# Land Administration, Land Management and Spatial Information in Sarawak, Malaysia

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**Key words:** land administration infrastructure, land registration, land policies, native customary tenure or "temuda", Land Code, sustainable development, spatial information system, LASIS.

#### SUMMARY

Sarawak Land and Survey Department is a multi-functional organization under the State Ministry of Planning and Resource Management. The core businesses of the Department are survey, land administration, planning and valuation. Under the Federal Constitution, land is a state matter.

We have a well established and unified land cadastre and registration system based on the Torrens principle. The basic features of land parcels and their boundaries are recorded in the cadastre to provide a legal definition of a land parcel. The cadastral information which formed the core data for land management and land administration has been converted to create a geospatial enterprise database.

Taking advantage of the organizational structure as a land professional agency involving in land, survey, planning and valuation services, the Department developed GIS applications and solutions as part of the integrated land information system to record land ownership, land values, land use and other land-related data. Enterprise land information for a multi-functional organization like us is vital and essential for managing information on current land use, monitoring changes in land use, for a market economy to function efficiently, to benefit tenure security, to support land use planning and valuation, and to achieve sustainable management of land resources.

Land management is the challenge of allocating land resources into efficient use to the best advantage of the State and the people. Land administration is the process whereby land and information about land can be effectively managed, supported by a strong legal framework and good governance.

Our land administration infrastructure will continue to evolve to cope with current economic and social developments and to ensure consistency with sustainable development principles. The Department has a long term strategic business plan to integrate wider range of data, information and knowledge into the land information system. Future focus will be more on system maintenance, including system enhancement and upgrading rather to create new systems.

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#### 1. **INTRODUCTION**

Land administration system is dynamic and of long term nature. As a result, there is a need for a clear roadmap to ensure that all developments and changes will ensure contribution to the overall vision for effective land administration system. The various factors inducing land administration reforms in Sarawak are as follows:

- Need to address land policy issues of the government to the urban and rural society.
- Implement a land administrative infrastructure which includes organization, standards, business and technological processes, as well as laws and regulations for land rights, planning and valuation.
- Land professional organization like Land and Survey Department has to demonstrate our role as an effective land administrator to justify public spending in the systems.
- Pervasive use of internet and mobile technologies will impact greatly on land administration organizations.
- Land is an economic asset. It becomes the main thrust of State Government of \_ Sarawak land policy to transform land into productive assets, to ensure that its policy will encourage optimum utilization of land to generate economic benefits to the State and the landowners.
- Need for improved service delivery to the public and financial transparency for \_ good governance.
- Response to the global demand for sustainable development and environmental management of land resources.



#### 1.1

Singapore

Malacca

Indonesia

(Sumatra)

Diagram 1: Map of Sarawak, Malaysia

Kuching

Kinabalu National P

Indonesia

(Kalimantan)

Sarawak is located on the western region on the island of Borneo. Covering an area of 124,450 square kilometers, it is the largest of the 13 states in Malaysia, making up some 37.5% of the country's total area of 329,750 sq km.

Sarawak had a population of 2.4 million. Its 27 ethnic groups include the Iban, Chinese, Malay, Bidayuh, Melanau, Kayan, Kenyah, Lun Bawang, Penan, Kelabit, Kedayan, Bisaya, Berawan, Lahanan, Sekapan, Kejaman, Punan, Baketan, Ukit, Sihan, Tagal, Tabun, Saban, Lisum, Longkiput and others. Cities and towns are populated by Chinese and Malays and a growing number of indigenous people who have migrated from their home-villages.

It is home to Rajang River, the country's longest river, and Mulu, the world's most extensive cave system. Holding the world's oldest and second largest tropical rainforest after the Amazon, Sarawak is a marvel of biodiversity.

Sarawak is presently divided into 11 administrative divisions; Kuching, Samarahan, Sri Aman, Betong, Sarikei, Sibu, Kapit, Bintulu, Mukah, Miri and Limbang. Kuching is the State capital and seat of the government.

