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Geospatial Information in Fiji *

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Fiji Presentations to

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Geospatial Information in Fiji

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Brief on Geospatial Development in Fiji

Fiji like any other island state in the Pacific has finite land mass surrounded by water but with abundant of resources to sustain itself. The growing demand for proper inventory of such resources in the face of investments for economic development set the platform for the government in early 1990s to embrace automation of its land records, mapping of natural resources as well as the demarcation of indigenous rights to fishing grounds. The Fiji Land Information inception in 1992 (funded and assisted by NZ Government) paved the way for the realization of how geographic information systems (GIS) and remote sensing (through aerial photography & satellite) can greatly assist in the digitizing of records for more effective and efficient ways of presenting and storing of such records. Most importantly integrating different data sets allow for identifying more appropriate ways of utilizing resources so that balancing the economic benefits against appropriate allocation of resources and the degrading of the environment can be realized. Prominent stakeholders in land resources were drawn in first and as years went by more and more end users of base data also contribute on whatever data they can provide for a more integrated approach to sustainable development. In the midst of such initiatives there were always hindrances to progress alluding to political wills, hesitancies to commitments, funding, limitation in technical know-how, access to new technology, datum change and standardization of systems and processes. The government of Fiji through the Fiji Land Information Council and the FLIS Secretariat within the Ministry of Lands and Mineral Resources persisted on innovations for more cohesive efforts in the training and in the provision for appropriate funding to expand the geospatial information development in Fiji.

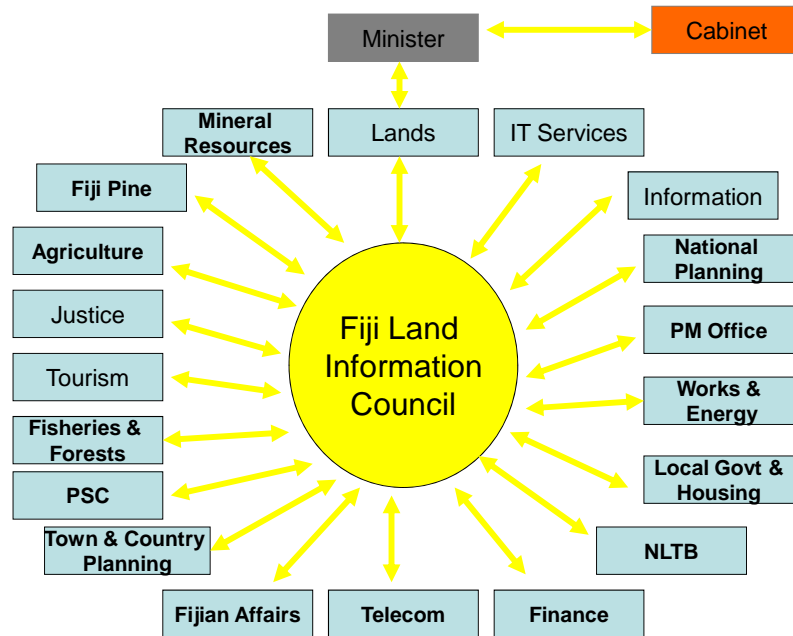
1. Background

The Republic of the Fiji Islands has a total land mass of approximately 18,400 square kilometers made of some 300 islands scattered around its sovereign boundary. Situated at longitude 175°00' East of Greenwich and Latitude 178°45' South of the Equator, the country has a population of 837,271. The majority of the population live in the two main islands of Viti Levu (10,429 sq. km) and Vanua Levu (5,556 sq. km) which have mountainous interiors - over 900 metres above sea level. Around 60% of the population live in rural areas. The combination of the prevailing south-easterly trade winds and these mountain ranges result in a distinct dry western climate suited for sugar cane and a similar distinctive wet and humid eastern climate which Suva, the capital city suffers from. Other main islands are Taveuni (470 sq. km), Kadavu (411 sq. km), Gau (140 sq. km) and Koro (104 sq. km). The other city is Lautoka.

In 1874 Fiji became a Crown Colony under a Deed of Cession signed by the leading Chiefs. This Deed stated that all surplus land (ie not alienated as freehold or actually used as customary land) was to be Crown land. In 1936, after a long debate on the issue, the Great Council of Chiefs resolved that lands not required for the maintenance of Fijian owners be made available for national development through an independent Native Land Trust Board (NLTB). However, relatively little land was not deemed to be occupied by Fijians, and now more than 80% of land still remains as 'native' (customary) land. Although this can be misleading as much of the land is not suitable for intensive agriculture, settlement and development. In 1959, as much as 35.6% of the prime arable land and 17.7% of the prime pastoral land were either freehold or leased Crown land. The bulk of arable land is covered by customary village or on sugar cane crops under lease.

