

Municipal GIS: The Gorakhpur Experience

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In order to develop a model for Municipal GIS in Uttar Pradesh, Gorakhpur was taken as a model city. It won over a Municipal GIS in Kanpur because it had a computerized billing and pay-roll system since 1988, unlike in Kanpur where the Ganga Institutional and Community Development Project (ICDP) had been trying unsuccessfully since 1996 to start basic computerization of the billing system within the Municipal Corporation. The Pilot Phase of the project was a joint venture of the Society for Planning & Research in Sustainable Management (PRISM) and the Gorakhpur Nagar Nigam.

When the Gorakhpur GIS came into being, the only other much talked about GIS for a city was that of Mirzapur. But the realities of the city of Mirzapur were different from that of Gorakhpur in the sheer size of the problem. Mirzapur was a city with a population of 2 lakhs and 23,950 properties while Gorakhpur with a population of 6 lakhs with 67,155 properties was considered as one of the Kawal towns in Uttar Pradesh.

The Gorakhpur Municipal Corporation (GMC) is financially stable, unlike most Urban Local Bodies in India. Thus the fact that a Municipal GIS is self-generating, and the adulation that the Mirzapur GIS had received, acted in its favor and the pilot phase of the Gorakhpur GIS was underway.

In order to further augment the coffers of the GMC, PRISM developed a successful intervention package that included immediate property identification and reassessment. The primary program objective was ***the proper enumeration and mapping of all properties, using GIS as a tool.***

The Municipal Corporation employees had already computerized the billing system, as stated earlier. This system, which had been created in FoxPro, was adapted into the project for faster execution and easy understanding of the GMC employees. According to this, all assessed properties lying within the purview of the Corporation were given a record number on the computer, coded in the form of a 10-digit number.¹ This simple number is very scientific in its structuring. The first 9 digits pinpoint the location of the property ward downward to house partition, if any. The last is a check digit generated automatically by the program once feeding of data for a record is completed, thus preventing duplication errors.

Property Enumeration and Mapping – The Problem

The computer savvy Gorakhpur Municipal Corporation lacked any form of visual representation of data. It possessed a map of the ward boundaries lying within the Municipal Corporation limits (extracted from the Master Plan for Gorakhpur), but no more. As a result, a 1913 Revenue map had to be dug up every time a problem arose in the field or there was a property dispute.

The Corporations computer database did not include any information pertaining to assessment of a property, the judgment of the Tax Inspectors and the clerical staff had to be relied upon. Thus crosschecking this information was extremely tedious, looking up ledgers or visiting the site being the only alternatives.

Added to this was the problem of property number allocation, which many a times was done by the clerical staff without even visiting the site, making it extremely difficult for the Tax inspectors to locate

¹ Nandan Vaishali, 2001, The Gorakhpur Geographical Information System, MapIndia2001

the properties in the field. Property numbers were not in sequence, incorrect demands were printed or there was wrong entry of property numbers, to the extent that properties that had been demolished and long gone were still alive on paper. Thus, there was no visual link between the location of a property and its corresponding data, rendering all forms of visual analysis impossible

The last blanket assessment of properties was done in 1984, since then, the city has grown to almost twice the size, with a proportionate increase in the number of properties. But, as was obvious, many of these properties were unaccounted for, even in the older areas of the city making reassessment of properties an essential need for the accuracy of the study.

Study Area

GMC has divided the city into 8 circles but 2 of the 60 wards of the 1991 Census were taken into consideration in order that the Map generated from the project could be made useful to other departments also. The Wards covered were Civil Lines Wards I & II (ward no. 45 & 48) comprising of the three Mohallas of Civil Lines, Bilandpur & Kalepur. The area houses approximately 2% of the total properties in the city.²

