The Challenges of Developing Cadastral System in Eritrea

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Key Words: Cadastre system of Eritrea, cadastre systems, progressive cadastre, proper management, lessons learned.

SUMMARY

The Cadastral Office of Eritrea, established at the end of the 19th century during the Italian colonial administration was intended to serve the main goal of guaranteeing security of property ownership for Italian settlers. It was organized under the High Courts, excepting for a brief period of time under the Municipality (during the Ethiopian colonial period in the 1970s). Since the fourth quarter of 1999 it had been under the Ministry of Land, Water and Environment, first as a Division and from August 2003 as a Department. It has a long history, but still retarded in becoming a modern national cadastral system, and in total employs 38 staff (permanent and temporary).

The main mandate of the Office is to register all land, rights over land and duties that emanate from such rights, register owners/right holders together with the property, register transfer of immovable property, provide information to persons enquiring whether the property has any encumbrances, charge appropriate fees for services rendered, establish registration offices or districts, etc.

During its long history of existence, the Cadastral System of Eritrea did not undergo through any qualitative change in its procedures. The Registration Law of May 1997 changed the voluntary nature of registration into compulsory; however, due to inadequate capacities it has not been strongly enforced. Besides, the system is still incomprehensive: it has no national or definite geographical coverage; the spatial data is not integrated with the textual data.

In the last 10 years attempts have been made to establish computerized cadastral and modern archiving systems, open regional offices to implement compulsory registration and introduce appropriate service charge fees. However, the achievements attained are limited.

The paper gives background on the Eritrea's cadastral system, its current status and overview of cadastral systems, and presents challenges, lessons learned and prospects.

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1. INTRODUCTORY BACKGROUND

The Cadastral Office of Eritrea, the office for the registration of land and other immovable property, was established at the end of the 19th century during the Italian colonial administration. The cadastre system in many European countries, influenced by the Napoleonic cadastre developed from the need to tax land equitably (Larsson, 1996, pp. 2-4) whereas in Eritrea it was established to guarantee security of ownership for Italian settlers. It was designed to serve colonial policy since the main goal of Italian colonialism was to make Eritrea a settler colony. The registration system remained voluntary, mainly confined to urban and some rural commercial farms.

The registered property had simple survey plan, and records related to ownership, area and plot number. Buildings had to fulfill legal allotment, construction permit, approved plan and building license by the technical office in order to qualify for registration. Hence, the Cadastral Office registered buildings that have physical plan and building license for the main urban centres and surveyed parcel of land allocated for commercial agriculture in rural areas. In this way the Cadastral Office existed for more than a century, but without any qualitative change in its procedures. It did not register traditional buildings in villages that did not have approved plan.

The Notary Public came into existence with the establishment of cadastral system. Indeed, both experienced difficult periods and attempts at their elimination, particularly during the 1970s of Ethiopian colonial rule. The presumed justification was that all extra-houses, small and large were nationalized and the need for registration of private houses was considered as a bourgeois practice (Weldegiorgis, 2009). Nonetheless, they narrowly survived as institutions.

The Cadastre Office and that of the Notary Public worked in close collaboration. The Eritrean Notary plays the role of an agent for the authentication of contract agreement in transaction of property. It is similar to other countries' 'real estate agent' but unlike them prepares all the paper work, registers title- deeds and sends the deeds to the Cadastral Office for title registration. The deed is a record of contract of a particular transaction that serves as specific agreement.

The registration system remained sporadic and incomprehensive, but maintained property records with utmost care. After Eritrea's independence, the Cadastre Office continued functioning and despite some shortcomings, it was the main supporter and reliable source of evidence providing property security in the Housing Commission's verification of property ownership.

By 1994, the State of Eritrea stated its land policy in its Macro- Policy and this land policy was followed by Proclamation NO. 58/1994 – 'A proclamation to reform the system of Land Tenure in Eritrea, to determine the manner of expropriating land for purposes of development, and to determine the powers and duties of the Land Commission'. However, the introduction of an efficient, simple and modern system for the registration of land and buildings was imperative for an effective implementation of the Land Law and expediting national economic development. Hence, in May 1997, Proclamation No. 95/1997 – 'A Proclamation to provide for the Registration of Land and other Immovable property' was issued and the registration system declared to become compulsory. But, due to inadequate capacities it has not in practice gone far beyond the voluntary.