2. Land Information Initiatives

The current Land Information Strategy that governed development of land information in Fiji was endorsed by Cabinet on 5th February 1991. It was structured in a more government oriented platform that involved the Minister for Lands and Mineral Resources to report directly to Cabinet with the Permanent Secretary for Lands as the Chairman of the Land Information Council made of relevant heads of government ministries and departments directly involved with land information. This restrictive FLIC membership then dictated for other ministries and corporate bodies whatever policies on land information defined by its members.



Though such structure existed but as experienced through the years the idea of automation of processes has been viewed by some line ministries as invasion of their territorial rights to their data and information which has to be converted to digital forms in the computerized systems for accessibility and storage. More so majority of organization structures were not aligned to the study paper on Land Information Strategy for the Republic of Fiji submitted by the NZ Department of Survey and Land Information in 1990 and endorsed by Cabinet for the Fiji LIS Strategy:

“A review of organizational structures should also be undertaken when automation is contemplated.”

Most of those at the helm of ministries and departments then were not ready for the transition holding on to their experiences on manual processes and record keeping on files and other formats. They were not ready then to let go of such systems and also the fear of disseminating data at the press of the button. For them bureaucracy is part of government systems where approvals at every point has to be endorsed. Such attitudes hindered the progress of automation and nearly to the demise of FLIC and FLIS if not for the persistence by the Ministry of Lands and Mineral Resources and more visibly in the utilities sector by Fiji Electricity Authority and Telecom Fiji. The Ministry of Lands carried on with the assistances of funding from the New Zealand Government creating few databases and in the automation of most records. Later it assumed total responsibilities of FLIS incorporating its activities in its

annual budget provisions but kept on track the ideals for its inception providing assistances whenever required.

3. Achievements of Fiji Land Information Systems

3.1 Computerised Cadastral Mapping Systems (CCMS)

Computer based representation of all legal land parcel boundaries in Fiji. It comprises over 90,000 land parcels, together with their legal identifiers.

The primary functions are to store the current shape, position, identity and relationship of Fiji's cadastral land parcels and to display the land parcels at appropriate scales.

3.2 FijiTopo Database

GIS of fully structured topographic data derived from 1:25,000 scale national mapping and aerial photographs. FijiTopo database contributes to the production of National Topographic Mapping Series of various scales, customized and thematic maps.

Topographic features in Viti Levu and other outer islands such as contours, rivers, lakes, streams and coastlines are being acquired digitally by scanning and digitized from existing large scale and medium scale mapping. For the second major island Vanua Levu data was captured digitally in New Zealand.

In the meantime Fiji has supplied to the ISCGM digital data at 1:200,000 for Global Mapping

3.3 Native Land Commission Mapping System - NLFC

The GIS database that contains spatial representation of all customary land parcels (over 13,000 parcels) recorded on the Native Land Commission (NLC) maps.

3.4 Survey Plan Imaging

A viewing package of all scanned approved survey plans (over 42,600 survey plans to date) and related documents.

3.5 Fiji Geodetic Database

Holds records of all geodetic controls in Fiji, – first, second and third order – 625 control points.

3.6 Cities & Towns Zone Mapping System – for Dept Town & Country Planning

An intelligent mapping system that holds details of both cities (Suva & Lautoka) and towns zoning plans.

3.7 Non-graphics

3.7.1 Survey Plan Journal

Holds details of each parcel created in all approved and not approved survey plans, and tracks the processes of survey plan checking to being approved and signed by Director of Lands.

3.7.2 Survey Plan Index

Contains key information for over 40,600 approved survey plans in Fiji.

3.7.3 Valuation Records

Holds all valuation assessments records made by the Dept. of Lands & Survey, as well as details of property sales in Fiji.

3.7.4 State Lease Administration System.

Contains details of over 51,000 Lands Dept (LD) files created to-date and including details of registered and un-registered State leases and Native leases to State, and records related actions undertaken and movement of files.

3.7.5 Native Land Commission (NLC) Report – NLFC, Min. of Fijian Affairs

An inventory of all Native Land as registered in the NLC Report, and links to the associated land owning units.