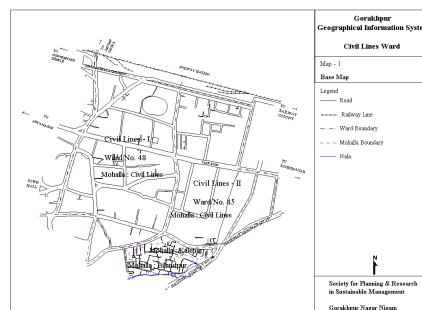


Figure 1: The Study Area

Property Enumeration and Mapping – The Methodology

After a rapid inventory of all available information, the first step was to prepare a Base map of the study area from the 1972 Survey of India Map at the 1:20,000 scale and the 1913 Revenue map at the 1:6,490 scale (the only maps available for Gorakhpur city) by scanning and enlarging them. This enlarged map had property locations notionally superimposed on it with the help of the Tax Inspectors and computer-generated property numbers allotted to each. New numbers were allotted to un-assessed properties and then the second step of cross checking the computer data began. This involved conducting a fresh property survey on the basis of a questionnaire³ and the data thus collected was checked, corrected and fed into MS Excel sheets at the end of each day.

Thus, all information pertaining to a property, for example, land use, location, number of floors in the building, year of construction, year of stay of the resident, status of resident (owner/renter), rent paid (if the property is rented), type of construction, number of rooms in the house, area of rooms, total area and covered area of the property, was collected and stored. Infrastructure related information (availability of water, sewer and electricity connections) was also collected and stored. The surveyors even attempted to sketch the plan of each property, for future reference and comparison.

² ibid. 1,073 of the 67,155 properties in the city. Collected on 30-06-2000 from the computer generated GMC Records.

³ ibid. The questionnaire was prepared in Hindi (the local language) and was commensurate with the current practices of property assessment followed by the Municipal Corporation as well as information that would be needed under the Property Tax Self-Assessment scheme to be adopted shortly by all the Municipal Corporations within the state of U.P. (The latter has now become mandatory for all Corporations in U.P.)

Rough field maps were faired and fitted to the enlarged outline map in order to create the first ever property tax map of Gorakhpur. Subsequently, this map was digitized and the data collected from the survey was attached to each property on the map.

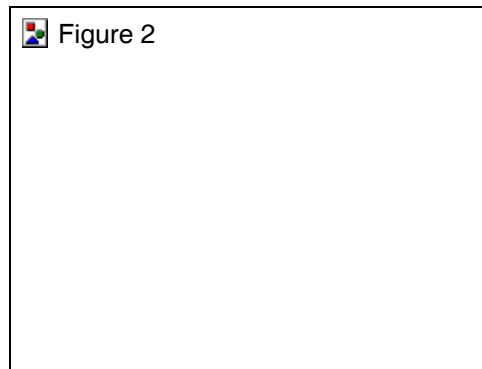


Figure 2: Data attached to the map

House Plans, which had been passed by the Gorakhpur Development Authority before the construction of a house, were scanned and attached to an MS Access database, along with the house sketches made by the surveyors in order that comparisons between the existing situation and approved plans could be made. The final analysis and reassessment of properties was done in the form of tables and maps.

Thus while the computer records of the Municipal Corporation, revealed 1,073 properties in the Civil Lines Wards I & II, the survey located 1,366 properties. The study showed that while 3%(41) of the properties in the Corporation records were non-existent, 21%(284) of the properties in the area still remained un-assessed. The maximum number of un-assessed properties was in the newer Bilandpur Mohalla, accounting for 156(11%) of the total records. But the un-assessed properties in the older Civil Lines Mohalla were no less, 98 (7%) of the total records. This gap between the assessed and un-assessed records was sufficient to justify the enumeration.

GIS to Increase Revenues

The first use of the new Gorakhpur Geographic Information System was to facilitate the municipal property assessment. There are few examples of successful reassessments in India, apart from Mirzapur, largely because of the inability of manual record keeping systems to manage and check the vast volume of data required in the process. With the well-managed computer record system being used in Gorakhpur, there was no hitch in proceeding towards the next step in a GIS. A feasible reassessment methodology could be developed and implemented without concern for data management

Information on property billing and arrears obtained from the Gorakhpur Municipal Corporation was also attached to the maps. According to the figures based on current ARV⁴ applicable in Gorakhpur, 72% property owners in Bilandpur and 66% in Kalepur had property tax arrears pending towards the Corporation and maximum cases were in the range of Rs. 1-3000 (on 30-06-2000). Through visual interpretation, it was now possible to identify their clusters and provide an explanation for non-payment, if any.

