# Need for Integrated Land Information System in India:

## A Case Study of Uttar Pradesh State

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## 1. Introduction

The efforts towards evolving a workable revenue settlement between the State and the peasants can be traced to the era of Turko-Afghan rule in India, around 1300 AD when Diwani-i-Amir Kohi (Department of Agriculture during the reign of Sultan Muhammad Bin Tughlug) and Diwan-i-Mustakhraj (i.e. Department of Land Revenues) were during the rule of Ala-ud-din Khilji were established. The Khilji ruler divided the property rights/tenure into tree classes:

- Khalsa or Crown-Lands
- Iqta or lands granted to followers and officers from certain years
- Muqta or lands granted to followers and officers for the life time of the grantee

The ruler also collected Khiraj or land tax from the Hindu chiefs. The state demanded 50% of the gross produce of lands (as the rate of revenue) and maintained price control on all kinds of agricultural produce. The State also promoted the export of agricultural goods viz., indigo-cakes, cotton, ginger, sugar, grain etc. besides cotton textile.

### 1.1 Mughal Revenue System (1570 AD)

During the reign of Emperor Akbar around 1570 AD, an elaborate system of land management and revenue assessment was evolved. Based on the rights to land of various kinds, lands were divided into 3 classes:

- Khalsa or Crown lands
- Jagir lands enjoyed by some nobles who collected the local revenues out of which they sent a portion to the Central exchequer and kept the rest for themselves
- Sayurghal lands granted on free tenure

Regular survey of the land and assessment was made “with reference to the area and quality of land”. Assessments were fixed annually on the basis of production and statistics of prevailing prices, and the demands of the State thus varied from year to year. In 1582 AD, Todar Mall, Diwan-i-Ashraf (Minister of Revenue) introduced a “regulation” system of revenue collection which had the following main features:

- Survey and measurement of land
- Classification of land
- Fixation of rates

Lands were carefully surveyed, and for the measurement the old units (whose length fluctuated with the change of season) were replaced by the Ilahi gaz or yard, which was equal to about 33 inches, tanabs or tent-rope, which assured a constant measure. Lands were divided into 4 classes according to the continuity and discontinuity of cultivation:

- Polaj or land capable of being annually cultivated
- Parauti or land kept fallow for some time to recover productive capacity
- Chachar or land that had lain fallow for 3 to 4 years
- Banjar or land uncultivated for 5 years or longer

Only the area actually cultivated was assessed and in order to ascertain the average produce, in respect of each class of land, the mean of 3 grades in which it was divided, was taken into consideration. The demand of the State was fixed at 1/3 of the actual produce which the peasant or ryots could pay either in cash or in kind. The cash rates varied according to crops. This revenue system was slightly modified for application to the Deccan Plateau and was better known as “Rayatwari”, that is, the actual cultivators of the soil were the persons responsible for the annual payment of the fixed revenue.

## 1.2 Sur System (1540 - 45 AD)

Sher Shah’s land revenue reforms have unique importance in the administrative history of India for they served as the model for future agrarian systems. After a careful and proper survey of the lands, the State settled the land revenue direct with the cultivators, the demand of State being fixed at 1/3 or 1/4 of the average produce, payable either in kind or in cash. For actual collection of revenue, the State utilized the services of officers viz., Amins, Maqadams, Shiqdars, Qanungos and Patwaris. The king instructed the revenue officials to show leniency at the time of land assessment for revenue and strictness at the time of collection of revenue. The rights of tenants were duly recognised and the liabilities of each were clearly defined in the Kabuliyat or deed of agreement, which the State took from him, and the Patta or title deed which it gave in return. Remissions of rents were made, and probably loans were advanced to the tenants in case of damage to crops caused by the encampment of soldiers or insufficiency of rains. The revenue reforms increased the resources of the State and at the same time, considered to the interests of people

## 1.3 British Revenue Administration of Bengal (1765-93 AD)

The British East India Company started experimenting with various options for effective revenue collections to fill its exchequer, as it lacked administrative skill and experience in revenue settlement.

### 1.3.1

In 1772 AD, revenue administration was placed under the direct control of the Governor and the Council who thus formed a Board of Revenue. The lands were given out by public auction and assessment was made for a period of 5 years. A Collector and an Indian Diwan were appointed in each district to supervise the revenue administration.