3.7.6 Vola ni Kawa Bula – NLFC. Min. of Fijian Affairs

A record of all indigenous Fijians referenced to the native land owning unit – *Mataqali, Tokatoka, etc.*

3.7.7 State Land Rental System

Contains Rental details of all registered and un-registered State Leases and Native Leases to State – 15,544 altogether.

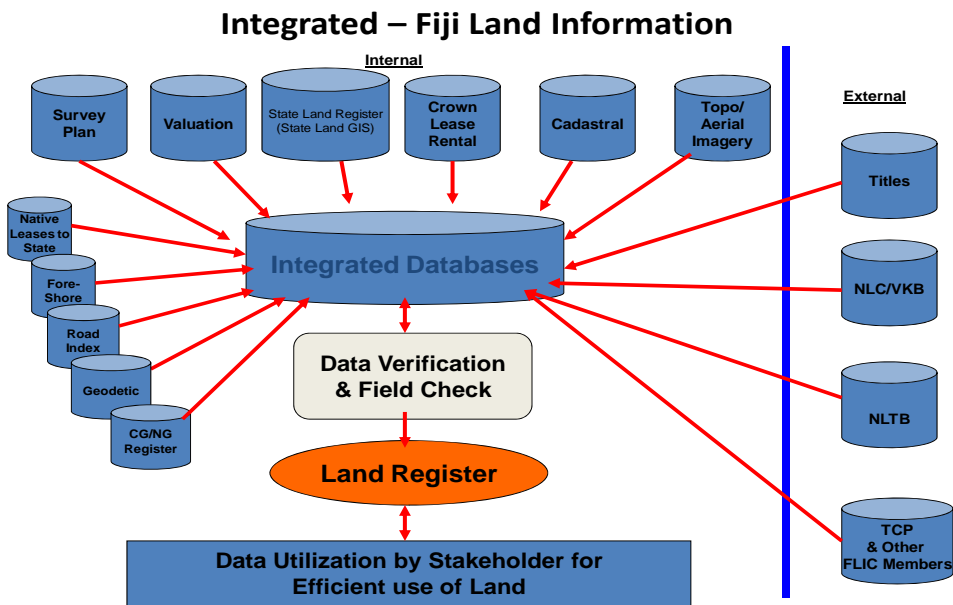
The System is linked live to Divisional Offices in Lautoka and Labasa through ITC services.

3.7.8 Government Rented Quarters – for Public Service Commission

An inventory of all buildings rented by State for office space and staff quarters

3.7.9 National Census Mapping System – for Bureau of Statistics

Holds records of National Census Boundaries – 1976, 1986 and 1996, & 2007.



