

# Optimising Land Information Management in Tribal Lands of Botswana

Emmanuel TEMBO and Julian V. SIMELA, Botswana

**Key words:** Land Information Management, Data collection, customary tenure

## SUMMARY

It has been recognised that lack of land information is a major stumbling block to development in both urban and rural areas. Land information in Botswana is however, extremely inadequate in rural areas due to the customary nature of the land tenure system. The lack of adequate provision for the capture of existing land information has resulted in poor land management. The challenge is to see how best land information for existing land rights can be collected and managed for effective decision-making at both micro and macro levels.

This paper addresses the issues of land information management in rural lands in Botswana. The dual nature of the land tenure system within Botswana (land can be held under customary land tenure or can be converted to common law land tenure) is and has been a challenge for any land information system that has previously been applied (Botswana Land Information System, BLIS, Land Inventory for Tribal Areas of Botswana, LYNSIS). Land converted to common law, by virtue of its spatial nature, can easily be captured into an information system at the time it is converted. However since most of the land holding is passed on from generation to generation, there currently is no accurate method of knowing at any one time how much of this type or any other type of land holding there is, to whom it was allocated and who currently owns it or its location. It is this type of spatially related information that is important to land management that Land Boards need to capture in order to make an accurate assessment of its land holding. The paper proposes an integrated model for data collection, data exchange and distribution across the various stakeholders involved with rural land management. It proposes a land information collection mechanism that would optimise data collection and suggests a nation wide system that would allow for the update and dissemination of information based on the current state of the art information and communication systems. The proposed land information system would be supported by existing structures of fundamental data provided by the Department of Surveys and Mapping, Government of Botswana.

The proposed system falls within the aspirations of the national spatial data infrastructure and in essence would strengthen the ideals of establishing such an infrastructure.

# **Optimising Land Information Management in Tribal Lands of Botswana**

**Emmanuel TEMBO and Julian V. SIMELA, Botswana**

## **1. INTRODUCTION**

Land forms the basis of any economic development and its proper management can only be achieved if information on the said land is available. All stakeholders e.g. planners, administrators involved in land require information regarding land for them to make effective decisions. Land information collection, however, has always been an expensive exercise and therefore in most areas in rural Botswana information is incomplete. This paper provides a brief background to the administration of land in tribal lands in Botswana and sketches attempts at setting up Land Information Systems in the past. The paper ends with a proposed model for a Land Information System that would promote data sharing between different stakeholders in land administration.

## **2. ADMINISTRATION OF LAND IN RURAL BOTSWANA**

Land administration in rural Botswana is governed by the Tribal Land Act of 1968. The Act governs access, use and disposal of 71% of land in Botswana. It provided for the establishment of Land Boards whose functions involve the grant of customary land rights. Part III of the Act states that the powers vested in a Chief under customary law in relation to land including:-

- a) The granting of rights of use of any land
- b) The cancellation of any grant of any rights to use any land
- c) Hearing of appeals from, confirming or setting aside any decision of any subordinate land authority;
- d) The imposition of restriction on the use of tribal land

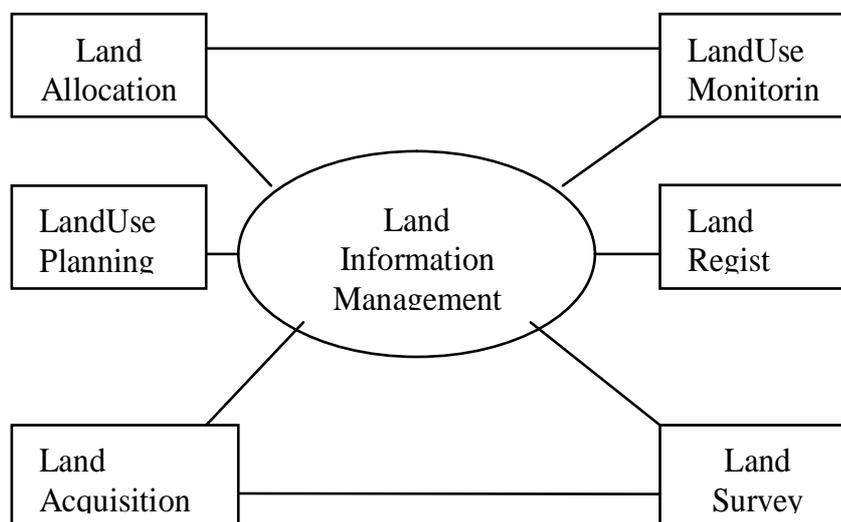
Shall be vested in and performed by a land board. In essence the Tribal land Act transferred powers previously vested in the chiefs to the land boards. The Land Boards are body corporates composed of elected members of the community. The current composition of the Land Boards is as follows:-

