of the Title Registration Department is required to issue titles under the “Bimsaviya” Programme efficiently. However, these developments are independent and no effect

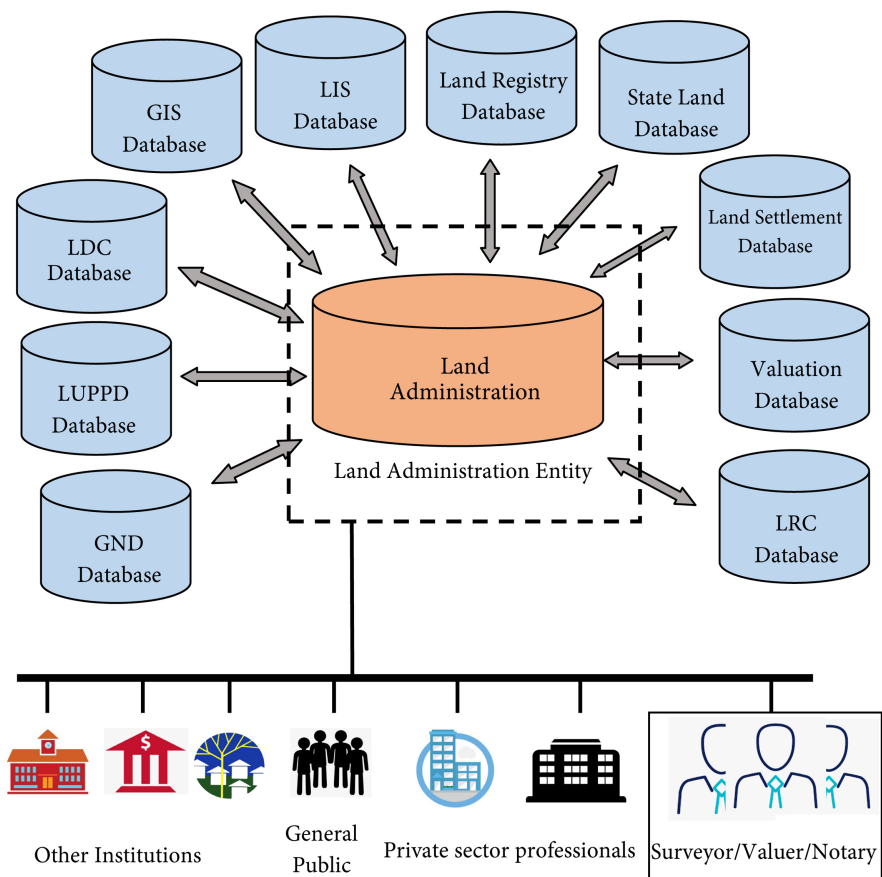


Figure 1. Proposed land administration model.

is caused in implementing the proposed land administration system although the outcome of land information from inter-linked departments will have a direct impact on updating the federated land administration database. Since information on all land-related activities is supposed to be updated in the LAFDB, in addition to the stakeholders, other relevant parties such as institutions, professionals and the general public as depicted in **Figure 1** above would also enable reading, crawling, and extraction of information online from this database efficiently.

5.1. Implementation Approach

The Land Administration Commission (LAC) is proposed to be established in the Presidential Secretariat. The Land Administration Federated Database (LAFDB) is suggested to create in three layers with the primary layer (Level I) being the Point Layer to which land information is linked (see **Figure 2** below). The next layer on top of the primary layer is an auxiliary layer (Level II), which represents a sketch of each land parcel graphically represented with its shape maintaining adjacency relationships between boundaries of land parcels. These