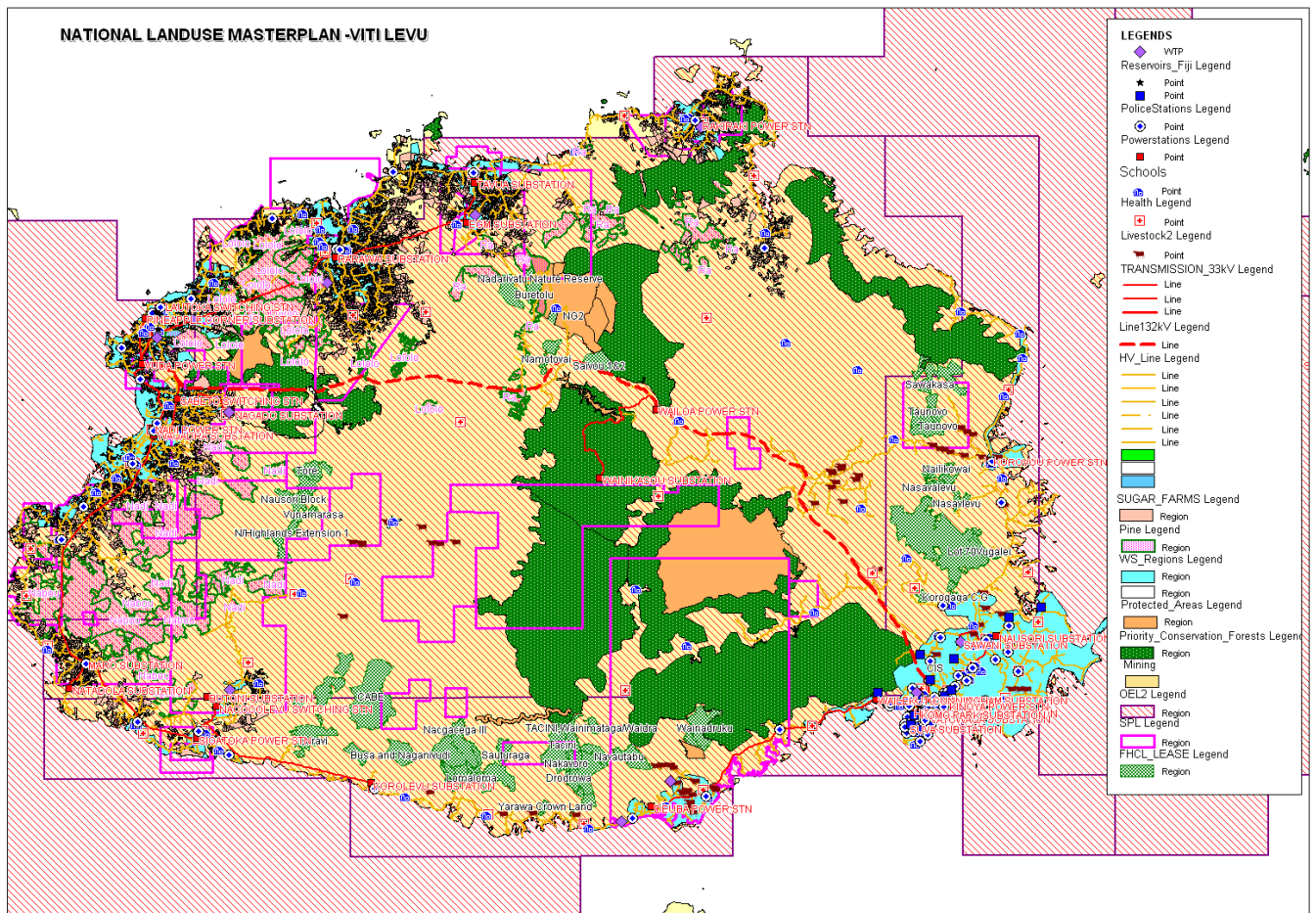
4. Current Projects

Few major GIS projects currently undertaken by the Fiji Land Information System Centre (FLIS) are focused on government’s priority plans for sustainable development centered on more economic use of land resources. Data exchange and sharing amongst FLIS and other willing stakeholders paved the way for the development of a National Land Register and the Land Utilization Map. These two projects will have a profound impact in the future development plans for the country.

4.1 National Land Register

The Register when completed will have all details of all land in Fiji – State Land, Native Land or Customary Land and Freehold. Data sets in various State Land Administration Databases and those with the iTaukei (Native) Land Trust Board (body that administers customary land in Fiji) and the Registrar of Titles for freehold are accessed for the compilation of the Register. By end of 2012, 100% of state land record, 25% of customary land and 50% Of all freehold details (land boundaries, lot numbers, areas, owner and lessees name, values, terms) will be verified, mapped and factored into the Register database.

management.



Existing development as data from different databases are integrated

4.3 Enhancements of Systems and Processes

FLIS has moved ahead in geospatial information initiatives incorporating existing expertise in systems computer programming and land resource information to design enhancement packages for management of state land leases, human resources and vehicle use monitoring.

4.4 Acquisition of Aerial Imagery

The Ministry of Lands and Mineral Resources being the only institute in Fiji that has in-house expertise in photogrammetry regularly acquires aerial photo imageries covering the entire country for land information updates on topographic details. Currently the Ministry through FLIS engages New Zealand Aerial Mapping for the acquisition of colored aerial photos at

1:20,000 scale. This project has to be completed by end of this year. Negotiations also underway with overseas companies for satellite imageries and possible set up of a satellite remote sensing centre.

5. Evolvement of Spatial Data Infrastructure in Fiji

The Fiji Land Information System Strategy is currently under review. The review has to consider the direction on which Land Information has to focus on from now. Automation of processes has now become a norm in the global context but data has to be formalized in the appropriate format for processing in the systems. Most ministries and institutions hold onto their manual data processes and most kept both the digital and paper formats where updates have to be factored in both. If Land Information advocates digitization for accessibility of data and sharing then that has to be confirmed and for all those involved to be attuned to the concept.