- 1) 5 members selected and appointed by the Minister from a list of 20 candidates elected by people living within the jurisdiction of the respective land board and submitted to the Minister
  - 2) 5 members appointed by the Minister;
  - 3) 1 member representing the Ministry of Agriculture
  - 4) 1 member representing the Ministry of Commerce and Industry
- (Government of Botswana, 1994)

The functions of the land boards with respect to land administration have been identified as land allocation, Land Registration, Land Use Planning, Land Use Monitoring, Land Acquisition and Land adjudication (Tembo, et. al (2001)).

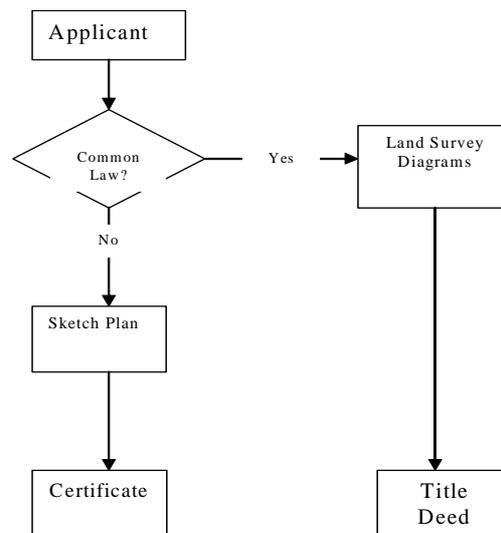
One of the major problems in most of the land boards is the failure to deliver on the said functions due in great part to the lack of qualified manpower. One area in which the lack of manpower has adversely affected service delivery in land boards is in record keeping. The Presidential Commission on Local Government Structure (2001) reports that it received submission regarding the poor state of records both in terms of land board minutes as well as the land inventory (pp89). Submission suggested that in “order to manage land in contemporary society, adequate information was required on the location, size and use of land to be managed. That maps and associated information should be increasingly used in computer format thus facilitating more informed decision making by the Land Boards.” The commission concluded that Land Boards should be encouraged to develop and train personnel in record keeping and computerization of records. It is clear that the current system of land record keeping does not satisfy the public. There is need to develop integrated systems that provide some form of one-stop-shop for the public and would allow for a more effective land board service. Dale & McLaughlin (1999) suggest that an integrated land administration reduces costs through among other things, minimizing duplication, economies of scale, and the potential synergies especially the sharing of service provision among different property agencies. In this case Land information systems developed should not only form the basis of any of the functions of a land board and administration but also be part of national integrated system. Undoubtedly any Land Information System will be fraught with problems emanating from the type of land tenure, the laws for which it must conform and the political organization of the society. A system that is proposed should naturally take cognisance of this and any other issues especially the technical and political ones.

Land Information management should however be the nexus of all the Land administration functions of the land board as shown in Figure 1.



