KANPUR MUNICPAL CORPORATION (KMC)

PROPERTY TAX MANAGEMENT SYSTEM USING GEOSPATIAL TECHNOLOGY

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The KMC Municipal GIS is currently in operation and has been a success story. For the first time the e-governance is GIS enabled and forms a Spatial decision support system in a local government. The system has resulted in enhancing the property based tax revenues by three times as compared to the system that existed prior to the introduction of the GIS based application. The other positive fallouts of this Endeavour have been:

1. *Transparency in governance*
2. *Reduction in delays in government processing of grievances*
3. *Online tax payment and status verification facility removes intermediary agents facilitating the same.*
4. *Better revenues for investments into civic facilities*

Introduction:

Kanpur Municipal Corporation (KMC), is one of the largest commercial and industrial Municipal Corporation in Uttar Pradesh, India extended to a total area of about 260 Sq. KM with a population of about 2.5 Million people 2001 census).

KMC is using ESRI software ArcSDE, ArcView since year2002. We had a (total station) digital map of Kanpur City and the map was integrated with other property tax related attribute data in the desktop plateform.

In year 2006 the KMC decided to update the digital maps with the help of Quick Bird imegery,updation of different ESRI softwares along with development of a GIS based intractive website and on-line property tax information and tax payment system.

Property Survey & GIS database Creation

Quickbird satellite data was procured and georeferenced based on the Ground survey conducted to collect the GCP's through DGPS. Base data of 1:1000 scale was created through digitization of satellite imagery and supplemented with secondary ground survey to capture information on covered / carpet area, land use, occupant's details, condition of structure, etc. The mapping done using the Quick bird Satellite data was used for conducting the primary contact property survey.

An Over View of the Project:

As a part of the e-governce initiatives, KMC envisaged development of an online web & GIS based property tax calculation information & payment system as a pioneering effort in the country. The job was formally tendered and the work was awarded to ESRI India on basis of best technical cum financial performance. The scope of this work covered the follwing are the major activities:-

- Creation of a GIS based spatial property database involving:
  o Procurement and supply of Quick bird Image (0.6m resolution) for the entire area under the KMC jurisdiction.
  o Georectification of the satellite image form the GCPs collected from DGPS survey.
  o Updation of digital GIS maps of KMC with the help of geocorrected Quickbird data and preparation of data for assessment list.
- Conduct a property level survey for every property unit
- Development of Informative and Interactive web GIS system for online property tax calculation and payment
- Development of desktop application for property database repository management and tax assessment.
- Supply and Installation of software's, hardware and networking with server and additional peripherals
- Training of KMC Personnel
- Renumbering of properties with unique premises no. and fixing of house number plates.

The Scope of work mentioned above could be categorized into two broad components based on requirements of the KMC project as –

- Property Survey & GIS database Creation
- Application Development and Website Development

GIS Based Data Creation Process

Property Tax Application and Website Development

The software development effort for the Kanpur Municipal Corporation included development of KMC portal and property tax application.

1. Property Tax Application

A property tax application has been developed providing a GIS interface to perform conditional queries on database such as 'Tax collected by Zone' or 'Tax collected in a financial year for a selected ward', etc. The database is linked to spatial layers to display results of analysis and queries on GIS maps. The application also enables the KMC staff to calculate tax based on digitized areas taking into account the **Unit Area Method** and generate various kinds of MIS reports required in the day to day operations of KMC. Primary focus of the application was to provide a server based Geographical Information System with key spatial layers and links to the relevant textual / graphical information available in the database.

Property addressing is one of the most important components in property management system; a proper addressing system is a prerequisite for efficient management of many of the public services, considering the complexity of the Indian metropolitan house pattern it is very difficult to find out full proof numbering system. However with application of modern tools like GIS it has become easy to design a logical and consistent numbering system.