Currently, the Cadastre Office is under the Ministry of Land, Water and Environment (MLWE). Previously it was organized under the Ministry of Justice. But since the fourth quarter of 1999, it had been under the MLWE, first as a Division and from August 2003 as a Department (Figure 1, p. 10). The MLWE itself is new, established in March 1997 during the second restructuring process of the civil services. Structurally, the Cadastral Office has two divisions and two units in the head office: Cadastral Information System and Registration divisions, and Supervision & Evaluation (M & E) and Human Resource Development (HRD) units. There are also five regional Cadastral Office Units. However, currently only the offices for Northern Red Sea and South Zones are functional. They were established respectively by the end of first quarter of 2006 and second quarter of 2007. In 2012, there is a work plan to open offices in all regional seats and major towns to implement compulsory registration.

2. THE CADASTRE SYSTEMS: GLOBAL OVERVIEW

Unlike the Italian system, the cadastre and land registry systems of Germany, Austria, the Netherlands, Switzerland, etc are closely linked (Larsson, 1996, pp. 30- 34). The Eritrean cadastre and land registry systems, though voluntary were integrated in one office. Cadastre, as a parcel- based land information system for social and economic development, in many European countries developed from the need to tax land equitably. The Eritrean system, with the main purpose of guaranteeing security of property ownership for Italian settlers was manually carried out and confined mainly to urban and some rural areas.

The purposes of cadastral systems vary and we find many cadastral systems at work. Whatever so, a cadastre needs to be a parcel-based land information system (LIS) consisting of textual and geometric data, supervised by the government. Records and spatial data are integral parts of the cadastre. It is now known that parcel referencing should be unique, accurate, easy to understand and remember, easy to use and maintain, flexible and adaptable, defines points and areas, and economic to introduce. Modern cadastre is multipurpose: it is used for land development, land and building registration, taxation, mortgage, land use planning, statistical data, environmental management. Many European countries like Germany, Austria,, much of Central and Eastern Europe and parts of Scandinavia provided robust models of multipurpose cadastres, which is considered as 'best practice' in the late 20th century (Bennett, et al, 2011, p. 3). Countries reform and modernize their cadastral systems for improved management of land and its resources, promoting political stability and social

justice, protection of land use right and tenure for users, promote land markets where land is privately owned, and introduce modern information technology (Osterberg, 1998, pp.2- 3).

In the Scandinavian countries such as Sweden and Finland real property formation, cadastral mapping, mutation, registration of real properties, ownership and legal rights, valuation and taxation are all combined in a basic cadastral system whereas in many parts of mainland Europe the cadastral systems evolved for the purpose of land taxation (ECE, 1996, P. 4). Experiences of many countries show failure to modernize cadastral systems by developing mapping institutions, failure to develop equitable land policies and practices had been and remain to be the primary cause of poverty, inequity and political instability in many societies (UCL, 1998, p. 36). Land policy, which is generally related to economic development should ensure social justice and equity, political stability, promote tenure security, improved access to credit, resolution of issues, provision of land for the poor, ethnic minorities and women. But access to land should not be viewed one-sidedly as benefiting only the right holders, but also guaranteeing security of land parcel itself in a sustainable way (Enemark, S. and Van del Molen., 2008, p. 12). Land policies are not static and change over time to reflect the objective reality of the country in question. And to properly respond to new global challenges, such as climate change, food shortage, environmental degradation and natural disasters, integrating land-administration systems with their cadastral components looks imperative. However, practicing the 'Global Land Administration Perspective' (Enemark, 2001) is a long way to developing countries like Eritrea.

The cadastre and land registry systems should be treated as components of integrated LIS. Cadastre and land registry systems need to be comprehensive and compulsory to provide the necessary benefits to management. This is practiced in many European countries such Germany, Austria, the Netherlands, Sweden, Denmark, etc. In Germany, attempts are being made to establish a registration of buildings as an integral part of the cadastre. Generally, the cadastre and land register systems of Western Europe are closely linked, although the French Cadastre as pioneer has not progressed far in the link of the two relative to other European countries. The French cadastre and land register systems are less linked. They lack updating of records and plans and their impact is seen in the former colonies in North and West Africa, and similar to that of Eritrea covers only a portion of land with focus on urban areas, although its nature is now changing. In Spain and most of Latin America, registration of deeds is independent of the cadastre. The German adaptation of system of titles instead of system of deeds at the end of the 19th century was a flexible approach (Larson, 1996, pp.24-39).