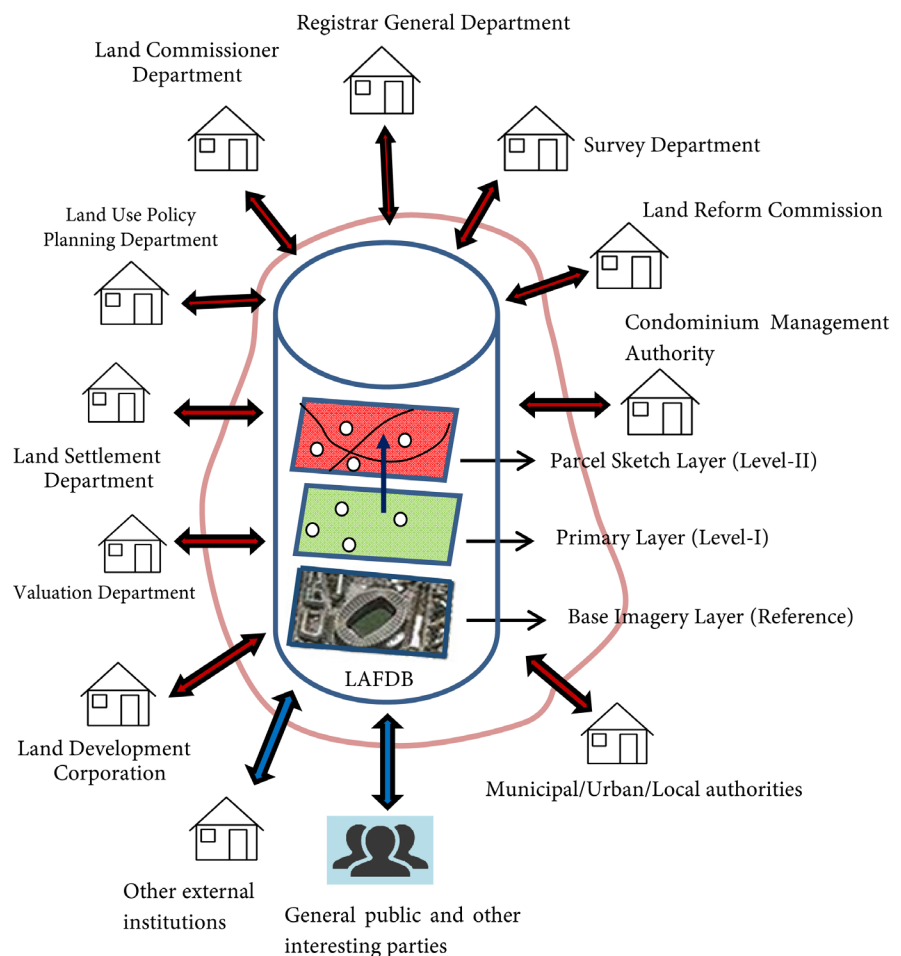


Figure 2. Proposed land administration model.

two layers should be linked vertically so that cross-relational spatial queries can be carried out efficiently. Under these two layers is the reference layer composed of base imagery and base vector layer information at the bottom. The base imagery should be composed of two spatial images; high-resolution ortho-image of 0.5 - 1.0 m resolution, which represents all topographic information on the Earth such as transportation, water bodies, buildings, land use, etc. and a Digital Terrain Model (DTM), which would provide terrain height information with a relative height accuracy of 2.0 - 4.0 m. In addition, base vector layers such as Administrative Boundaries, Transportation, Hydrographic Features, and Place Names can be obtained from the Survey Department of Sri Lanka.

Initially, implementation of the Land Administration Federated Database Management System (LAFDBMS) is proposed to be carried out in Colombo district as a pilot activity, which is composed of thirteen Divisional Secretariat Divisions with five hundred and fifty-seven (557) Grama Niladhari Divisions (GNDs). The main reason for choosing the Colombo district is that it has got diverse land use and lands owned by different registration documents such as leases, mortgages, vesting orders, permits, grants, deeds, and titles. In the implementation of the system, priority is given to create the Primary Layer, which consists of land parcels represented by point format along with a unique spatial reference identification for each land parcel and other land-related information such as ownership, land use, etc.

The following steps will have to be adopted in realizing this entity.

- 1) Preparing a cabinet paper to form the NLC and to get the green light to prepare an act to empower the NLC with authority to establish and maintain a parcel-based land administration system for both state and private lands.

- 2) Formulating national land administration policies to fulfil the information requirement of the specific objectives (main activities) mentioned in Section 4 above, studying the exiting ordinances, acts, and policies on parcel-based land-related activities in consultation with Provincials Councils (PCs). Especially the policies of the central planning committee, which is currently in operation with members from the Central Environment Authority (CEA), Agrarian Department, Urban Development Authority (UDA), and Land Development Corporation (LDC) established to give a recommendation regarding the development of lands to the relevant local authorities for the final approval.