### 1.3.2

In 1773 AD, a Committee of Revenue consisting of two members of the Board and three senior servants of the Company, was established in Calcutta. The post of European Collector was abolished, and the revenue administration of each district was placed under the Indian Diwan. The Company adopted the method of annual assessment by public auction, but preference was given to the Zamindars (Landlords) in making these annual settlements of land revenue.

### 1.3.3

In 1781 AD, a new plan was adopted for the administration of revenue. The essence of the new plan was to centralise the whole business of revenue collection in Calcutta. A new Committee of Revenue was set-up, consisting of four members assisted by a Diwan. The provincial councils were abolished with no effective role of European Collectors appointed in each district.

### 1.3.4

In 1790 AD, one Civil Servant of the Company, Mr Shore who applied himself to the intractable problem of land revenue, maintained that Zamindars were the proprietors of the land and only liable to pay customary revenue to the Govt. The authorities in England endorsed Shore's views and accordingly instructed the Governor General of Bengal to make a settlement with Zamindars as far as practicable. The settlement was to be made at first for a period of 10 years only, but with a definite idea of making it ultimately permanent. On March 22, 1793, the Decennial settlement was declared permanent. Its effect was to make the Zamindars permanent owners of land subject to the payment of a fixed annual revenue to the Govt. The above revenue settlement continued upto 1947.

## 1.4 Abolition of the Zamindari System in UP

Through Acts passed in different States of the Indian Union immediately after independence, the Zamindari System which sapped the initiative and enterprise of the Indian peasants was liquidated. In Uttar Pradesh, the Zamindari Abolition Act was passed in 1950 with a modification in 1952. It thus dispensed with the role of intermediaries in the revenue settlement between the State and the cultivator, and also the rights to public land was vested in the Gaon Samaj and Zila Parished for land management and resource harnessing.

# 2. Need for Accurate Cadrastral Survey

The wanton growth of Indian population and consequential pressure has been the cause of fast depletion of our natural resources. Growth of urban conglomerates, loss of fertile lands and growing commercial attitude towards agricultural activities have tremendously boosted the land prices throughout the country. It has instilled awareness in the common man about the necessity to delimit and protect his land holding with more care than ever before.

After 1905, the Survey of India which had been responsible for all kinds of land surveys including those for revenue settlements, caused the transfer of Cadastral surveys to the Provincial Governments probably due to attendant administrative and legal issues which fell beyond the competence of the Department. If we look at current status of survey technique employed by the Revenue Department in Uttar Pradesh, it does offer a lot of scope for improvement in the use of equipments and methods of surveying/mapping.

## 3. Cadastral Survey in Uttar Pradesh

The Govt. Of Uttar Pradesh ceases cadastral surveys and consolidation of land holdings for the purpose of revenue assessment in each revenue circle normally after a period of 20 years. For land survey, the measuring instruments include iron chains & bamboo rods. The ground control is derived from the triangulation pillars established on the periphery of the revenue village. These reference pillars have coordinates in the Cassini system with local origins. The ground control is extended from above reference pillars and densified in the area of survey through the method of plane-table traverse or, with the use of measuring chains and optical squares. The sides of land parcel are measured and the vertices of the polygon are plotted by taking perpendicular offsets from the longest diagonal. The inherent inaccuracy in the cadastral survey methods as above, rakes up a host of issues which often lead to protracted litigation among the landowners. Besides, it encourages corrupt practices among the officials responsible for cadastral survey and consolidation of land holdings.

## 4. Improvements in Cadastral Survey Techniques

### 4.1

In order to rationalize and improve the accuracy of cadastral surveys, it is expedient to evolve a coordinate system for revenue and cartographic delineation of the land holdings. There are many options that are being debated among scientists and one of them is the adoption of a topographical projection system of India for cadastral surveys, as it offers attractive possibility of integrating all cadastral survey datasets. Further, it may also provide basic ground data for easy and timely updating of topographical maps. The topographical maps of India are based on a poly-conic projection system using Everest spheriod as geodetic datum. This projection system is still in vogue probably for strategic reasons though its relevance and appropriateness are questionable in the context of modern concepts operating in surveying in terms of method, equipment, positional accuracy of ground features, and user-friendly approach. As such, before deciding upon a suitable reference system for cadastral surveys, we need to analyze the cartographic attributes of various projection methods and choose one keeping in view the vast territorial distribution of India, and also the additional technical and administrative resources that would be required to implement it.