# **1.2** Corporate Profile

Vision:

To be An Excellent Land Administration and Land Management Organization

Mission:

To Administer and Manage Land To The Best Advantage To The State and People With Professionalism and Integrity In Tandem With The Aspiration Of The State

Slogan:

An Agency to Facilitate Development

#### **1.3** Key Responsibilities

- Management and administration of land in Sarawak and authority on land registration
- Responsible for cadastral survey
- Deals with land use planning and subdivision of land
- Responsible for acquisition of land required for public development
- Agency responsible for land information

#### **1.4** History of Land Legislation

The earliest law relating to land dated back to 1863 when the first Land Regulations were introduced by the first Rajah of Sarawak, Sir James Brooke. No form of land

tenure as it was understood in English Law existed under the Government of Brunei when Sir James Brooke took over responsibility for the Government of Sarawak in 1841. The first Rajah did not immediately interfere with the system of customary laws which existed in Sarawak at that time, and it was not until 1863 that the first Land Regulation was introduced with the approval of the Supreme Council.

The Land Regulations of 1863 were comprehensive although they were comparatively simple in nature. Provisions were made in these regulations for the issue of leases for 900 years and for grants in fee simple or grants in perpetuity. These regulations were amended from time to time and were supplemented by various Land Orders to meet the changing needs and to overcome administrative problems, and it was only in 1920 that the first comprehensive land legislation recognizable by legal standards as a statute was introduced as Order No. VIII of 1920.

In 1931, the Order of 1920 and the Regulations issued under the Order were replaced by Order No. L-2 (Land Ordinance). This was followed in 1933 by Order No. L-7 (Land Settlement Ordinance) which provided for the guarantee of titles by the State following adjudication of rights to native customary land.

The classification provisions of the Land Order of 1931 and the Land Settlement Order of 1933 were replaced in 1948 by specific provision in the Land (Classification) Ordinance for the division of Sarawak into five (5) classifications:

- Mixed Zone Land
- Native Area Land
- Native Customary Land
- Reserved Land
- Interior Area Land

For the sound administration of land in Sarawak, it was found that these Ordinances were inadequate and in 1957, the present Land Code was enacted with the objective of consolidating the laws relating to land in one piece of legislation and bringing it up to date by filling in the gaps on which the laws were silent and by amending those parts which had been found unworkable or overlapping.

The Land Code is an omnibus piece of legislation which provides for the alienation of State Land, administration of alienated land, classification of land, compulsory acquisition of land for public purposes, adjudication of native customary rights to land, survey and registration of dealings in land.

#### 2. LAND ADMINISTRATION AND LAND MANAGEMENT IN SARAWAK

The new approach to land administration system is to support land management and land markets. The key processes are those activities connected with the four fundamental functions in land management: land tenure, land value, land use and land development. The fundamental challenge for the land administrators is the management of the transcendental aspects of land to derive wealth out of the landrelated interests and to manage these opportunities accordingly to sustainable development objectives (Wallace, Jude, 2009). Efforts should be focused on land management processes for registration of land rights, indefeasible title, mortgageability and compensation for compulsory acquisition. These reforms pose challenges to the land administration capacity to manage land holistically.

Land administration should focus on land management processes like adjudication, land transfer, subdivision, planning and valuation, rather than on institutions, legal and regulatory frameworks. The land administration system should incorporate a strategy for development reform in land administration accordingly to global factors that can affect the processes. Furthermore, effective land administration systems need to manage the ever growing sophistication of rights, restrictions and ownership over land due to environmental and social pressures.

In this paper, we will discuss the 6 principles that are the enablers to transform our land administration and land management to meet global demand such as sustainable development, urbanization, globalization, economic reform, climate change and environmental management. It is important to recognize that the land administration system for each state or each country requires its own strategy to address the specific social, legal, cultural, economic, institutional, administrative and global circumstances, depending on the dynamic relationship between the people and the land. Capacity must be built to permit an evolution of the relationship.

# 2.1 Institutional Principle

Under the terms of the Inter-Governmental Committee Report and the Constitution of Malaysia, land and cadastral surveys are State subjects which come under the portfolio of the Minister of Planning Resource Management.

Subject to the direction of the Governor in Council, land in Sarawak is administered in accordance with the provisions of the Mining Ordinance and the subdivision of land is administered in accordance with Part X of Land Code, the Public Parks and Greens Ordinance, 1993 and the Strata Titles Ordinance.

