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Land Records Archiving Using Geospatial Techniques

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Abstract: **Maintenance of land records and the availability of easily accessible land information is one of the most significant challenges of the governance today and becomes necessitates to embark upon scientific measures for better management of the scarce land resources and of course, for ensuring good governance including the implementation of land record spatial data infrastructure (LRSDI) in country. Use of geospatial techniques for the land record computerization including field book and massawis (paper maps) mapping can lay foundation for intelligent archiving and leverage for applied applications.**

Keywords: **GIS, Land Digitization, Transformation, Geospatial Techniques, Massawis, Lath (papers maps).**

1. INTRODUCTION

The present research is a qualitative in nature which has been primarily focus on two case studies carried out on the aspects of land digitization by public and private organization in country, as UN-habitat recent intervention in Khyber Pakhtunkhwa province to bring the international standards in adaptation and transformation of conventional system while the Urban Unit (largest pvt. organization) in Punjab province exercised cost effective solution for transformation and integration of land records with geographical maps and make them online for wider public access this overall provide opportunity with innovative ways of system monitoring and reach out, this incorporates the diverse sources for validation and consolidate systems transformation to address the research inquiries.

2. STUDY OBJECTIVES

- To study the procedure for developing a computerized Land Records archiving and its implementation plan, for decision making and strategy planning.

3. BACKGROUND

The conventional land record system in Pakistan is being administered through the officials that can be categorized into two classes on the basis of their functions. This system has borrowed this hierarchy from British, but the new millennium has heralded a new system based on devolution of power in tune with local governance in Pakistan. The new organizational hierarchy for the system of Devolution. Although the system of local governance has changed for the better management, but the mechanism of land records handling and revenue assessment remains same as followed since Mughal era. Before discussing various data constructs of the conventional land record system it will be better to take a look at various nomencla tures that are frequently used. The land records data is maintained at Tehsil offices whereby following record sets are developed at the time of settlement.

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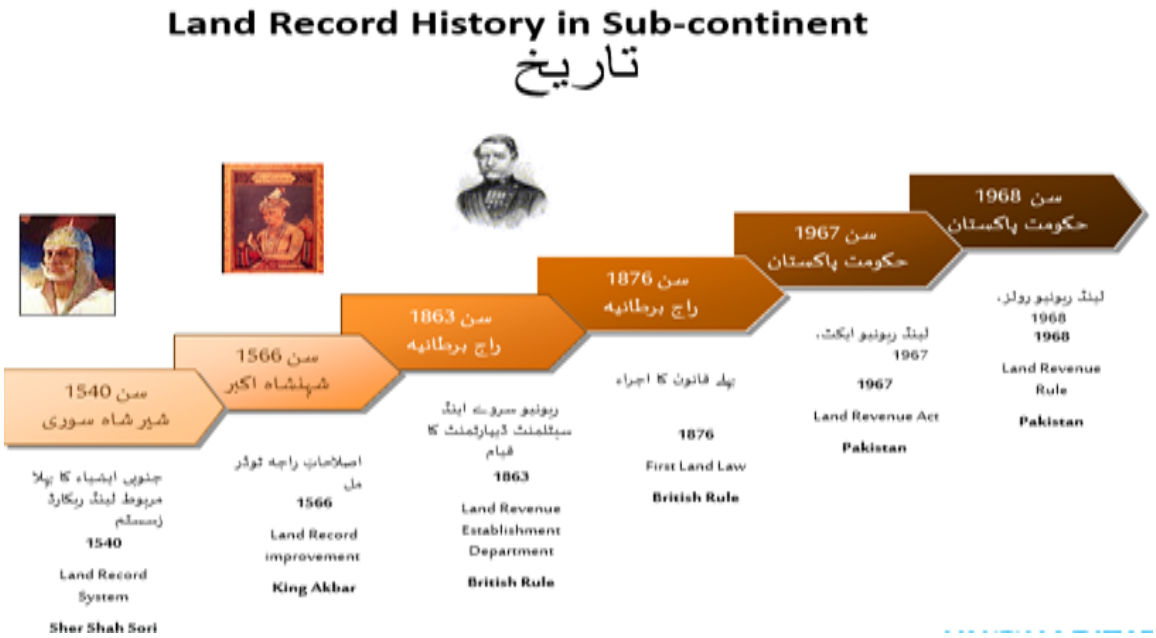

Fig. 1: Land record history in sub-continent

1. Mussawis (Index Map)
2. Khatuni Pamaish bandobast
3. Chittha Shajra Nasb Malkan (Pedigree Sheets)
4. Chittha Wajab-ul-arz (Customs Book)
5. Field Book
6. Index Survey khasra Number
7. Index Radeef War Malkan and Murthnan
8. Missal Haqiat
9. Fard Partal
10. Note of Changes in kind of soil
11. Statement of Right in wells and Tube wells
12. Order of Revenue Officer determining the assessment
13. Order of Revenue Officer distributing the assessment over holding
14. Index of Mutations
15. Last attestation of the Revenue Officer.