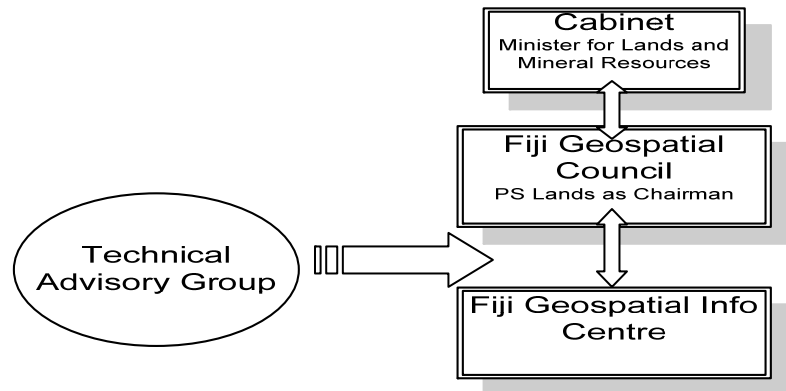
The review also needs to consider the validity of territorial notions and on the perimeters of traditional thinking and social culture where sensitivity of data pertaining to property rights and land ownership prevail. Relevant custodians need to identify levels of access to such data sets though this has not been clearly addressed in the formulation of the earlier strategy, the challenge will be to acknowledge data sources even in the event of multiple enhancements for the final output. FLIS has to be the centre of all data collected and disseminated with connections to all other databases for the Central Index or the Central Information Centre and has to be granted free accesses to such privileged databases at certain extents.

5.1 the Change to Geospatial Information

The other consideration for review is whether data in the context of Land Information is still relevant to the whole processes of acquiring information for mapping only. "Land information system gives support to land management by providing information about land, the resources upon it and the improvement made to it." – *Peter F. Dale, John D. McLaughlin. (1988) "Land Information Management" pp.8-11.* Today we see a whole range of management decisions based upon the data initially captured for land information and data being migrated from different sources. Basically land data are now seen as providing impetus for in-depth studies on diseases, environment and natural disasters. With it a wholesome of processes that provide GIS and IT personnel challenges to venture beyond their horizon of expertise in order to customize information that meet demands. Several suggestions come up for the renaming of FLIC and FLIS to denote the changes that now incorporate development and improvement of processes rather than mapping alone. The review has to confirm renaming the Fiji Land

Information Council as **Geospatial Information Council** and the Fiji Land Information Centre
Fiji Geospatial Information Centre

5.2 Council Structure



A major innovation for consideration is the inclusion of 2 or 3 geospatial experts in to be members of the technical Advisory Group assigned with the task of advising the Council as well as the Centre on quality control, standardization and specifications as well as on technology updates and directions. The Council will not to be confined to government ministries only but to also include Heads or Representatives of entities in the Private Sectors directly or indirectly involved in GIS and RS technology.

5.3 Strengthening of Connectivity

Cutting through the barriers of territorial notions remains a challenge for data and information sharing. Recent revival of Council Meetings and the strategy review will set the direction for a more cohesive approach to address institutional disintegrations alluding to data standards, quality and compatibility of processes for integrations. Realigning commitments to the **Geospatial Databank** strengthens data accessibility and sharing amongst stakeholders. Current uses of intranet services and portals within the Ministry of Lands and Mineral Resources have to be extended to cover for all stakeholders as well.

5.4 Satellite Remote Sensing

Real time data is vital for the country given its vulnerability to natural disasters. Change in global weather patterns now impact on aerial photography work in tropical climates – regular aerial photography coverage is not always possible. Negotiation is underway for either outsourcing mapping by satellite remote sensing or to acquire satellite imageries and facilitate map updating and enhancement of natural resource monitoring techniques locally.

5.5 Map Datum

Geodetic coordinates for mapping in Fiji are still in WGS 72 Spheroid and the country needs to adopt UTM projection and WGS 84 conforming to global standards. Some work has been done with the assistance of Geoscience Australia for the determination of ITRF coordinates for the 2008 northern Fiji Islands GPS Survey campaign Network. More concerted efforts that may need support regionally and from global authorities will have to be sought to resolve this.

5.4 Training

The country will continue to rely heavily on foreign support for technical training in IT, land surveying, GIS, remote sensing, photogrammetry, cartography and land use planning. Local tertiary institutes now offer Diploma courses in land surveying and Bachelors degree for land use planning. The University of the South Pacific in Suva will introduce the Bachelors degree in Geospatial Information in 2013. Advance degree courses are now being offered by Asian countries that will boost human resources development and add further dimensions and the development of geospatial information in Fiji. Overseas short courses, seminars and conferences that complement local events have greatly increase awareness of the regional and global directions.



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