**Figure 1:** The Land Information Management Nexus

The issues concerning tenure dictate how land information is gathered in Tribal land areas of Botswana. The Tribal Land Regulations regulation 10(1) states that a Land Board in making a grant for a piece of land without a survey diagram, the land board shall describe that land by reference to permanent and ascertainable boundary points or boundaries where possible and whenever possible to attach a sketch plan. The description or the sketch plan need not be in any coordinate system. On the other hand in order for a common law grant to be registered the Tribal Land Act regulation 21(2) requires that a survey diagram be obtained for the granted piece of land. A survey diagram is prepared according to the Land Survey Act. Tembo, et.al (2001) identified two routes to land registration (see Figure 2)



**Figure 2:** routes to land registration

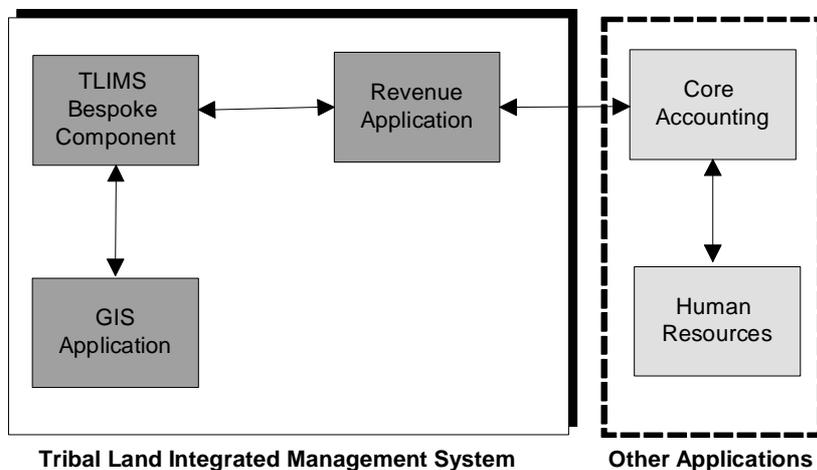
The way in which land rights are granted under regulation 10 suggest that the spatial component of land records is not in a sufficient technical detail. This is insufficient in the sense of creating a spatial database that would truly form a base for GIS. The sketch plan path is the one taken by most land owners in tribal land. It is reported that the vast majority of titles on tribal land are inadequately recorded and that many titles are not recorded at all (Natural Resources Services, 2003). Ng’ong’ola (1999) is also quoted in the Policy review document by Natural Resources Services as stating “One problem that severely undermined the Botswana system was the failure to provide, initially, for the recording and capturing under the system of all existing customary land rights.” In many respects whilst the introduction of the Tribal Land Act was meant to modernize the customary land tenure by introducing a written law it has had difficulties in integrating the customary land rights into a standing information system.

### 3. THE DEVELOPMENT OF TRIBAL LAND INFORMATION SYSTEMS

The Government has attempted to set up land inventories in the past mostly on a pilot basis (Review of Botswana National Land Policy, 2003). The first was the Tati Settlement Scheme in 1969 which was a manual system. The first partly computerized system was used to develop an inventory in Maun for the purpose of supporting physical planning activities (Ibid). The report further cites land inventory pilot projects in villages of Ramotswa where aerial photographs were used and in Goodhope where the intention was to integrate land survey data and other information. These pilot projects were started in the mid 1990s. The Goodhope project spawned the Land Inventory for Tribal Areas of Botswana (LYNSIS) which was introduced in a number of land boards. As indicated earlier, however, most of these projects have never been replicated anywhere in the country. The Review of Botswana National Land Policy report states that this could be due lack of understanding of what an inventory should contain and the failure to allocate sufficient resources including training.

#### 3.1 The proposed Tribal Land Information Management System

The Government through a consultant is developing the Tribal Land Information Management System which it envisages would integrate the land administration work. The system is to have the following functionalities (Figure 3); Land Use Plan, Process Plot Applications, Plot allocations, Change Land Use, Transfer Land Title, Plot Registration, Sub-Divisions, Sub-Leasing / Sub-Letting, Development Control / Compliance, Acquisition and Compensation, Adjudication and Land Board Revenue. At the time of writing the system was still at design stage.