The Spanish and Italian systems, influenced by the French system are still partially developed lacking national coverage. Similarly, Greece has no comprehensive and homogenous national cadastre. In most countries, the cadastre systems include land registration. The European experiences show that sporadic registration like that of Eritrea, England and many other countries is insufficient for establishing comprehensive land records. Even in England, until recently land was registered only on sale and is subject to long lease (Larson, 1996, pp. 32-43). Cadastre systems also need to address issues, such as customary rights, which is still a great challenge for cadastre organizations in many developing countries (Osterberg, 1994,

p.7), including Eritrea. Moreover, informal settlements present major cadastral challenge in many developing countries. The rapid urban growth is forcing 30% of developing countries urban population live in slums. In sub-Saharan Africa 90% of the new urban settlements are informal settlements, taking the forms of slums (Potsiou et al, 2010. p. 3). In South Africa for example, there are about 360 separate informal settlements located within the boundaries of Johannesburg (Fourie, 2000, p. 1). It is also a major issue in the developed world. Upgrading squatter settlements into planned settlements is a major challenge in terms of resources for construction and titling

The cadastre system in England and its former colonies came into existence recently; the introduction of compulsory registration in the Anglo-Saxon countries is therefore of recent phenomenon. The British land registration system has had strong influence in its former colonies. The Torrens system of Australia, for example, is influenced by English Law and practices having' title register' and its impact is also seen in East Africa such as Kenya and in the provinces of Western Canada. The deficiency of the Torrens system of Australia is that registration was done only when new land grant was given by the state. Land registration system in the United States of America is based mainly on private conveyance and registration of deeds; it has limited success in 'title registration' in states that followed the Torrens system of voluntary title registration. India is one of the exceptions where many provinces established cadastres only for taxation purposes (Larson, 1996, pp. 44-53).

In Northern Europe, the cadastre system of Denmark is similar to that of Western Europe where there is integrated cadastre and land register systems and comprehensive cadastral map connected to a common reference system. Similarly, the Swedish and Finish systems are closely linked, having 'title registration' based on cadastral units. The Swedish system has been further integrated with land register through automation. European cadastral and land register systems are strongly influenced by LIS: multiple uses, automation, geocodes and digitization (Larsson, 1996, pp. 32-39) Although no country has achieved complete automation of its cadastre system, Sweden may have gone the furthest in establishing an automated, online, integrated system of cadastral, land register, land taxation, and population records.

In Eastern Europe, conventional cadastres, like that of Eritrea exist; however, there are strong tendencies to develop cadastral systems into systems of multi-purposes. The Swedish and Finish Cadastre systems developed from simple cadastre and land register progressively into multi-purpose operating systems through gradual upgrading and improvement (Larsson, 1996, pp. 32-39). Appropriate policy and determination at the top are imperative for success, even though constraint of resources in developing cadastre systems occurred, as the experiences of many European countries at the 19th century show. Computer technology offers excellent opportunities for automation and creation of LISs, but is dependent on an infrastructure for maintenance and communications and access to well-trained operators (Osterberg, 1994, p. 9) where many developing countries are lacking the necessary resources for procurement of technology and professional training.

The development of cadastral systems is inconceivable without the development of mapping /surveying institutions. In almost all European countries, mapping works are led by national mapping agencies where the principles of mapping/ surveying - control, consistency, economy, independent check and maintenance - are guaranteed (UCL, 1998, p.9). Developing countries like Eritrea lack the necessary expertise and other resources to develop their cadastral systems and mapping institutions. Mapping/surveying is a tool of planning and managing of land and its resources. But there is a gap for technology and skilled profession and hence strict follow-up of the basic principles of mapping/surveying remains a significant challenge for poor developing countries like Eritrea.

Traditional concepts of cadastre and land registration are being replaced by 'Cadastre 2014'. Cadastre 2014 is a 'methodologically arranged public inventory of data concerning all legal land objects in a certain country or district, based on a survey of their boundaries….' (Steudler & Roberge, 2001, p. 24). It also contains official records of rights on the legal objects. Its design elements demands survey accuracy, systems of layered property objects, third (height) and fourth (time) dimensions (GIM International, 2010, p. 37). These design elements are modeled for developed countries ignoring the needs of poor developing countries where land-rights infrastructure is a priority to fight poverty. I agree with Roberge's view (Ibid, p. 41) on the challenge faced by the design of survey accuracy incomprehensiveness and the need to develop other design elements appropriate for developing societies. Time will tell whether the design elements of Cadastre 2014 and beyond are achievable. Developing countries are faced with many complicated issues and thus societal needs vary in addressing pro-poor land administration systems. I thus support the inappropriateness of 'one-size-fits all' (Ibid, p. 45). The Eritrean Cadastre is still mainly traditional and incomprehensive having a long way to travel towards Cadastre 2014 and beyond.

