

Cadastral Survey/Re-Survey under the DILRMP - Challenges/Solutions

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Historical Background

- Land records date back to the Mughal era- specifically during Emperor Sher Sha Suri's regime (1540-45)
- Todar Mal – Considered one of the greatest revenue experts at that time, started his career under Sher Shah Suri later served Emperor Akbar, remembered even today for evolving a system of revenue assessment and survey,
- Survey of India was responsible for cadastral mapping/ maintenance of Land Records till 1905. Subsequently, the States were accorded the responsibility. The States adopted/ followed different systems since
- Common features of cadastral mapping in States:
 - **Cassini** projection : Based on an arbitrary local origin, thus 'geo-referencing'/ 'tying' to the National topographic framework posed major challenge
 - Parcel boundaries: By and large, cadastral features not 'delineated'/ demarcated on ground- no physical features which can be surveyed/ mapped

Highlights of Cadastral Survey Pilot Project undertaken by CST&MP in Goa

- Undertaken by CSTMP (a UNDP funded project) , Survey of India, Hyderabad-1969-72 in Goa* * *liberated from Portuguese control in 1961*
- *The pilot area was about 66 sq Km in extent and covered about 13 villages*
- Aerial photography flown on 1:6,500 scale
- Precise photogrammetric plots of all physical features identifiable on photos undertaken on 1:1,000 and 1:2,000 scale- field verification of cadastral details using PT and theodolite traverse (for parcels under tree cover)
- SOI surveyors worked with Goa Land Survey staff who summoned land owners to demarcate their land (using lime powder / lime wash)
- Findings :
 - *Except in a few cases ,photogrammetric plotted 'cultivation bunds' were **not** parcel boundaries*
 - *Demarcated boundaries were surveyed using steel tapes, with the help of field 'bunds'/ topographical features plotted on maps , as reference*
 - *Temporary demarcation (using lime) found 'tampered' in several cases during random field verification*
 - *Parcels under plantations/(private) forests were surveyed through theodolite traverse*

Use of 'Rectified Aerial Photos'-1974-1984

- Under the Command Area Development Programme (CADP) launched in December 1974 ,SOI provided large scale (1:1,000) '**rectified***' aerial 'photo-maps' to project authorities , with contours @ 10 cm CI
- ***(Analogue) Rectification eliminated 'tilt displacement' of aerial camera -replicating topographic -maps in flat terrain**
- The product was offered to States for cadastral surveys- since large scale photomap base was excellent for delineation/demarcation of cadastral boundaries
- Rajasthan request for mapping villages in Banswara and Dongerwar (relief exceeding permissible limit) **using this product could not be met...***
- ***Meeting of Revenue Secretary Rajasthan with SG.....**
- **SOI circular amended** after the meeting



Use of High Resolution Satellite Data for Cadastral Mapping/Resurveys

- *Current Govt of India, Policy on aerial photography, requires ordering of photography ...through DGCA .. a daunting task for States*
- *Better Alternative: Use of high resolution satellite data (Indian and foreign satellites) through NRSC*
- *As per **Remote Sensing Data Policy(RSDP-2011)** all data up to 1.0 metre resolution “distributed on non-discriminatory basis ‘on as required basis’ “*
- *Data with resolution ‘better than 1.0 metre’ available after ‘screening ‘ through NRSC*
- *3 to 4 control points(GCPs) in an image usually adequate to geo-reference an image in flat areas*
- *‘Photo map’ base ideal for : “Survey and Re-survey” under DILRMP*
- *Recommended : ‘Pilot projects’ in different States in association with(DoS) RRSSCs/ State Remote Sensing Applications Centres (funded by DST)*
- *Should include training for Revenue staff in handling/ interpretation of photo-maps*
- *Based on pilot project findings, DoLR may issue SOPs ’ to States for effective ‘Survey/Re-Survey*

Recommendation: Need to keep the process ‘simple’, with the focus on DILRMP implementation, making use of existing capacities available in RRSSCs and State RS Centres



Symposium on 'Towards Effective Land Administration in India: Potential Benefits, Road Map & Challenges ' - February 2012 at IGF-2012, Gurgaon,

- Symposium sponsored by DoLR
- Dr Munshi requested by Geospatial Media& Communications to design and conduct the Symposium
- Addl Secretary DoLR , Joint Secretary and other Officials actively participated and provided their valuable inputs / guidance
- Senior officials from States (ranging from : Principal Secy ,Addl Chief Secy, Commissioners Settlement etc) participated
- Topics covered :
 - Resurvey/ updation of cadastral maps/records using geospatial techniques
 - Establishment of Integrated LIS /Land Administration Database linked to land Registration offices
 - Mechanism of on-line data access by Stake Holders / citizens
 - *Panel discussions/takeaways :*
 - *Validated the findings of Goa pilot project : that physical demarcation of boundaries / parcels a challenge*
 - *Need for standards: Encoding , Metadata , Ontology, Web publishing etc*