Sarawak Land and Survey Department is a multi-functional organization under the State Ministry of Planning and Resource Management. The core businesses of the Department are survey, land (including land registry), planning and valuation. Our Department is responsible for the land administration infrastructure for the state. Our organizational strength lies in the functional collaboration, sharing and coordination between surveying and mapping; the cadastre; land registry; the valuation; and town and country planning sections within the same organization.

Due to the institutional setup and the legal framework, the strategy will be to focus on the key land management processes in order to support the land administration infrastructure to ensure accomplishment of the vision and mission of the Department. Issues relating to legislation, organization and funding are more challenging to solve than the technical matters. The key to good land administration is good land management.

The land management affects its value and the type of land use will be determined by the physical characteristics and planning laws and regulations. The efficiency of the land market will influence the land use. The form and security of the land ownership rights will affect the land values and in term, determines the utilization of the land. Therefore, to ensure and support sustainable development, the land resource managers must have full access to information about land and property and to understand the inter-dependencies between the various services of the land professionals. Therefore, our Department has been adopting an integrated and enterprise approach to the new role of land administration.

# 2.2 Land Policy Principle

In the administration of land, the Land and Survey Department is guided by the policy statements: "To ensure that land is to be administered and managed to the best advantage and to generate economic benefits to the State, having due regards to planned development and to the future land requirement of a growing population." In order to accelerate development of the State, the government encourages the private participation.

The government will continue to reform land administration and adopt land policies for making land available for development by the private sector as well as to provide housing needs and other basic amenities for the people. In Sarawak, land policies have been formulated and implemented to ensure a systematic opening up of land for agriculture development for smallholder farmers as an effort to improve the living standards of the rural, to provide housing lots to the landless, to resettle squatters, to cater for the housing lots for the extended families in established villages and to encourage private sectors in opening up rural land (both State and customary land) for large scale plantations.

Such land administration infrastructures and land policies are designed to encourage optimum utilization, sustainable development of land, environmental management of land resources, increased agricultural activities, supporting efficient land market, political stability and social justice, taking into consideration the interests of the State as well as the needs of the people as a whole.

Land administration system is part of a broader land policy. Land policies reflect the manner government wants to deal with the land issues in sustainable development of the State. Since the Rajah era, it is our state government land policies to ensure equal access to real property to all people of urban and rural society. The process for formalizing and transferring of the land rights have been made simple and efficient through direct alienation of state land; systematic adjudication and demarcation of customary rights under the land laws; and the adoption of the Torrens Title System. Land policy has taken into account the whole complexity of socio-economic, cultural,

historical, legal and institutional parameters that dictate the most efficient utilization and allocation of land resources.

The way how rights to land, the registered proprietors and the land is understood and perceived by the individual people, determines the content, meaning and success of the land administration system. To achieve this objective, the land policies implemented by the state government must be committed to institution of property and rights in land. The process involves creation of rights, interests and estate that can stabilize land distribution; generate income from utilization of the land resources; and creation of value. Our Department, in collaboration with our Ministry has been aggressively organizing and engaging the people through dialogues, civil assemblies and land policy workshop to building the cognitive capacity o the public to understand the market related concept of land.

Effective land administration system should provide the infrastructure for efficient management of land. However, land policy decisions should be decoupled from management of the land administration system. In Sarawak, land policies are formulated by the Ministry and implemented by the Department. Land administration infrastructure is the skeleton to and forms the foundation for the implementation of sustainable development and environmental management policies for the economic development of the State and the benefits of its people.

The land policies must be regulated and structured to ensure the land rights and interests in land remain in a politically, socially and economically acceptable balance for the state to develop. Our land administration system which is dynamic and flexible, functions on the requirements defined by various instruments, which are at the disposal of the government in order to allow timely and appropriate implementation of its land policies.

# 2.3 Land Tenure Principle

Effective land administration should focus on setting out an efficient land administration infrastructure to manage sustainability in land developments. It is critical to fully understand that land administration system should not interrupt the land tenure, but provides an inventory of rights, restrictions and ownership of land.