Fig. 2: Land records conventional storage

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4. LAND RECORD DATA TYPES AND DESCRIPTION

There are two components of land record data, 1) Geographic data is a special kind of paper maps for each village. These are known as "latha" or "kapra". 2) Various Alphanumeric data pertaining to each individual land holding Registers.

Mussawis: Mussawis are "quantifiable measurements" in geographic space (See Fig 4). The measuring unit on Mussawis is "karam" which is equal to 5.5 feet. These are basically surveyed at different scales, at a village scale, usually at a scale of 1 = 40 Karam (that is about 1: 2500 or so according to parcel sizes in the village). Land parcels are labeled with their Khasra number and dimension of each side. Each Khasra number is owned by an owner at the time of settlement. No changes can be made in this record set till next settlement. Subdivision lines in a regular geometrical shapes. The subdivision lines are represented with dotted line and defined for the area calculation on the map. A Mussawis also contains Index Mashkookiat (Errata List) on which the errors on the map as compared on the ground. Every Mussawis has an index number which helps in mosaicking all the Mussawis of a particular village to get the map of entire village at given scale.

Shajrah Parcha (Latha or Kapra): This is a mosaicked reflection of all the mussels of a particular village on a big cotton cloth called latha. This record set is primarily kept by patwari of the village, which makes temporal changes like splitting or merging of land parcels. (Usually with a red pencil)

Field Book: It is an alphanumeric representation of Mussawis, which keeps the entire attribute information related to every land. Khasra number (Kotra number of last settlement), new Khasra number Plot ID of current settlement), Khatuni number (Farmer ID), type of land for each parcel, and area of each type of every parcel. Every village book contains an aggregate chart of the village at the end of which the total land types and their areas in the village, total agricultural land in the village and some other aggregated information.

Records of Rights (Register Haqdaaraan-e-Zamin or Misl-e-Haqiat): This register contains ownership records and is developed at the time of settlement along with mussawis, and owner information. Also contains pedigree sheets which gives the details of the cultivating and landowner families of the village and their relationship. This record set contains several indexes like owner ID vs. Parcel ID List (Khaivet number vs Khasra number), alphabetical index of owners (Index Radeef war Malkaan) etc. And other data like Owner ID, participants in the ownership, land parcels comes under their ownership, share of each owner.

Mutation Register (Register Intaqaal): This register dynamically changes as mutation in land records happen. This register contains all transitional land ownership record. At the time of new settlement it replaces the name of old owner with new owner. This is a very important register that contains the purchase value of mutation.

Khasra Girdawari: It is the crop cultivation in every Khasra number (per acre) is made after the visit by the Patwari in presence of Lambardar (Village headman) and other interested persons. It also indicates ownership, person cultivating and the crop sown on the land. It is made twice in a year i.e. for crops of Kharif (October) and Rabi (March).

Roaznamchah (Diary): It is a small village in the north of the country.

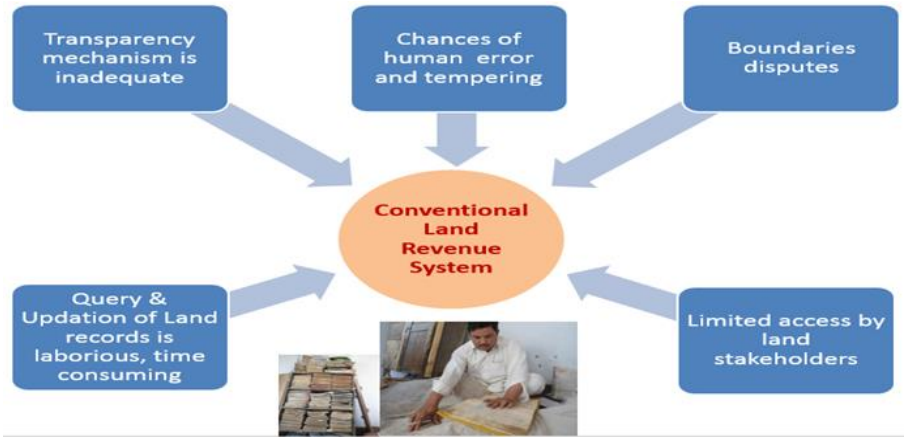

Fig. 3: Limitation in existing System:

Although the system has been tested and has been functional for a couple of years, there remain unfulfilled management requirements that need to be accounted for under the new system of devolution of powers at the level of local government because a few individuals can understand this syntax (Patwari being the central figure in the manipulation of numbers and

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records). His intimate knowledge of nomenclature leads to strengthening his sovereignty over the system. The consent of Patwari became the prerequisite to interact with system. Since Patwari is the only person who can demarcate the extent of landholding actually on ground, his authority remains unquestioned. That is why the role of Patwari is greatly misused in this system. A Patwari then become a key person to temper records and parcel boundaries in the absence of checks on him or he knows the ways to mold the things accordingly. Notwithstanding the aberrations in the system, land records are maintained at three different levels (Patwar, Tehsil and district levels) to protect against unauthorized alteration. Various levels of access are also defined. The temporal archives are only stored at district level record room. Still there are occasions when the whole record is wiped out due to fire or floods. Some of the flaws and shortcomings of existing system of land records are highlighted hereunder;

- Data is unsafe and stored in dilapidated conditions.
- Maps do not follow cartographic rules.
- Manually generated records have poor accuracy.
- Approximate Measurements.
- Conventional mapping and survey is slow and time consuming.
- Records need to be updated at the completion of survey.
- System is complex
- Data is Widely Distributed.

5. METHODOLOGY

Database Designing: A database that can be shared by different users. It's a group of records that are a little or no redundancy. The redundancy and the minimization of data. The data consist of entities and attributes. The entity being a feature that exists, and about which there is specific interest, whereas, the data associated with it may consist of relationship attributes and other characteristics.

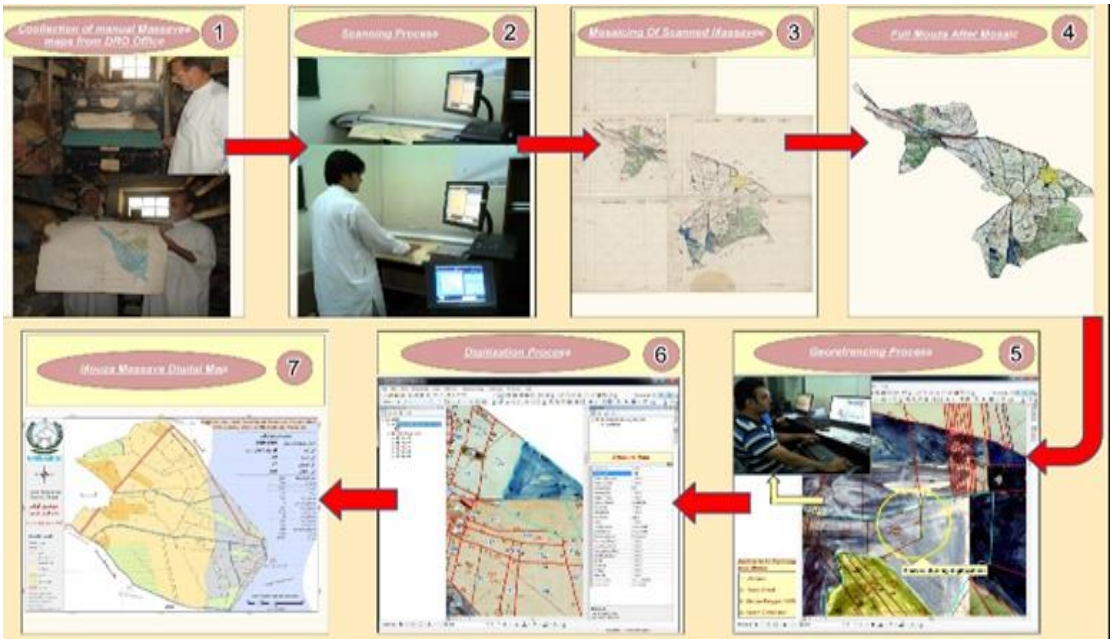

Fig. 4: Process flow of transformation and intelligent archiving

The attribute is in fact a quality of an entity. The development of such a process; Data analysis through which the types and quality of the data to be incorporated in the database is identified. A conceptual model of the data is constructed by making use of data modeling, taking into account all basic facts and constraints under which the database will have to operate, particularly, the relationship among different entities and their attributes.