Considering the actual scenarios in Kanpur, the numbering system which is practical for Kanpur will be a administrative boundary based numbering system. In this system, the house number or premise number is unique within the smallest administrative boundary that is Chak/block in the case of Kanpur.

GIS Based Website Features

Property Tax Application
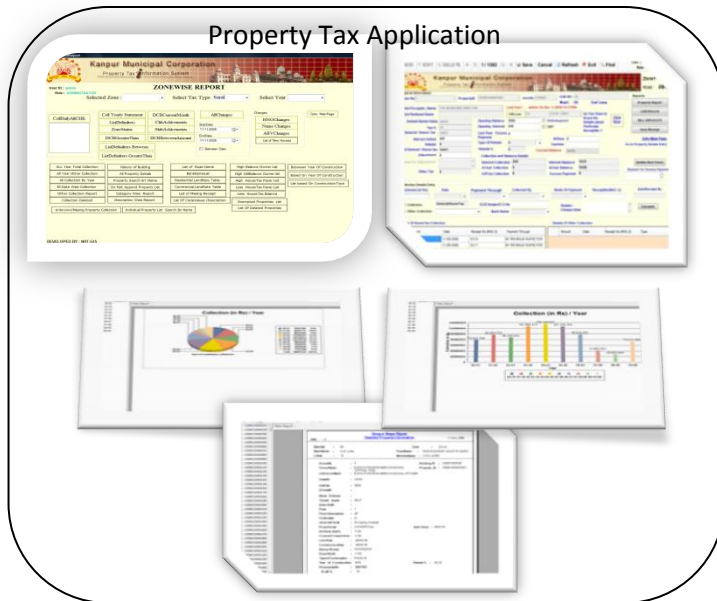
KMC GIS Based Website

An interactive GIS based website was developed for KMC to provide on-line information to citizens on

- Property Tax Details
  a. Property Tax liabilities
  b. Existing status of paid taxes
  c. Annual taxes due to be paid,
- On-line Property tax calculation based on the **Unit Area Method and On-line tax payment**

A facility to access maps based on Zones, Wards, Blocks and Chaks will be provided. In case an individual or an organization wishes to buy relevant maps, the site also provides for visualization of maps and placing an on-line purchase request by the individual or organization.

Online tax payment

Some special feature of the website to provide on-line information to citizens on

- Transaction failure redressal.
- Automatic receipt generation

Automatic data updation based on time specific scheduler

Software & Methodology Followed by KMC

KMC application uses the three-tier architecture based on ESRI technology. An ArcSDE service conveys spatial data between Geographic Information System (GIS) applications and a database. The system architecture uses database management systems (RDBMSs) – SQL Server with ArcSDE. It is a registered collection of ArcGIS feature classes. The application that can connect to and access spatial data from an ArcSDE service will be automatically designed in the application. The solution component for KMC application development and deployment follows three-tiered system architecture as given below:

➤ **Presentation Tier** or Client Tier where the users access the KMC application through internet browser
➤ **Application Tier** where the KMC application business logic resides
➤ **Data Tier** where the KMC application databases reside

Time Frame:

Initially it was one year but it was extended twice i.e. it took 3 years to complete.

Property Numbering

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Structure of the property number
The unique property number has 6 components i.e. Zone No., Ward No., Chak No., Premise No., Floor & parts and will have 17 digits in total.
Example: **10590150022501001**

Parameter	Number of Digit	Description
Zone Number	1	Zone Number, a number in between 1 and 6.
Ward Number	3	Ward Number, a number in between 001 and 110.
Chak Number	3	Chak Number, a number in between 001 and 999
Premise Numberr.	5	Premise number will be the number of the plots or the house, this will alphanumeric.
Floor	2	Code for floor, E.g. 00 for ground floor, 01 for first floor etc
Parts	3	Individual units inside a single premise. E.g. 001

The Tax Payers consultation/participation

1. **One month time was given for self-assessment by fixing date to property owners.**
2. **Objections were invited by property owners after publishing data. Objections were disposed off.**

### Experience of KMC GIS Project
During the Project:

➢ The project faced strong opposition from the grassroot level worker's to senior officer's of the corporation itself, as it exposed the gap's and revenue sharing holes.