Any land administration reform must recognize a land tenure which is capable of adopting sustainable development principle and objectives, with transparency, fair compensation, legal recognition, adjudication and documentation of native rights.

Part V (Settlement Operation) of the Land Code provides for the adjudication or formalization of native customary rights or NCR in Sarawak, with the objectives as listed below:

- To carry out survey on all land in Sarawak and to bring those onto the land register (Settlement Operation).

- To investigate the rights of natives to land held under native customary rights and to bring such land onto the register for security of the land tenure.
- To identify state land not subject to claims for the purpose of planning and development.

The vast idle native customary land needs to be brought into the mainstream of development and for this a paradigm shift is required. To survey, adjudicate and issue titles per se is only one aspect of the solution to issues on native customary land. Issuing titles will not add value to land without basic infrastructure.

Because native customary rights land is an economic asset, it has to be converted into an instrument for investment to generate optimum benefits. Towards this end, developing the vast tracks of idle native customary rights land, comprising of more than one lawful claimant, for large scale commercial plantation under the one-title system is seen as an ideal approach. Settlement Operation will still be carried out but only in areas where native customary land development is, nevertheless, not jeopardized.

Native Customary Land (NCL) Development policy is a new and bold strategy aimed at bringing about changes to the rural communities through large scale land development utilizing native customary rights land as an asset. Traditionally such land had been used only as a "Pusaka". "Pusaka" refers to the customary tenure in which land is held as an inheritance which can be passed from one generation to another.



Diagram 2: Land Tenure in Sarawak

# 2.4 Land Administration and Cadastral Principles

A sustainable development objective requires all land to be recorded in the land administration system to include all rights, restrictions and ownership with regard to all lands. As far as possible, the land information system should include all state, private, customary, forest and reserved lands. The adoption of a complete cadastre is essential to most efficient management of land resources to the best interest of the state and its people, land transactions are open and to promote a good governance.

Brief History of Legislations affecting Land Registration in Sarawak is given below:

# 2.4.1 Land Regulations, 1863

An Order passed by the Supreme Council during the time of the First Rajah provides "All mortgages upon lands to render them legal must be registered ....."

# 2.4.2 Court Order V of 1898

Declared that no Bill of Sale or other document giving parties other than the owner of any lien or security for value received over any description of real, personal or moveable property shall be deemed to be valid unless registered in Court.

# 2.4.3 Land Order VIII of 1920

An order made by the Third Rajah of Sarawak in 1920: Every person whose name is recorded in any Government Register as the owner of land shall be deemed to have a permanent and transferable right interest and occupancy of his land.....

# 2.4.4 Rajah Land Order No. L-2 of 1931

The Land Ordinance was the first legislation to provide for the registration of titles and land transactions in Land Offices and Land Registers open to public inspection.

#### 2.4.5 Land Settlement Order No. L-7 of 1933

The Land Settlement Ordinance provided for a new register of titles based on an accurate and fully verified cadastral survey. The Ordinance re-enacted the provision of the 1931 Land Order requiring all dealings in land (other than sublease for a year) to be registered.

#### 2.4.6 The Land Code (Cap. 81)

The Land Ordinance and the Land Settlement Ordinance form the basis of the present Land Code which was enacted in 1957 and came into operation on 1.1.1958. An important feature of the present Land Code is by making the title to land indefeasible. Land registration is incorporated under Part VII of the Land Code which practices the principle of the Torrens System.

It is critical to recognize that land administration, cadastral and land titling processes are continuous and long term. It is pertinent to systematically undertake the adjudication of customary rights and to register the rights, too. Equally important is the need to continue land policy development to improve the land law and regulations to support adjudication and registration of some 1.629 million hectares of customary lands or 13 % of Sarawak land mass.

Systematic adjudication of customary rights through implementation of land policies without legal security could result in poor or weak land administration system, which

could have adverse impact on the economic development, social stability and environmental management of land resources.

# 2.5 Human Resource Development Principle

One of the success factors of any land administration infrastructure is attributable to the quality of management and skills of the people who are responsible for the systems. Therefore, commitment to human resource development in education and training is essential.