- 3) A policy needs to be introduced such that the basic registration of land should be considered as the improved deed registration, which means that no land can be registered in a deed without a survey plan, and registration of title to land should be made voluntary amending present act in place.

- 4) Passing a land administration act based on the formulated policies, for which prior compliance from all stakeholders including PCs dealing with land-related activities will have to be obtained to make sure that policies are coherent, consistent, and not duplicated.

- 5) Investigation of workflows and data dealt with the annual action plans of

government stakeholders as depicted in **Figure 2** and analysis of data to determine data fields, which should represent in the Land Administration Federated Database Management System (LAFDBMS) to fulfil its objectives as mentioned in Section 4.

6) Implementing a parcel-based online land administration system. This system should be capable of updating information on land transactions and actions taken on each state/private land parcel on the four core functions described in Section 1 under relevant government stakeholder organizations and interacting with other institutions such as banks. The following steps are suggested in implementing the system.

a) A high resolution (0.5 - 1.0 m) satellite image mosaic showing land parcels and topographic features such as roads, hydrographic features, buildings, land use should be introduced as the main base map imagery of the country in the land administration database management system as depicted in **Figure 2** above. A Digital Terrain Model (DTM) of 2.0 - 4.0 m relative accuracy, which provides terrain height information, should also be used as the base vertical imagery in the system. Heights are really important in reclaim, sub-division, reconsolidation, land use policy-making, issuing development approvals, and alienation of lands.

b) Each land parcel is suggested to be captured with a unique parcel reference identification number (PRIDN) in point format (See Primary Layer—Level I in **Figure 2**), based on absolute coordinates (Latitude and Longitude) at doorstep location or at the approximate centre of the land (if the land use is bear with no construction) in the system. This PRIDN is formed in such a way that the location of a land parcel can be easily tracked from the PRIDN.

c) Basic land information attributes such as ownership details, GND Name, and Division, Survey Plan Details with extent (image of the plan), deed/title number and date including the name of Notary/Registrar, Assessment No. with Assessment Tax details, Land use and information on any encumbrances such as lease/mortgage will have to be captured and tagged with the PRIDN of the parcel spatially represented by a Point, using a hand-held Personal Digital Assistants (PDA) at Divisional Secretariat Division (DSD) Level with the assistance of Grama Niladharis and Adjudication Officers employed from the Land Settlement Department.

d) The next step is to create the Parcel Sketch Layer in the LAFDB. This layer is known as Parcel Fabric Layer in Geospatial terminology. This layer is important to make spatial queries with adjacent land parcels in relation to other topographical information stored in a Geographical Information System (GIS) database as depicted in **Figure 1**.

The digital parcel fabric showing graphical boundaries of all state lands, and private lands surveyed by the Survey Department under the “Bimsaviya” programme can directly be incorporated into this Parcel Sketch Layer—Level II. In areas, where no parcels are surveyed either by the Survey Department or the

Registered Licensed Surveyors, such boundaries of land parcels can be mapped with a hand-held GPS or a smartphone in the field so that LAFDB layer level II can be updated online.

All private lands with survey plans tagged to a point location in creating the Primary Layer—Level I can be sketched referring to the survey plan and the base imagery layer to create parcel sketch layer—Level II as well.

It should be mentioned that for land administration, Primary Layer with base imagery is sufficient. However, enriching Parcel Sketch Layer – Level II as an auxiliary layer would improve spatial analysis capabilities for decision making. Once the system is established and operational, the auxiliary layer can gradually be populated over time.

5.2. Main Activities in the System Implementation

Following is each activity to implement the system in the Ministry of Lands, with data collection in the district of Colombo as a pilot activity.

Activity 1—Institutional arrangements: setting up the Land Administration Commission (LAC)

The land administration commission should be set up to function as a separate entity in the Presidential Secretariat with its own space and full-time staff and funds. Members working in the land management discipline with decision-making authority from the Government and Semi-Government Sectors including the Central Environment Authority (CEA), Agrarian Department, Urban Development Authority (UDA), and Land Development Corporation (LDC) shall be appointed to the commission. The functions of the LAC should be overseen by the Secretary to the President. Further, NLC has to work in liaison with the PCs at local level in making policies and statutes. However, steps should be taken to make provisions to the NLC to deal with private lands as well since no powers have been vested with the NLC by the thirteenth amendment to the constitution [10].