➢ The change in the tax level directly affected the property owners weather Government or private which led to many litigations in the local court as well as Honorable High Court.

➢ The issue of tax revision was grabbed by the political parties and a big hue and cry was made in the parliament elections till it was stayed by the State Government.

➢ The details of the whole project, need of the project, modality, transparency in the system, use of GIS and other techniques, its public interface, revenue generation details and the grievance redressal system to be applied in the project was explained to the Government and Government vacated its stay. It was discussed in details at every level to clarify the confusion created about the project.

➢ To ensure the quality of the data three times filtration/field verification was done.

➢ This tax revision was made after 21 year's, it resulted into many fold increase in the tax amount (from three times to ten times). The major increase was because of the increase in land cost rates and addition/alterations of the building or the change of the use of the property (from residential to non-residential or industry)

➢ Visualizing the acceptability factor the land cost based rates were substantially reduced. The grievance redressal system was decentralized to six Zonal officers under the supervision of Deputy Municipal Commissioner to cater fast decision. This system worked actively throughout the year.

After the Project:

• System has been enforced completely.
• Litigation in the courts have been decided in favour.
• Everyone is happy because the collection is three times than the previous year.

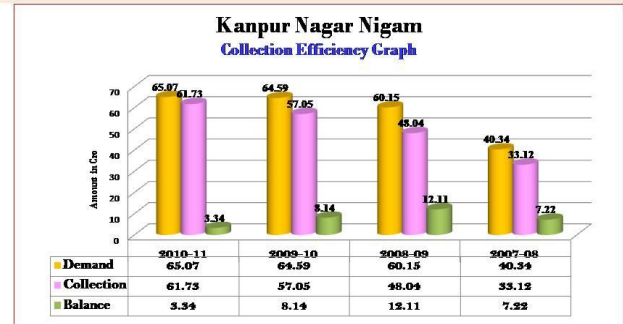### THE PROJECT ADMINISTRATORS ARE CONFIDENT HURDLE RACERS

DEGREE OF THE SUCCESS OF THE PROJECT IS ...
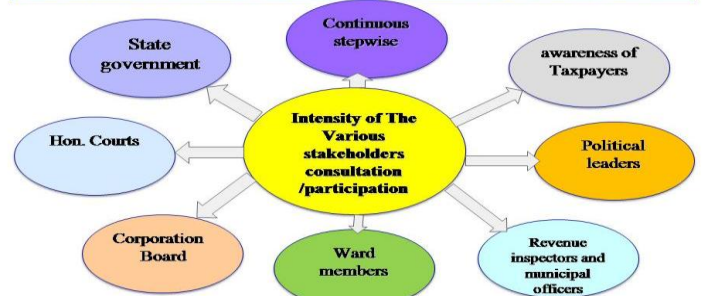
Financial Benefits Accrued by the KMC through Property Tax

Cost Effectiveness

The total project cost – **150 Lac** (including 50 Lac for Software & Hardware and required networking/training)

Kanpur Nagar Nigam
Collection Efficiency Graph

	2010–11	2009–10	2008–09	2007–08
Demand	65.07	64.59	60.15	40.34
Collection	61.73	57.05	48.04	33.12
Balance	3.34	8.14	12.11	7.22