Our organization has a long term strategic planning to leverage on new technology and develop new business applications. Our human resource development and management units fully realize the importance of having the right skills and knowledge to execute their tasks. Our people must enhance their competency in their core business of land management and to ensure that high standards are maintained at all levels and in all areas of land administration.

Capacity building ensures institutional capacity and excellence is enhanced through training, up-skilling, further formal education in-line with strategic human resource planning and on the job training, to create expert user groups responsible for managing and operating the organization. The Department believes that human resource development, particularly training and education, based on training needs analysis and succession planning approach is the key to sustain land administration and good governance in the State and to deliver a quality service.

Training and education are provided at all levels in our organization. At the operational level, the Department, together with the system developer, provides on-the job training to all users. Management trainings are provided to the supervisory staff.

Our knowledgeable and competent land professionals have a good understanding of the business in which they are managing, are able to provide appropriate training programs for the staff to develop their skills, particularly, the new recruits who are IT savvy and readily adaptable to information and communication technology.

#### 2.6 Technical Principle

The primary role of cadastral surveying, mapping and land registration is to form the core data to support the establishment of spatial cadastre where application systems for other land management services are developed to support strategic activities for modern governments, businesses and ubiquitous societies. Cadastral surveying and mapping form the base layer to the land administration infrastructure. In our Department, the spatial land information is known as LASIS or Land and Survey Information System.

Land administration and cadastral systems in our organization has been unified into a multi-purpose cadastral system through the adoption of information and GIS

technologies, where information about natural resources, planning, land use, land value, land titles, cadastral information are integrated and shared for analysis and decision making relating to land development.

The computerization of land administration records and the implementation of spatial land information infrastructures require long and continuous political, financial and institutional commitment. This initiative is one of the most challenging components of land administration and requires a detailed strategic planning to design, develop and implement to meet the global demand of sustainable development, environment management of land resources, to serve the interests of the government and to improve the operational and information efficiency of the land market. The implementation requires long term vision, extensive training, top management commitment, data modeling and data conversion standards, system and application testing, and a long term commitment to human resources and development.

Modern land management focuses on planning and sustainable development and good governance, leveraging on GIS. Land administration is not just about data capture, storage, retrieval and display of land records. New models for understanding land as a resource or asset must be developed. Inter-relationship between its attributes (land rights, land value, land use) and the external determinants in the political, social, economic and physical environment must be explored.

Land administration systems need to be spatially enabled to allow information and intelligence sharing; business process reengineering and collaboration with society at large. The Department has a long term strategic business plan to integrate wider range of data, information and knowledge into the land information system. Future focus will be more on system maintenance, including system enhancement and upgrading rather to create new systems.

#### 2.6.1 Strategic Approach

The approach to building a comprehensive land information system divided into phases. Phase 1 applications focus on production of core data and establishing a solid base to anchor all applications together as one integrated system. The applications in LASIS Phase 1 are as follows:

- Survey Computation System
- Cadastral Mapping System
- Title Registration System
- Revenue System

With the completion of LASIS Phase 1 applications as well as the system enhancements and upgrading to establish a unified cadastre system. LASIS Phase 2 applications were implemented to enhance the service delivery of the Department in both land administration and land management. The applications in LASIS Phase 2 are as follows:

- Valuation Information System
- Planning Information System
- Land Administration & Adjudication System
- Aerial Photograph Information System



Diagram 3: Roadmap for implementation of Land And Survey Information System (LASIS)

# 2.6.2 LASIS Structure and Applications

Our IT vision is to have a fully integrated land information system where information can be accessed ubiquitously for processing, value adding, analysis and decision making. LASIS is built as a high performance parcel-based land information system with security, reliability and data integrity mechanisms.



Diagram 4: Schematic Diagram of Land and Survey Information System (LASIS)

The objectives of the application systems in LASIS are as follows:

- Survey Computation System: for processing of survey jobs and establishing a Master Survey Database for the state of Sarawak.
- Cadastral Mapping System: for updating of cadastral maps from the surveys and maintaining the basemap for Sarawak to be used by other applications.
- Title Registration System: for registration of titles, state lands and land instruments. Maintain and update the database of registry records.
- Revenue System: for collection of land related revenues and maintain the revenue and payment database.
- Valuation Information System: for processing of land acquisition required for project implementation and valuation of landed properties. Also maintain a database of land acquired for public use and property market transactions.
- Land Administration & Adjudication System: for processing and monitoring of land applications and checking the status of the land.
- Planning Information System: for processing of subdivision applications and other development. Selection of site for development as well as other town and country planning facilities.
- Aerial Photograph Information System: for processing and maintenance of aerial photographs and orthophotographs to facilitate decision making for land and development applications.