**Figure 3:** Proposed TLIMS

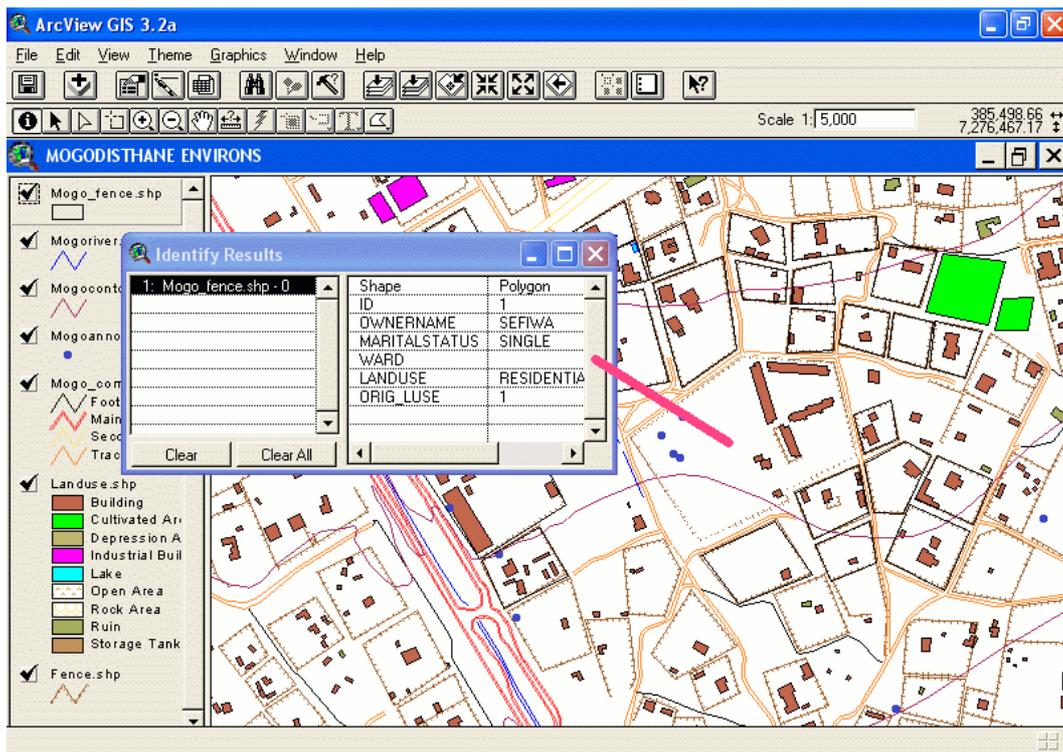
## 4. DATA COLLECTION

A system however is as good as the data it has. There is need to systematically collect data about existing land holdings and this undoubtedly is a huge task. To optimize the data collection in existing developed areas two things must happen:

- a) Data identifying existing boundaries must be collected. Where these are not available a process of systematic adjudication will be required.
- b) Collection of attribute information about ownership, nature of use of the land and original use for which land was allocated.

### 4.1 Defining boundaries

Defining boundaries is associated with some transaction costs, implying that the degree of precision with which boundaries will be identified will depend on the nature and use of the land in question. (World Bank, 2003). Given that the land boundaries or sketch plans that are required for customary grants are not specified technically it can be taken from ortho-photographs or DXF or DWG drawings from the Department of Surveys and Mapping. For the areas that are economically active the Department of Surveys and Mapping has developed 1:5000 digital map sheets which could be used as a base for the GIS. An example of the digitized map which has been converted into ArcView shape file format is shown below



**Figure 4:** Digitised plot boundaries of a Tribal Area (example of captured information)

## **4.2 Data to be collected**

According to the Tribal Land regulations Regulation 6(1) the following information needs to be supplied to a land board by an applicant for a customary law right;

- a) The full name and postal address
- b) Marital status
- c) The ward, if any, in which the land is sought
- d) The nature of the right sought
- e) The location, description and extent of the land affected

The actual tribal land register should also contain plot numbers, date of plot allocation, name and address of allottee and plot description (e.g. number) and location (e.g. name of ward, map reference/ or coordinates).

For the land boards to collect this information and create proper registers a model is hereby proposed that would also enhance data shareability and reduce duplication.

## **5. LIS MODEL**

The proposed LIS will attempt to address the current deficiencies in land administration and management by providing linked data to all stakeholders at different levels of accessibility and data manipulation. The success of the proposed LIS hinges on all stakeholders accepting ownership of the Land Information System and all playing an important role in the financing, design, implementation and management of the system.