⁴ Annual Ratable Value (12% House Tax, 12% Water Tax, 3% Sewer Tax and 0% Conservancy Tax)

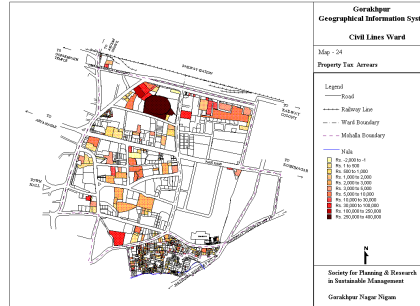


Figure 3: Property Tax Arrears

Properties were further divided on the basis of land use, type of construction, year of construction, year of stay, location of property, availability of basic amenities, covered area and carpet area. Attempts were made to derive the per sq. ft. ARV from the available data but progress on the reassessment front cannot be made because of unavailability of comprehensive data on the carpet area of each property. A task possible, only when reassessment of properties is carried out for the entire city.

Financial Gains

Irrespective of the reassessment stumble, financial benefits projected for the Gorakhpur Municipal Corporation were tremendous. All calculations were made in accordance with the 27% tax levy on the residential population.

Table 1: Financial Justification

Head/ Mohalla	Civil Lines	Bilandp ur	Kalepu r	Total
Average ARV	15,652	2,158	3,983	21,794
No. of Un- Assessed HH	98	156	30	284
Expected ARV (Rs.)	1,533,958	336,794	119,490	1,990,243
House Tax (12%ARV)	184,075	40,415	14,338	238,829
Water Tax (12%ARV)	184,075	40,415	14,338	238,829
Sewer Tax (3%ARV)	46,018	10,103	3,584	59,707
Estimated Property Taxes (p.a.)	414,168	90,934	32,262	537,365

The Financial benefits accruing towards the GMC, as seen above, amount to **Rs. 5.37 lakhs** for the two wards in question. In order to make the projections for the entire city realistic, the total number of un-assessed properties within the city has been considered. This amounts to **Rs. 70 lakhs** for the entire city. (20% of total properties are un-assessed, excluding an estimated 2% non-existent records and taking an average ARV of Rs.2,000 as the datum value)

The property reassessment, that will be mandatory for this project to be of any value, will also add a further **Rs. 82 lakhs** to the coffers of the Corporation (estimated that a minimum 25% of the current properties will need reassessment, and the increase in ARV will be a minimum of Rs. 500)

The benefits derived from the un-assessed properties as well as from the reassessment exercise should more than cover the costs of the project.

A Cyclic Exercise

Since this exercise was not a one-time operation, it was necessary to train the staff in order that the project could stay alive. Workshops and presentations were held within GMC for creating awareness amongst the officers as well.

Conclusion

Municipal GIS is by far one of the most critical uses for the geographic information system. Almost all cities will have to conduct a similar exercise in the next several years due to the severe municipal financial crisis, even though it is generally mandated every five years. The magnitude of financial benefit from this is enormous.

After successful completion of the Gorakhpur GIS, Pilot Phase, the results were presented in front of the then Chief Secretary of the State, who gave the word for Municipal GIS to be initiated in all the 11 Kawal towns in the State (Ghaziabad, Meerut, Agra, Kanpur, Lucknow, Gorakhpur, Moradabad, Bareilly, Varanasi, Allahabad and Aligarh). Bidding took place and work has started in a few cities. Gorakhpur has been awarded to Rolta India Pvt. Ltd.

References

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2. Nandan Vaishali, May 2001, And Gorakhpur followed the suit..., GIS Development Magazine, CSDMS, Delhi.
3. Scott Gibbons, May 1998, Mirzapur: A GIS that works, GIS Development Magazine, CSDMS, Delhi.