Essential Features of DILRMP Program

- Digital India Land Records Modernization Program (DILRMP) under the Department of Land Resources(DoLR) , Ministry of Rural development
- Three essential components :
 - Computerization of Land Records
 - **Survey/ Re-Survey**
 - Computerization of Registration
 - **Survey/resurvey** and updating of the survey & settlement records (including ground control network and ground truthing) using the following modern technology options:
 - ✓ Pure ground method using total station (TS) and differential global positioning system (DGPS)
 - ✓ Hybrid methodology using aerial photography and ground truthing aided by the photo-map base *
 - ✓ High Resolution Satellite Imagery (HRSI) and ground truthing aided by photo-map base*- **Ideal option for on-site demarcation and survey of parcels**

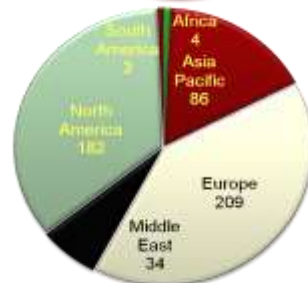
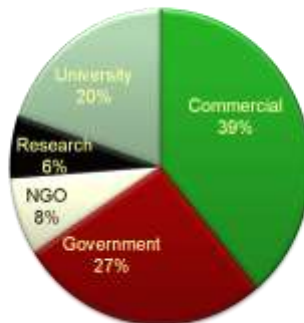
Note: Delineation /Demarcation of cadastral features, pre-requisite for 'Survey/ Resurvey'



The Open Geospatial Consortium

Not-for-profit, international voluntary consensus standards organization; leading development of geospatial standards

- Founded in 1994.
- 515+ members and growing
- 48 standards
- Thousands of implementations
- Broad user community implementation worldwide
- Alliances and collaborative activities with ISO and many other SDO's
- *DWGs(Domain Working Groups) play vital role in developing Standards through consensus process*



Land Administration DWG -Charter

- Examination of current land administration system landscape, *with particular emphasis on the **developing world***
- Objective /Scope :
 - Examine existing systems of land administration;
 - Develop best practices regarding standards-based implementations;
 - Identify potential interoperability experiments, pilots and testbeds to validate interoperable solutions
- Development of outreach to help the technology and user community in Land Administration understand and align to Open Standards
- Coordinate with World Bank Land and Poverty Conference
- Provide input to ISO / TC 211 LADM standard revision
- *All involved in the implementation of DILRMP are invited/requested to :*
 - Join the mailing list: Landadmin.dwg@lists.opengeospatial.org
 - Contribute to the White Papers
 - *Submit use cases and solution ideas*
 - *Specific to India : OGC needs use cases and workflows that describe State vs. National efforts and coordination*
- ***Till date there is no participation from India – this situation needs to change urgently in the best interest of the DILRMP implementaion***



Importance of DoLR Participation

- The DoLR , under Govt of India, Ministry of Rural Development, is the nodal agency , responsible for implementation of the DILRMP
- It is responsible for providing budgetary support/ technical guidance to the States for the implementation of the DILRMP
- Participation of DoLR as a Technical Committee member of OGC and a Chartered Member of the 'Land Administration DWG' vital for ensuring that this key program of GOI, possibly the biggest in the area of Land Records globally , is implemented on the foundation of Open Standards
- Proposal for OGC membership and participation in the Land Administration DWG has been made and a detailed presentation undertaken for Shri Hukum Singh Meena ,IAS , Joint Secretary DoLR
- It is hoped that DoLR would contribute to the efforts of OGC/ Land Administration DWG



Concluding Remarks

- Land records in India date back to the Mughal era- specifically during Emperor Sher Sha Suri's regime (1540-45)
- **Technology prescriptions for modernization has to factor the historical/cultural complexity of land administration in India**
- **Use of high resolution satellite data optimal for 'Survey /Re-Survey ' under the DILRMP**
- **Symposium on 'Effective Land Administration in India 'sponsored by DoLR highlighted the need for Standards in the area**
- OGC Members , particularly Technical Committee members , with inputs from DWGs play a key role in the formulation/adoption of OGC standards / best practices
- Participation in the Land Administration DWG is vital for the adoption of Open standards / best practices in the area
- Participation/ contribution of DoLR , the nodal agency of the Government of India responsible for implementation of DILRMP , in the OGC / Land Administration DWG vital for the adoption of Open Standards /best practices in the area