In order for the system to work properly for all stakeholders, all would have to provide the minimum data requirements for the smooth running of their operations and these requirements would be the basis for determining what attribute data is required during the data collection phase. As indicated earlier the basic data as stipulated in the Tribal Land regulations have to be collected.

### **5.1 Structure**

The proposed LIS model should have a central database housed and managed by the Ministry of Lands and Housing and this would be made accessible and linked to all relevant stakeholders responsible for land administration and land management. These would include the Ministry of Lands and Housing, all the Land Boards, the Attorney Generals Chambers, whom amongst other things handle the legal aspects of land allocation and management, the Ministry of Finance who would oversee issues relating to land taxation and revenue collection. The public should also be allowed limited access to the final system in order for them to be appraised of developments and availability of lands in their respective areas. This would be in line with the Government's 2016 vision of a well informed and educated nation.

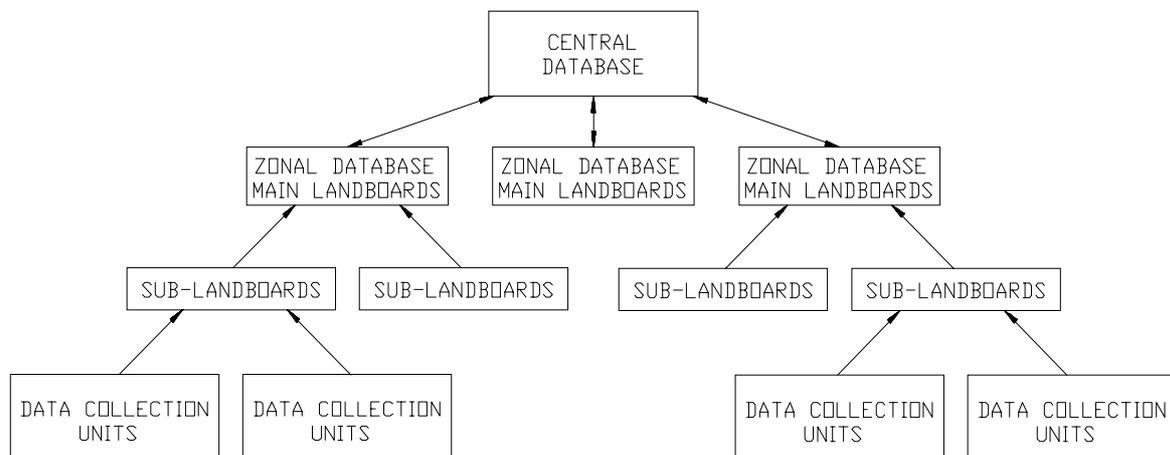
Under the Ministry of Lands and Housing, the Department of Surveys and Mapping would have the responsibility of furnishing coordinate data, aerial photography, digital ortho-

photography and other data pertaining to the initial digitization of plot boundaries and subsequent allocation of plot numbers to be used within the system. The department would undertake the responsibility for the reconciliation of surveyed tribal land, converted to common law. Still under the same ministry, the Town and Country Planning Board, whose responsibility is the proper planning and zoning of localities gazetted as planning areas, from the data collected this model would have the capability of determining areas that have been allocated, their zoning and provide other data relevant to planning issues. In their capacity as the department responsible for the registration of title to land, the Attorney General's Chambers would have access to data collected to track transfers of land, land ownership, dispute resolution etc.

## 5.2 Accessibility

It is envisaged that as attributes to land change, relevant departments have access to their own data and be responsible for its upkeep and correctness whilst giving other stakeholders read-only privileges.

To facilitate the exchange and shareability of information it is proposed that the database be accessible from and linked to the main Land Boards throughout the country. The main Land Boards at zonal level would similarly be linked to the sub-land boards and would serve as the main holding and verification centre for data collected at sub-land board level before its transfer to the central database. At sub-zonal level, the sub-land boards would be equipped with data collection units capable of the collection of attribute data relevant to spatial location, ownership, legal status, land use/zoning etc, as well as the verification of plot size and shape. The figure below illustrates the linkages described above.