Activity 2—Formulation of new policies and implementing the land administration act

Studying existing policies and formulation of new policies and finally taking steps to implement land administration act and subsequently implementing rules and regulations to reflect the policies, making a land administration workflow from the central administration to the PCs (local level).

Activity 3—Creating land administration federated database management system (LAFDBMS)

A fully-fledged spatially enabled Land Administration Federated Database Management System shall be implemented with an expert IT staff to manipulate and maintain the system. Database model should be developed in consideration of the heterogeneous data models used by the stakeholders in their land information databases.

Activity 4—Primary data collection and populating the LAFDB at Divi-

sional Secretariat Division (DSD) level

In this phase, the main emphasis is drawn to populate the database with the information at Primary Level I as described in Section 5.1 above. There are thirteen (13) DSDs and five hundred and fifty-seven (557) Gram Niladhari Divisions (GNDs) in the district of Colombo. It is proposed to collect land parcel information at the GND level through Grama Niladharis (GNs) providing a Personal Digital Assistant (PDA) to each GND.

A mobile APP shall be provided to collect and upload parcel information to the LAFDB. Provision should be made to validate the information collected and uploaded by the GNDs to the LAFDB. Firstly, information should be validated in the office by the staff in the LAC and each owner of the parcel should be allowed a sufficient period to comment on the information published in the LAFDB. If any discrepancy is found, the owner or his authorized representative should be allowed to interact with the relevant officials to rectify the information through LAFDB.

Activity 5—Data collection at parcel sketch layer level and populating the LAFDB

There are three steps involved in this phase; 1) automatic population of the LAFDB, once softcopy plans of private lands are approved by the local authorities; 2) incorporating existing parcel-based land information available in digital with the Survey Department of Sri Lanka, and 3) digitizing parcel sketches at GND level with the help of base imagery in office at the LAC. In areas, where parcel boundaries are covered with canopies, the assistance of GNs should be sought, allowing GNs to connect to the LAFDB and complete the sketch with the mobile APP using PDA by investigating the land parcel in question in the field.

6. New Regulations Proposed for Land Transaction Processes

With the implementation of the system, the following regulations will have to be formulated based on the Land Administration Act.

1) A new regulation should be imposed in consultation with the Survey Department to instruct all Government and Private Sector Surveyors to connect all land parcel surveys to the National Grid Reference System.

2) Such land parcel surveys carried out by private sector surveyors should enable production of plans in both hardcopy and softcopy format when handing over to the client.

3) Before any land transaction, approval of the survey plan and annual tax payment will have to be given by the local authority, updating the LAFDBM with the softcopy plan. If the land is a condominium property, in addition to approval from the local authority to the survey plan and architectural drawing, approval from the Condominium Management Authority (CMA) will have to be obtained. There may be instances where approval from the land development corporation, CEA, the Agrarian Department will have to be obtained depending on the land

use of the land.

4) After obtaining approval of the survey plan, Landowner should consult an authorized land valuer and get the land assessed and the assessed value should be updated by the land valuer in the LAFDBM.

5) Upon valuation, a land transaction can be done in consultation with a Notary and the Notary, checking prior approvals to the land under transaction from the LAFDBM, should execute a deed, lease, mortgage, or title, taking into consideration of the assessed value. Once the deed/title is executed, it should be updated in the LAFDBM with the registration number of the deed/title and date of attestation.

6) Once the documents (deed/title) reaches the relevant land registry, its content should be checked and validated by the land registry and confirmation to its assessed value should be obtained from the relevant Provincial Authority through the LAFDBM system and LAFDBM needs to be updated accordingly to finalize the land transaction.

7. Role of the National Land Commission (NLC)

Following are the main functions identified of the commission but not limited to:

1) Taking action to formulate policies to establish and maintain LAFDBMS, studying the other existing policies/ordinances/acts such as Urban Development Authority Act, Registration of Title Act, policies of the planning committee, etc. in consultation with stakeholders dealing with land matters.

2) Taking action to prepare and pass the Land Administration Act based on the formulated policies.