### 4.2

Aerial photogrammetric methods are being experimented within some provinces like Madhya Pradesh, Andhra Pradesh and Tamil Nadu to assess their suitability as an accurate and economical alternative to the prevalent classical cadastral survey method. It is emerging that the geo-coded rectified aerial Photost at 1:50,000/1:10,000 scale could been an excellent substitute for field manuscripts, but the issues relating to the availability and cost of aerial photos must be addressed before accepting a photogrammetric method as a viable proposition for cadastral surveys.

### 4.3

In order to enhance the accuracy of ground control points (planimetric) established and used by various Revenue Departments, it is desirable that these points be tied onto the G.T. stations or other geodetic points so as to incorporate them in the national control network. An important issue which is vital for the success of control integration as above, is maintenance and security of ground control data which are treated as classified information within the meaning of Restriction Policy of the Govt. of India.

### 4.4

We may envisage efficacious use of the EDM/GPS traverse for establishment and extension of planimetric control for cadastral surveys. Digital mapping of land parcels and computation of necessary parameters with the help of GPS are another possibility.

## 5. Revenue Assessment in Uttar Pradesh

The State enters into revenue settlement with the cultivator or owner of the land which is reviewed and revised after 20 years. The parameters which are normally considered to determine the quantum of revenue for each land holding include the soil type, status of irrigation, average agricultural produce for each soil-type, and other non-agricultural usage of land which contribute towards enhancement of its commercial value. For example, the land revenues assessed are also charged on the trees or buildings standing on the holding or the rents and profits thereof. For the purpose of taxation, lands are divided into two categories namely agricultural and non-agricultural, and the state makes the necessary declaration to that effect at the request of the land owner.

Agricultural Land: Land holding for the purpose of agriculture, horticulture and animal husbandry including pisciculture and poultry farming

Non-Agricultural Land: Land holding for industrial and residential purposes

Land revenue assessment needs further rationalization by including additional parameters for soil classification, some of them being:

- Rate and the degree of geomorphological changes that affect the fertility of, soil viz., soil-erosion, denudation, desertisation etc.
- Chemical composition of soil and changes therein
- Soil suitability for various crops
- State arrangement for development and augmentation of agricultural resources viz., irrigation facility, supply of high yielding seeds and fertilizers mechanized tilling and harvesting etc.
- Sub-soil water table
- Environmental suitability
- Average climatic conditions
- Proximity to the urban centers
- Transport facility
- Price Structure of agricultural goods
- Marketing facility in the vicinity

## 6. Recommendations

### 6.1

In view of the emerging pattern of landuse, appreciation of land prices and need for futuristic planning of land related developments, it is inevitable that we evolve some kind of dedicated information system for optimum land management. This information system may consist of spatial and thematic database components.

### 6.1.1

The spatial component should address the nagging problem as to how to make the cadastral survey procedures in vogue in different provinces rational and mutually consistent. Similarly, if we choose to apply the cartographic norms of Indian topographical mapping to the cadastral surveys for interconnectivity among various states and fusion of survey data, we have to decide on methods of reducing the ground control points and unrelated measurements caused by different agencies, often with different accuracy specifications, onto the local geodetic datum. Distribution and archival of above control data also require careful thought, as the application of restriction policy to them may be unpalatable to the state agencies and impede flow of spatial information to the administrators and planners.

### 6.1.2

The thematic component of the database may consist of relevant data on soil landuse/land cover, crops, sub-surface water, status of irrigation, land development infrastructure and logistics.
Definite efforts should be taken to introduce the state-of-the-art surveys and mapping methods to the cadastral operations in the country. It is high time that we started using GPS, remote sensing and digital mapping for generation and presentation of data on lands.

### 6.2

A possible solution for the integration of cadastral surveys of the various states in India may be the division of Indian territory into various zones for the purpose of cadastral surveys. Each zone may have its own coordinate system for reference. As the irregular shapes of administrative boundaries of the provinces do not offer the possibility of zoning on the basis of provincial territories, the State may accept a particular zone reference system for its cadastral operation and data description.

## 7. Conclusion

There is great scope forimprovement of the existing land management techniques in the Uttar Pradesh. Integration of cadastral surveys of various provinces would be a welcome step, but it requires critical consideration of the cartographic, legal and economic aspects of the problem. Preparation and storage of land records and data should be in digital form, and it is imperative that the Govt. chalk out a definite policy and programme in this direction.