3. THE ERITREAN CADASTRE SYSTEM

Cadastre is an up-to-date information system on land and other immovable property based on a division of land into parcels. It gives information of rights (ownership, usufruct, and lease), transactions of ownership and right, mortgages, etc. The lease period varies from country to country. The lease period in Eritrea, for instance is up to 60 years, whereas in many countries it extends up to 999 years. The Eritrean lease can be renewed upon the agreement of the two parties. The main mission of the cadastre system is to guarantee security of property ownership and right and to facilitate proper management of land and its resources, thus contributing to sustainable development. The advantages include:

- Guarantee security of ownership or right of use;
- Provide credit through mortgaging buildings;
- Protect registered state-owned land;
- Reduce land disputes and less work for the courts;
- Improve conveyance of property transactions;
- Improve property management;
- Produce statistical data for management; etc.

Land is scarce resource that needs proper management to put land and its resources into good effect. Land management covers activities relating to its management as a resource from social, environmental and economic perspectives and includes farming, mineral extraction, property and estate management, and physical planning of urban and countryside, property conveyance, property assessment and valuation, implementing land-use policies, development and management of utilities and services (ECE, 1996, p.5). To do so accurate information of land and its resources is imperative.

Towards these goals, the Government of Eritrea issued the Macro Policy (GoE, 1994) in which it stated its land policy. The goal of land policy as already indicated is generally related to economic development, social justice and equity, security of tenure, political stability, etc. After issuing its Macro-Policy, proclamations related to land and registration were issued. The main features of the land law are the following:-

- All land is owned by the state;
- Eritrean citizens (>18 years) have equal right to *tiesha* land (residence plot in village);
- Farm land is allocated on usufruct basis for those whose livelihood depend on farming;
- Usufruct rights are given for life-time of the individual and offspring are given preference in the reallocation after the death of the usufruct holder;
- Leaseholds are provided for housing, commercial, and other social services;
- Women have equal rights to land as men.

Land law is a means for implementing land policies, provides definitions and rules regarding the nature of land tenure and connected property rights. To fill this gap, Legal Notice - Regulations for the Distribution and Administration of Land was issued. But this was not adequate for effective implementation of the land law and thus Registration Law was issued. The main tenets of the Registration Law and main mandate of the Cadastral Office can be summarized as follows:

- Register all land, rights over land, duties that emanate from such rights, and the transfer of property through sale, donation, succession or other manners. But the delay of reinstating public notary in all regions has been a constraint for accessing services secure transfer of property.
- As necessary register all *tiesha* land, agricultural usufruct, leasehold, land utilized and unutilized by the state. Usufruct land rights are not fully enforced and hence negatively impacting on land registration**.**
- Give information on transfer of immovable property for any encumbrances by charging appropriate service fee.
- Register right holders of land together with immovable property erected over it.
- Designate Eritrea as one registration district, or as many as may be necessary.

The main purpose of land and property registration is to establish certainty of ownership and right through publicity and legal protection. Data in the cadastre include: textual data of property section- property identifier, property address, location, land use, land and building area, building date and type, building purpose and license, boundaries, etc.; proprietorship section such as owners/right holders name, address, id number, spouse name, date of purchase, vendor's name and address, etc; and encumbrances such as mortgage, pledge, release of mortgage/pledge, etc. So far, the textual data has not been integrated with the spatial and the spatial part needs to develop. The development of spatial data infrastructure (SDI) is essential to integrate the two and GIS as a tool can address the challenge through 'measuring, managing and acting'. But the full potential of GIS can be realized only when the necessary SDIs are in place at the local, national and transnational levels (Masser, 2010, p.8). In Europe organizations are building SDIs through INSPIRE to enhance access to geographic information whereas developing countries like Eritrea have a long way to go.

To properly manage land and its resources and undertake development goals in a sustainable way, accurate information of land and its resources is essential. Accurate information of land and its resources is not possible without the development of mapping/surveying institutions, in which Eritrea's mapping institution is young. Mapping/surveying should be at the service of all development issues related to land and its resources. Cadastre comprises textual and spatial data and thus mapping and cadastre organizations are interlinked and in most countries closely organized. This is lacking in Eritrea.