**Figure 5:** Schematic for data flow within a Land Board Zone

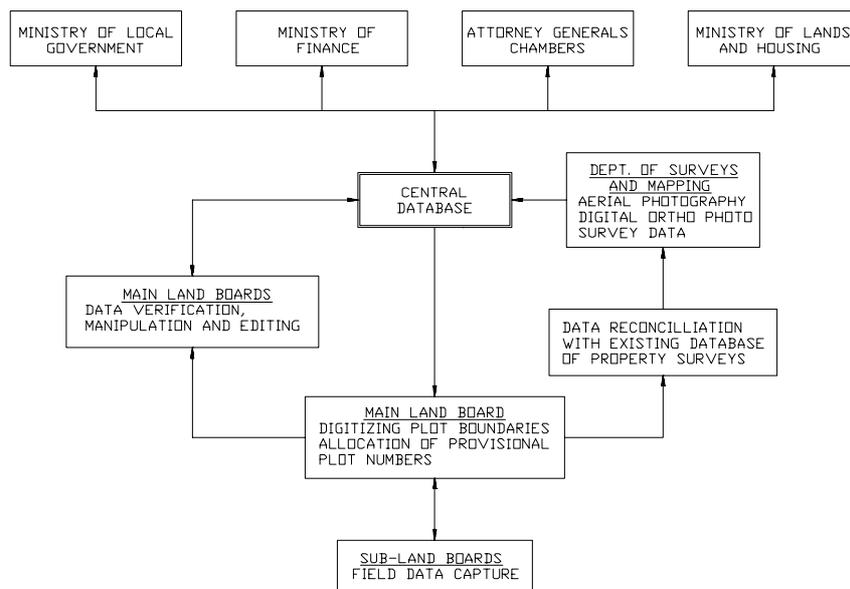
## 5.3 Data Security

To ensure the security and validity of any information collected, there would need to be limited accessibility at the different levels within the system. At sub-zonal level, the facility

would only permit download and transfer of data to zonal level. Data collection units would have the functionality of new data entry and field editing of data with non or limited access to updating of information currently in the database. At zonal level, data verification and data exchange between the zonal and the central databases would enable inter-zonal database updating. This facility would enable collection and update of the database in cases where partial initial data collection would have resulted from residents staying or working in a location different from that of the plot of land.

## 6 DATA TRANSFER PROCESS

Data captured in the field will be done using data logging or collection units capable of downloading a GIS type overlay of linked and geo-referenced aerial and ortho-photography and digitized polygons of plot boundaries. A similar copy of data will be saved to the database to serve as an easy referencing system that could be used by stakeholders. The data logging units would also be able to upload all the gathered information into the database without need for manual data entry. This method would eliminate all possibility of human error in the transfer process and improve the reliability of the information obtained. The figure below is a schematic showing the flow of information between the stakeholders, the database and a single Land Board Zone.



**Figure 6: LIS Model for Land Management**

Within each zone the main Land Boards will be tasked with the digitization of polygons and the preliminary allocation of identification numbers that would reference database information to a particular piece of land. The purpose of the photography will be to easily define zones that will be worked on. On site, the photography will be used to quickly orient the user and verify that the polygons as digitized conform to ground truth. The polygon plot overlay would be used to trigger a series of linked database tables containing all the attributes

required for an efficient land management. On site, this would be done by identifying any coordinate bounded by the polygon sides.

## **6.1 Field Data Collection**

Due to the urgency for the operability of LIS, the initial gathering of data would involve both Land Board and private land surveyors. The role played by both at this stage would be to speed up the data capture process as well as verify that the polygons as digitized conform to boundaries on the ground. It is recognised that in any data capture project there is a tradeoff between quality, speed and price. (Longley et.al, 2001). It is being recommended here, however, that a strategy of rapid data collection be adopted which will have both human and financial resource implications. The software used during data collection should have GIS capability and the option to modify the shape of a polygon to suit the features on the ground. Data dictionaries of the minimum data to be collected would be uploaded into the loggers so that the basic data is not left out at the time of collection.