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The content of the database plays an important role in the overall design of the system and depends on the sources identified, users and desired applications of the database. Therefore, the size of a database is a function of its content. The database design in such a way that it takes care of future expansion and adaptability. The feature codes, symbols, and attribute definitions must be determined at the very early stage of the project. In database monitoring, the system is fine tuned

Integration of Local Language: Urdu is the national language of Pakistan and widely understood throughout the country. (NADRA) Pakistan has already done this for personal registration database, the system will become easy, understandable and transparent.

Data Warehousing and Data Mining: Data warehouse is a storage device or simply a vessel in which information is added. It is a well-conceived and well-designed environment that is a key to decision making process. It brings the power of predictive modeling to decision-makers and strategy planners. The concepts of data warehousing and mining could be extended to spatial (maps and images) data also.

The huge volume of information created for the Land Records Management can be implemented within data warehousing. The history of property transfer can be visualized with this technology. The income information for land holders, crop pattern and yield trends can well be studied in the land records is warehoused.

World Wide Web: The web technology has given tremendous scope to Land Records Management. The large database of land records includes both data and records. This information will be accessible via internet from anywhere in the country. Various levels of information will be available to prevent illegal access. This is a great opportunity to learn more about the company and its customers.

Advantage of Geospatial Techniques and Development:

Rapidly progressing technologies such as GIS, data warehousing and World Wide. Use of these value added technologies will make land records management easier, effective and efficient. (Mussawis) and Lattha and the pattern of alphanumeric data as explained in the following section:

- Centralization of widely distributed data sets
- Secure archival of temporal data
- Integration of various other national level databases
- Effective e-governance at grass root level
- Bringing the power of predictive modeling to decision makers and strategy planners.

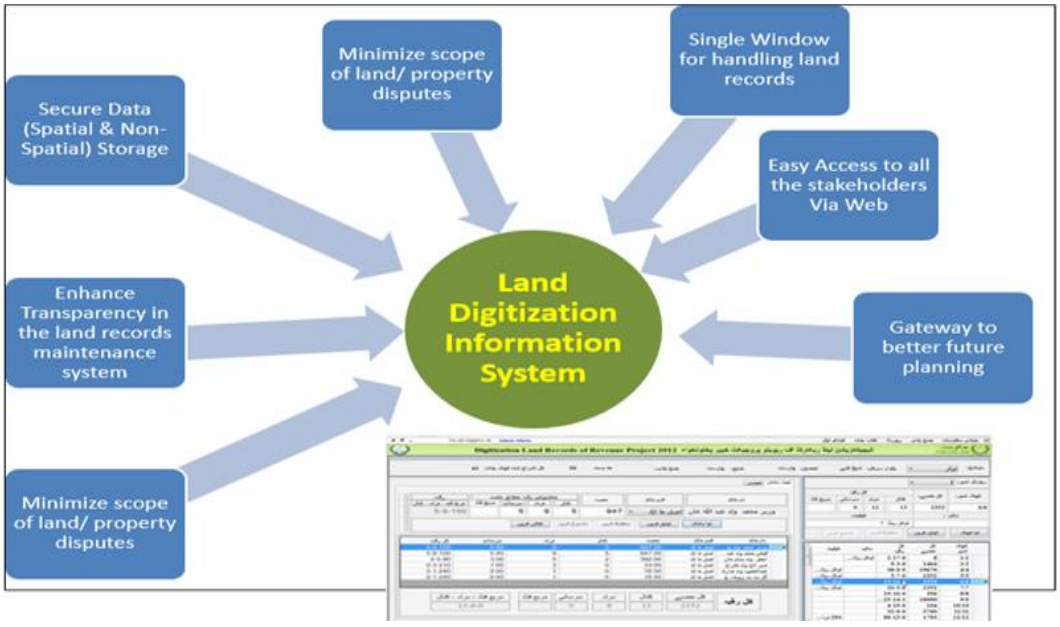

Fig. 5: Land digitization system

6. CONCLUSION

In conventional system, query of land records is lengthy, overwhelming and circles round a single person (Patwari) that is why incorporation of geographic data and their appropriate alphanumeric data is necessary to develop and maintain a all-inclusive Land Records Archiving. The geospatial techniques of the present information can be very useful to transform the conventional system into an efficient, easy-to-use, updatable, remotely accessible and above all practically applicable land record system. The information contained in this publication is for information purposes only and does not imply the expression of any opinion whatsoever.

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