Urbanization is growing fast. Asmara, the capital city, for instance had a population of 98,000 in 1939 (Free Encyclopaedia, 2009). In 1998, the Municipal registration shows that the population of Asmara was 429, 939 and by the end of 2008 this has grown to 570, 000. The number of immovable property that can be registered could be estimated from the fast growing population. The Housing Commission's estimated data of housing of major towns, built before the country's liberation (1991) show to be about 66,000 (Weldegiorgis, 2002). This of course doesn't include the tens of thousands of buildings built in post-independence period. So far, there are 70,293 immovable properties registered in the Cadastral Office, although the registration of immovable properties includes repetitive processes of property transactions. The Office expects tens of thousands of unregistered property, but their registration depends on the capacity of the Office and related Technical Offices that give building license, a requirement for registration. To estimate the number of unregistered immovable property, the Office has already distributed relevant questionnaire to regional administration offices. Nonetheless, from 1992 - 2011, 21,908 immovable property, 5,635 mortgage/pledge and 8,098 release of mortgage/pledge are registered and this is illustrative of the small scope of work accomplished so far after independence.

3.1 Procedures of Registration

In primary registration, the building is verified in the technical office of the Municipalities against the approved plan and after being given building license is being sent to the Cadastral Office with other related documents for title registration. As in other countries, stamp duty

and registration service fee is set for property registrations and mortgages. The stamp duty and registration fee vary from country to country; for example, compared to that of Sweden, the Eritrean one is small. It has been realized that the Eritrean fees, which were revised and introduced in February 2007, still need revision based on value system, size of land parcel, etc. The revision will benefit from the experience taken at the Cambridge Conference, the Exchange (Southampton, UK, 12-15 July 2009). Valuable experience was learnt from the conference, and in particular notice has been taken on registration service charge fees during the tour made to the Land Registry Centre for England and Wales at Portsmouth.

The service charge fees currently applied, but on revision are the following:

Title registration –	150.00 Nfa (1 US Dollar = 15 Eritrean Nakfa)
Mortgage registration –	100.00 Nfa
Release of mortgage –	50.00 Nfa
Correction of document errors –	20.00 Nfa
Information on the status of property –	15.00 Nfa
True copy of a document - per copy-	5.00 Nfa

The fees were fixed on arbitrary basis and being paid in the Cadastral Office upon registration or request. The stamp duty charged by the Public Notary is 5.00 Nfa and for a property being bought, property transfer fee of 9% of assessed value is charged by the government. The % of the assessed value of Eritrea looks relatively higher than that of Sweden whereas the stamp duty and that of mortgage are lower. The rate of stamp duty of property conveyance in Sweden is based on the assessed value: 1.5% for private individuals and 3% when a property is bought by a legal person and for mortgage registration 2% of the sum and is collected upon collection of documents (Swedessurvey, 1998, p. 10). The transfer cost of buying a house in countries like France, Portugal, Spain, Ireland, Italy, Germany, etc. is higher than that of Sweden.

Relative to other continents and regions Africa's average transaction fee is much higher than those of other regions. For example, in 2009 the average fee for Sub-Saharan Africa was 9.8% whereas for East Asia 5.6%, Eastern Europe and Central Asia 1.9%, East Asia and Pacific 3.8%, Latin America and Caribbean 5.6%, Middle East and North Africa 6.3% and High Income countries (OECD) 4.4% (World Bank, 2010, p.30). The Eritrean transaction fee is one of the highest in the world, excepting for many African countries. The table below (World Bank, 2010, p. 29) shows transactions fees for selected African countries and other continents expressed as percent of property value:

Table 1

Africa	Transaction Fees %	Other Continents	Transaction Fees %
1. Zimbabwe	10.0	8. Ireland	6.0
2. Guinea	13.9	9. Jamaica	5.0
3. Cameroon	17.8	10. Russian Fed.	0.13

4. Mali	20.0	11. Azerbaijan	0.22
5. Senegal	20.6	12. Belarus/Georgia	0.02
6. Nigeria	20.9	13. Saudi-Arabia	00
7. Chad	22.7	14. New Zealand	0.9

3.2 The Organization

The Cadastral Office, which is under the MLWE, has revised its mission, vision, goals, strategy as well as its organizational structure.