To support sustainable development, land information and intelligence must be managed in a manner that allows land resources managers to understand the interdependencies. Diagram 5 illustrates the interoperability and integration at the technical level where data exchange and compatibility occur within the institutional setup of our Department. Spatial data infrastructure is a critical component of land administration system.



Diagram 5: LASIS Spatial Data Integration and Interoperability

# 2.6.3 Achievements

LASIS has transformed the work culture, business processes and the service delivery of our organization with its capabilities and benefits affecting the areas of people, processes, system and the services.

- Inspiring the people to be proactive and innovative at standardizing processes and re-engineering of processes for automation. Looking at ways of embedding business rules and intelligence in the system.
- Innovation of business processes to benefit from the system capabilities by way of re-engineering, streamlining and automation.
- Integrated land information system, LASIS which unified cadastral surveying, mapping, land registry, development planning, valuation services and land administration.

- Improved services to the internal and external customers through quality products. Short processing time (e.g. land instruments registered within one day). Provide more avenues to the customers to interact with the organization.

# 3. CONCLUSION

Land administration serves various socio-economic functions in a society. One of the functions is to improve the land tenure security, particularly, the adjudication and registration of customary rights in the State. The government has always recognized genuine native customary rights legally created, over the land with the objective to eradicate urban and rural poverty and improve the living standard of the rural people.

To regulate the land market and improve its operational efficiency, the land administration infrastructure continuously improves procedure for land transfers and dealings. For regulation and control of town and country planning and development, the support of land administration lies in the control of a given land use to establish equilibrium in the supply and demand of land utilization.

Land administration system must have the capacity to support the basis for valuation of compensation for the compulsory acquisition of both private and customary land for government projects and to work out the land premiums and quit rent for the alienation of state land.

The management of environmental resources is of increasing importance. The measures or initiatives a land administration agency can consider are by imposing restrictions on the use of land to ensure compliance. These restrictions are eligible for registration and enforceable.

ICT transforms the management processes of land administration system to serve the people and the public. There is a need for radical change to improve the accuracy, reliability, timeliness, confidentiality, availability and accessibility of land related information for analysis and decision making on land valuation, land use planning and development and management of natural resources.

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# REFERENCES

Dale, Peter, 1999, Is technology a blessing or a curse in land administration?, UN-FIG Conference on Land Tenure and Cadastral Infrastructure for Sustainable Development, Melbourne, Australia.

Economic Commission for Europe, 2005, Land Administration in the UNECE Region: Development trends and main principles, United Nations, New York and Geneva.

Osman, Sudarsono, 2009, Evolution of Land Policy: Transforming the Landscape of Sarawak, Working Paper of Land Policy Workshop, 21-22 April 2009, Bintulu, Sarawak.

Paul van der Molen (NL), 2003, Some options for updating the land administration guidelines with respect to institutional arrangements and financial matters, UN/ECE Committee on Human Settlements Working Party on Land Administration.

Porter, A.F., Land Administration in Sarawak, Published by Authority.

Wallace, Jude, 2009, Making Land Markets Work for All, Article of the Month – May 2009, International Federation of Surveyors.

Williamson, Ian P., 2000, Best Practices for Land Administration Systems in developing Countries, International Conference on Land Policy Reform, Jakarta, 25-27 July 2000.

#### **BIOGRAPHICAL NOTES**

Sudarsono Osman is the Director of Land and Survey Department, Sarawak, Malaysia since 2006. He is presently Chairman of the Sarawak Surveyors Board which regulate the land surveying and practice of cadastral surveys in Sarawak and has held positions as Board member of the various statutory bodies and government linked companies in Sarawak. He is the member of the Sarawak Planning Authority which is a centralized planning authority.

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