Number of assessed properties have increased from **2,74,205 to 4,48,472**
System is time saving for citizens who want to view, calculate & make Tax Payment. This system has substantially reduced purposeful intra-city movement, thus will help in reducing fuel consumption and congestion in the city.
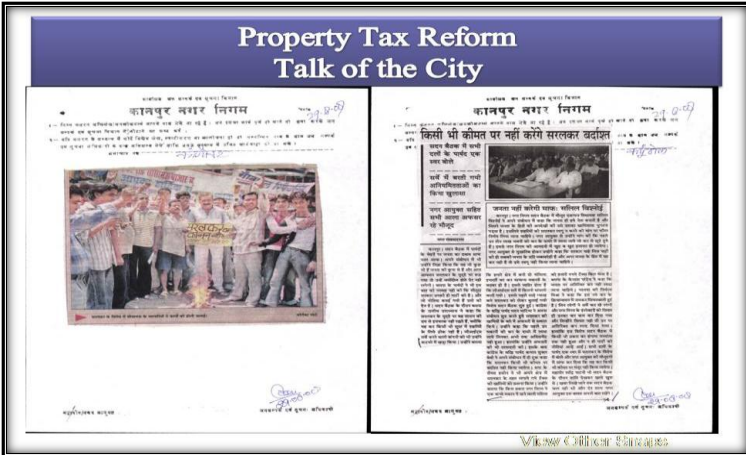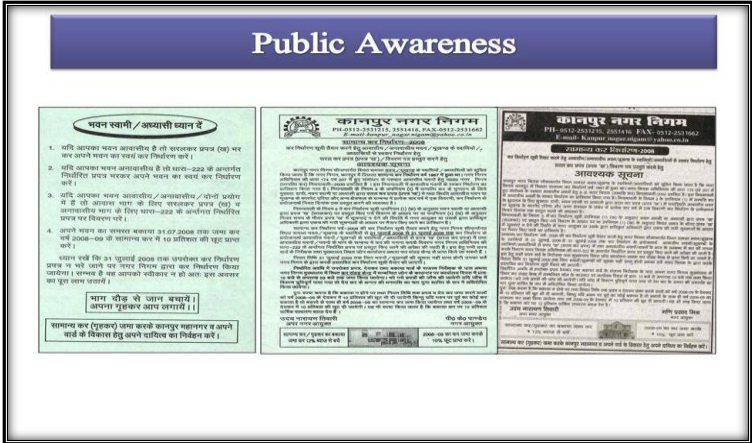

USE OF KMC GIS –MAPS

GIS Map used in –
• By Kanpur Municipal Corporation (KMC) for planning and revenue generation.
• Delimitation of KMC Wards- 2006.
• Ward wise Backward Population Survey- 2007.
• BPL (Below Poverty Line) Survey - 2007
• For planning, design/implementation of water supply & sewerage projects under JNNURM.
• By Kanpur Electric supply Company (KESCO) for power distribution planning and revenue generation.
• Census -2010-11 For enumerator block boundaries
• For Development of City Mobility Plan by U.M.T.C

WE REMEMBER THEM & ARE THANK FULL TO

○ The TRAINING faculty of IIPA New Delhi and specially Mr G.Sriramam initiate the concept.
○ Ex Municipal commissioners:-
  Mr.Arvind Singh for conceptualization ,
  Mr Badal Chatterji for selecting a confident partner, Mr.M.P. Mishra & Mr. P.K.Pandey
○ Mr. Mukund Rao, President, NIIT-GIS for successful execution.

Emotional Experience of KMC GIS Project

Public Awareness Campaign to Educate the Tax payer

Public Awareness

Property Tax Reform
Talk of the City

Property Tax Reform
Intense Discussion in the Kanpur Municipal Corporation Board

Project Implementation was A hurdle race

As usual change is always painful till it is accepted, else till it becomes a habit. A strong management support from KMC and ESRI has been proved to be **the key to win this hurdle race.**

We have learnt that

- *Continuous stepwise consultation/participation with various stakeholders*
- *Awareness of Taxpayers*
- *Political/Administrative will*
- *Media Support*

       ………. is very much needed for successful implementation of this Project.

KMC Core GIS Team

**U.N.Tiwari
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**Parvez Khan,
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**Krishna Bihari Mishra
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With technical support of our partner NIIT-GIS Ltd. New Delhi , consultants & Developers