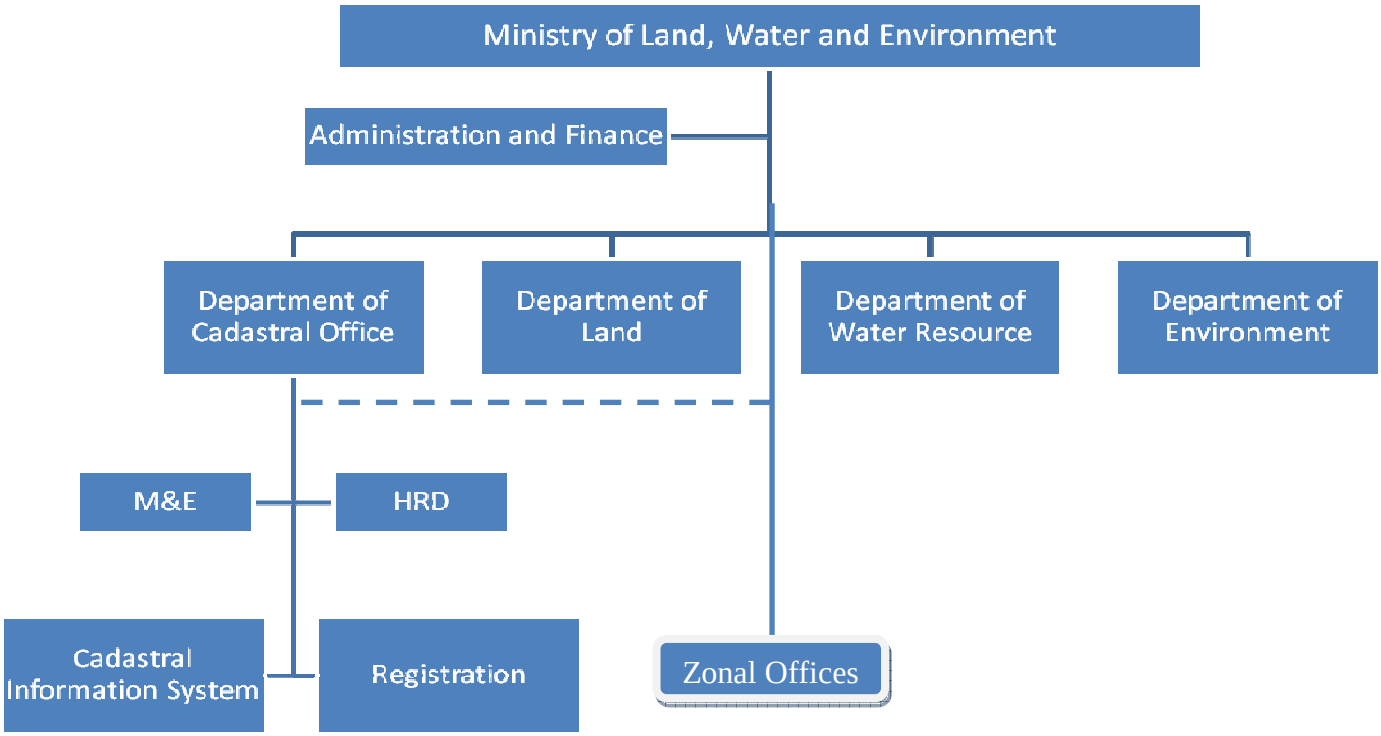

Figure 1: Organizational Structure of the MLWE

Mission represents what the organization thinks its basic role or mandate and is 'to *protect and guarantee security of immovable property ownership and use rights over land'*. And Vision as a statement or description of a desired outcome shared by all members of the Office is '*Make registration of immovable property speedy and easier for all clients'*. In undertaking its mission the Office inculcates core values as its guiding principles that include integrity, team work, fairness, professionalism and openness.
Goals are objectives toward which the Office directs its energies and concerns in terms of plans and resources in order to realize its mission. These include:

- Strengthen capacity to develop modern cadastral system and improve the efficiency and effectiveness of cadastral services, ensuring that registration law and attendant guidelines are adhered to in cadastral works through out the country;

- Apply mandatory registration of immovable property by upgrading regional offices and providing convenient on door step service for clients.

The strategies pursued to achieve the above objectives are:

- Establish and consolidate regional offices**.** In 2012, cadastral offices will be established in all regional seats and major towns.
- Develop institutional infrastructure and capacities to manage and sustain the system. The Office needs to be strengthened with the necessary equipment, manpower and expertise. The Office has provided and will continue providing training on cadastral registration to staff members to be assigned in regional offices. The Office has only two graduates in computer science.
- Introduce and utilize up- to -date technology. So far, the Office has gotten some computers, although inadequate. In the current year the computerized system will replace the simple, mostly manual database.
- Develop awareness within the public about cadastral benefits. The Office has been working to raise the awareness of benefits from cadastral registration through symposium, brochures, media interviews and seminars.
- Make the process simple, transparent, less bureaucratic and less costly.
- Register land allocations, contractual agreements, transfers, and mortgages in time. Timely registration requires coming closer to clients and the Office is working on this issue tirelessly.
- Charge appropriate service fees and introduce other mechanisms to ensure self-sustainability. The Office will continue to revise registration service charge fee.