Since most major villages have been designated planning areas, the current procedure is that allocation of plots only occurs once the land has been demarcated. Entry of this data into the database will be easy in that it would only involve identification of parcels of land based on the available coordinates and plot numbers approved by DSM. This would run in parallel to the initial gathering of data in areas where currently no data is available. At the end of the initial data capture process, any ongoing capture and input of data will fall within the jurisdiction of the sub-land boards. Editing, verification, updating and data manipulation will be done at zonal level.

The link between the central database and the stakeholders will make it possible to keep track of availability of land, planning, zoning, allocation, taxation etc.

## **7 CONCLUSION**

The proposed Land Information System must form the basis of all spatial data and would be used in the management of land in rural areas. It is noted that the state has embarked on two systems which will manage land viz; the State Land Information Management Systems and Tribal Land Information Management System. These two systems being developed will hopefully be structured in such a way that access to information that will be in the system will not only be for the technocrats in the area of land management but that it will be a system that everyone working in the area of land and interested in land will have access to. The model proposed here is intended to aid in the sharing of data and improving data accessibility for a host of different land information users.

Though the collection of data required to populate the land information system seems onerous it is a process that needs to be done if the information system will truly be meaningful. As Fourie (2000) has stated the integration of customary and statutory systems remains a major challenge for policy in Africa and more work is required to clarify both the technical and institutional options available, but it is hoped that the new systems will begin the marriage between the customary and statutory tenure systems in Botswana.

## REFERENCES

1. **Dale P & McLaughlin J, 1999**, "Land Administration". Oxford University Press.
2. **Fourie C, 2002**, "Comments: Designing Viable Land Administration." Paper presented at the Regional Workshop on Land Issues in Africa and Middle East and North Africa Region, April 29- May 2, Kampala, Uganda
3. **Government of Botswana, 2001**, "Report of the second Presidential Commission on the Local Government Structure in Botswana." Gaborone, Government Printer
4. **Longley P, Goodchild M, Maguire D & Rhind D, 2001**, "Geographic Information Systems and Science, Chichester, John Wiley.
5. **Natural Resources Services, 2003**, "Review of Botswana National Land Policy". Department of Lands. Unpublished
6. **Tembo E. ,Manisa M & Maphale L., 2001** "Land Information Management in customary Land of Botswana" Proceedings of FIG conference on Spatial Information for Sustainable Development, 2<sup>nd</sup> -5<sup>th</sup> October 2001, Nairobi, Kenya
7. **World Bank, 2003**, "Land Policies for Growth and Poverty Reduction", Oxford University Press

## BIOGRAPHICAL NOTES

**E. Tembo** MSc Geodetic Engineering, KTH, Sweden (1993), BEng Land Surveying UNZA, Zambia (1987)

Currently Lecturer at the University of Botswana in the Department of Civil Engineering (since 2000). Has worked previously as Lecturer with the University of Zambia (1993-1999) and City Land Surveyor with the City Council of Lusaka, Zambia from 1988-1991

**Julian V. Simela** BSc. Land Survey Eng. Purdue University. USA (2003), Dipl. Mining, Haileybury School of Mines, Canada (1981)

Currently Senior Instructor in Engineering and Mining Surveying, University of Botswana, Consultant in Engineering and Topographical Surveying. Previously has worked in Mineral Exploration (Coal & Water) (1981-1986), Engineering and Land Surveying (1986 – present)

## CONTACTS

Mr Emmanuel Tembo  
University of Botswana  
Department of Civil Engineering  
P/Bag 0061  
Gaborone  
BOTSWANA  
Tel. +260 3554349  
Fax +260 3952309  
Email: tembo@mopipi.ub.bw  
Web site: <http://www.ub.bw/civil>

Mr Julian Simela  
University of Botswana  
Department of Civil Engineering  
P/Bag 0061  
Gaborone  
BOTSWANA  
Tel. +260 3554319  
Fax +260 3952309  
Email: simelajv@mopipi.ub.bw