3) Setting up rules and regulations in maintaining/revising administrative/local authority boundaries and handling land transactions. Crowdsourcing provision should also be made available in the LAFDBMS. This enables obtaining feedback from the general public on both attribute and spatial information (change of name of a GND or a boundary inconsistency such as overlap between GNDs or revising a GND boundary) without any data collection effort in the field.

a) Setting specifications for the establishment of the centralized LAFDBMS in consultation with main stakeholders and other relevant institutions such as banks, local authorities, etc.

b) Procurement for the establishment of the LAFDBMS.

c) Taking measures to improve capacity building in conducting training programmes for the officers involved in the system to gather required expertise to process and exchange land information with LAFDBMS including those in the stakeholder organizations dealing with land matters.

d) Building up the interaction between the relevant stakeholders, especially between the central level (Ministry of Lands) and the local level (PCs) and form a coalition among them to make sure the smooth functioning of the processes involved in the proposed system.

Table 1. Indicators of achievement against the expected outcome of the proposed system.

#	Outcome	Indicators of achievement
1	Institutional arrangement.	Land Administration Entity.
2	Implementation of National Land Commission.	Role of the NLC.
3	Formulation of policies to regulate land development, systematic alienation, land reclamation, land use, and building construction.	Land Administration Act.
4	Ability to resolve disputes on administrative boundaries/local authority boundaries based on the feedback of stakeholders and the general public.	Gazetted administrative boundaries.
5	Close monitoring of property valuation preventing deeds/titles from being written at undervalued amounts.	Standardization of uniform land valuation, eliminating ad-hoc land assessment.
6	Tracking collection of tax by local authorities.	Systematic monitoring of annual land tax collection by creating various financial report summaries.
7	Ability to track the status of issuance of street line certificate, building line certificate, non-vesting certificate, development approval by the local authority for each land parcel.	Ability to control land degradation and misuse.
8	Ability to summarize land information for quick decision making; for example, the amount of compensation to be given in acquiring private lands for new road construction.	Report generation with analyzed results.
9	Controlling ownership transfer until conditions imposed are met such as clear ownership history, residential/commercial development approval, proper land valuation, etc.	Rules and regulations on land transactions based on the Land Administration Act.
10	Allowing people to invest in alienated state lands by transfer of ownership with an outright grant with minimum restrictions and encumbrances in utilizing lands to boost productivity.	A number of outright grants issued to state lands alienated to people.
11	Provision of land information for Urban and rural planning and management, and disaster management and resilience.	Report generation with analyzed results.
12	Generating revenue as a business model by providing necessary land information to various parties including financial institutions and the general public involved in the land transaction process as described in Section 6, and interacting with relevant stakeholders to resolve issues on land transactions.	Daily income against land transaction dealings.
13	Updating heterogeneous databases crawling information from the LAFDBMS is possible. For example, the Valuation Department can collect private property information once a land transaction takes place as mentioned in Section 6 (ii).	Completeness of timely information.

e) Conducting awareness programmes to the general public, emphasizing the advantages and benefits of the LAFDBMS. The general public should also be encouraged to voluntarily comment on issues of administrative/local authority boundaries through LAFDBMS.

f) Coordinating, monitoring, and attending to comments, requests, and complaints by any institution or general public related to land matters and intervene to resolve issues through LAFDBMS online.

g) Maintaining and updating the LAFDB making sure that the data is secure and backed up.

h) Holding the responsibility to overall revisions and updates in the entire system as and when required.

i) Introducing new policies and statues where necessary to deal with land matters in liaise with the PCs.

8. Expected Results

Achievements expected from the outcome of implementing the proposed system are listed out in **Table 1**.

9. Conclusion

The proposal described in this paper introduces a practical approach to establishing a land administration platform suggesting implementing the NLC to deal with land administration by implementing a Land Administration Act in accordance with the devolution of powers of lands based on the thirteenth amendment to the constitution of Sri Lanka. Further, it describes a detailed methodology about its establishment and maintenance to efficiently and effectively manage all state and private lands under one umbrella under the e-governance concept. Initially, the realization of the system is proposed in the Colombo district as a pilot work. Later, the system can be further enhanced to cater to land administration as a business revenue model in the entire country.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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