4. THE CHALLENGES

On legal and policy matters, we can say that there is no problem since Registration Law is in place. However, there must be harmonious horizontal relationships with the institutions responsible for land allocation, cadastral index maps, building/habitation license, etc. Coordination can be obtained through laws, establishment of standards, advisory body, regular meetings, exchange of information, etc. Towards this goal, the Cadastral Office in its capacity has been undertaking semi-regular meetings with some of the institutions. Besides, the Regional Cadastral Offices need to continue the autonomous arrangement in relation to their specific mandate of work, even though they are organized under the regional Division of the MLWE for other administrative purposes. This is imperative for speedy and effective work programme. However, the challenges are paramount.

Due to the 30 years War of Liberation against the Ethiopian colonial rule, on Liberation, in May 1991, Eritrea inherited critical constraints to development: the physical, social, and institutional infrastructures of the country have been severely dismantled by the war and negligent policies of colonial regimes. Besides, human capital development was curtailed and the technological foundation of a modernising economy devastated by war, drought and

inappropriate economic policies (GoE, 1994, pp. 2-8). In brief, the economy was left in utter destruction and deprivation imposing immense challenges for survival and development.

Although it is argued that the current global economic turbulence has significantly impacted on the development of mapping agencies and cadastral systems of many countries, it has no direct bearing on Eritrea's system. Eritrea's main challenges emanate from the long wars and ruined economy. Besides, there is a situation of 'no war, no peace' after the Boundary Commission's final and binding verdict due to Ethiopia's refusal to abide by the final verdict.

Mapping is a tool of planning and managing of land and its resources. Without mapping of land and its resources, development initiatives become antagonistic to sustainable use of resources. Modern cadastre is inconceivable without mapping. Thus, the developments of mapping and modern cadastre are interrelated. They are essential prerequisites for a country to develop its economy and mange its resources sustainably. Success in land administration is based to a great extent on the 'availability, access and applicability of related spatial information' (WB/FIG Conference, 2009), and in this context resources associated to the development of spatial data infrastructure have the capacity to optimize land administration processes and land management**.** But in Eritrea, the Mapping Centre is very young and the development of such a tool in practice is yet to come. In developing countries such a tool of development, is often compromised with other priorities like poverty alleviation and food security, health services, education and national security.

Maps provide information about location of places and their distances, transportation routes, natural resources, climate, population, landscape, natural hazards such as earth quakes and volcanoes and people used maps for thousands of years and through the years people explored more of the world adding new information to maps. Modern scientific discoveries have made maps more accurate and as Staiger Rudolf (2009, pp. 14-15) says, 'measurements are so easy-just push the button' but their accuracy depends on 'mastering the entire process' -decision on the optical measurements and data processing strategy, followed by optimal choice of instruments. Thus, cartographers/surveyors that master the entire process are needed. But many developing countries, like Eritrea may not benefit from such accuracy for lack of 'mastering the entire processes'. Technology can address the challenges, but inadequate human capacities and non-availability of the required resources for training and procurement of equipment remains to be critical. Human resources issues and inadequate financial resources are major limitations in the development of cadastral systems.

Proper mapping of land and registration helps create peace and stability in society - a requisite for economic development. It helps to avoid disputes and friction over land and its resources. Security of ownership or right in return builds confidence in any development investment. In short, modern development is unthinkable without mapping. It provides accurate information about land use, resources over land, climate, population, transportation routes, hydrology, etc. All these help to mitigate economic problems and pave the way for further development. But, such resources are inadequate in developing countries.

Cadastral systems need to be comprehensive. The spatial data need to be integrated with the textual data to serve for proper management of land and its resources. Administration of cadastral data, that is, data standards and data exchange, security and privacy, security of property and compensation, pricing (ECE, 1996, pp. 53-55) are challenges that require appropriate response for a smooth forward going. Building spatial data infrastructure (SDI) demands seriousness since its objective is to disseminate, utilize and manage spatial information of land and its resources.

Land information should be treated as a shared resource since land is the most valuable resource to mankind that must be utilized with minimum waste. The rationale for land management information is that land is a basic resource that must be properly managed to achieve sustainable development; good land information is essential component of good land management, proper management of land and resources can create wealth , and the costs of mismanagement are often not quantified but are nevertheless real (UCL, 1998). Hence, for proper management of land and its resources, the development of computerized cadastral system is essential. But computerization requires availability of well- trained personnel, access to maintenance, adequate communication and suitable storage capability. The delay of Eritrea's mainly manual cadastral system into a computerized one is related with this point.

There are also other institutional constraints that hinder work development. The work of the Cadastral Office and that of the regional technical offices are complementary, and thus the capacity of the technical offices needs to be strengthened. Moreover, although efforts are being undertaken to re-instate the Notary Public at regional centre levels, its establishment requires speedy implementation. Without its establishment a credible and fast up-dating of property transactions are not possible.

5. LESSONS LEARNED AND PROSPECTS

At the end of the 19th century resources for developing cadastre systems were meager even in many European countries that are now highly developed. Because of this countries were made to follow flexible approaches that go with their objective realities. Sweden and Finland are the countries that developed their systems from simple cadastre and land registers progressively into highly developed operating systems through gradual upgrading and improvement. This flexible, progressive cadastre allows developing the cadastre system further when the required human resources and technology are available and through this approach Sweden has made significant advance on its cadastral system. And developing countries that have meager resources have a lot to learn and creatively apply according to their objective conditions.

The German adaptation of system of titles is another example of flexible approach that developed a system of titles instead of system of deeds (Larsson, 1996, p. 39). Developing countries can learn more than any other countries from the European experiences in their endeavors to develop modern cadastral systems and land registers. The Torrens system of Australia has also made useful contribution on land registration for developing countries. But

learning and utilizing others' experiences demand insight and skillful application reflecting the objective reality of the given country.

Besides, European experiences show that serious consideration would be given to maintenance and updating from the beginning; if there is insufficient updating, the result is weak cadastre unable to fulfill its role. This reminds of the saying 'one reaps what he sows' is true. In addition, the rapid state of change in European cadastre systems during the past decades show that design of cadastral and land registration systems require to be future oriented. But developing countries should critically examine their objective conditions and other countries' experiences and skillfully apply what is appropriate for them, when and how to go for automation, for example. This is possible only through the implementation of compulsory registration according to Registration Law by addressing its challenges.

Experiences show that cadastre systems can not be developed and maintained in a sustainable way without the development of the necessary skills and capacities. Human and institutional capacities need to be improved to meet the medium and long-term goals of the Cadastral Office. Capacity building efforts should be seen 'comprehensively in the wider context of developing institutional infrastructures' addressing the 'societal, organizational and individual levels' (Enemark, 2003, p. 4) for sustainable development of the cadastral systems. The Cadastral Office is planning to address capacity building by strengthening its institutional capacities.

Standardization is key in developing cadastral system, be it computer networking and data exchange arrangements. Hence surveying/mapping works require standardization, control and coordination. In the present Eritrean context, the Department of Urban Development of the Ministry of Public Works in collaboration with other relevant government bodies, like the Mapping and Information Centre, technical offices and private organizations would be the competent body for introducing standardization**.** Cadastral systems should not depend on government funds indefinitely, despite the fact that they do not use the funds directly. Improvement of service charge fees and introduction of other marketing mechanisms to ensure self sustainability are also imperative.

Finally, learning from experiences and best practices should throw insight and require skilful application of what deems appropriate to the objective realties of the country in question. What is relevant to one country may not be appropriate to another country, depending on the socio –economic conditions of the country. One model fits all is inappropriate. Thus, learning requires skilful application of what is appropriate to the objective conditions of the country.

6. CONCLUDING REMARKS

We live in a rapidly changing world where there are many challenges. Technology can address the challenges, but the capacity to introduce and use the technology in itself is a challenge for developing countries due to the meager resources they have. Nevertheless, solving it through giving priority is sine qua non since it rewards later through sustainable

development. As ‘a journey of one thousand kilometers begins with one step’ it requires beginning the first step to reach at destination of computerized modern cadastral system.

The ‘progressive cadastre’ looks appropriate, and as Doebele (1985, in Larsson, 1996, p.145) presents is ‘a system that can be applied rapidly, upgraded and improved to conventional standards as resources and political support permit’. It leads to integration of textual and spatial data, national coverage and automation. Here, earlier works are not negated, but are readily adaptable to further modernization. This demands capacity development efforts through education and training to upgrade the gaps in human capacity, which is critical to success.
It is time for compulsory registration and serious support by the higher authorities. The success of cadastral systems depends on protection of land rights, is up-to-date, fast transfer of right and ownership, effectively, securely, promptly at affordable costs. Awareness of the general public on cadastral benefits also needs to be upgraded.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED in Africa Environment Outlook, UNEP, 2002). This can only be attained through developing cadastral systems that facilitate proper management of land and its resources in sustainable ways.

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BIOGRAPHICAL NOTES

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