

## VILLAGE MAPPING USING HIGH RESOLUTION REMOTE SENSING DATA AND FIELD SURVEY

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### Abstract:

Village information system is a comprehensive and detailed study of villages at the core level and it provides complete information for decision - making based on their existing resources and capabilities. The information would range from facilities present in the village the infrastructural quality within it. A comparative analysis has been carried out in the villages that have been taken into consideration, namely Bhopalpur, Tikri khurd, Nandapur villages, which is a part of Pindra Block of Varanasi district covering an area of about 1.68 sq.km. An attempt has been made to study the present status of water resources, land resources, soil fertility, cropping pattern etc. to prepare the digital thematic maps namely, land use, house type, source of water resources, occupational structure etc. on Arc GIS platform using high resolution IKONOS data ( year 2007) in conjunction with SOI topographical map (year 1972) and field. Population data, occupation data and household level data are collected by both primary and secondary data collection methods and after that digital database were generated. This kind of information is very useful for to create better infrastructure at the village levels.

**Keywords:** Village information System, High Resolution Data, Arc GIS etc.

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## Introduction

Village information system is a GIS based application, which provides detailed information pertaining to demography, infrastructure and natural resources for every house. These information's are needed to analyze the existing scenario at the development stage in the village. Through GIS and Remote Sensing, it is possible to compile this geographically referenced data on a systematic manner and store them for retrieval at a subsequent point of time, planners and decision makers at village level have to depend upon spatial and non-spatial data for optimal interpretation. Hence, the planners need to have at their disposal sophisticated data management systems to handle such spatially correlated data. This new technology can reduce the time and cost to the planners in organizing the data in arriving at precise conclusion and decision.

## Study Area

The study area covers namely Bhopalpur, Tikri khurd, Nandapur villages, which is a part of Pindra Block of Varanasi district covering an area of about 1.68 sq.km. Location extent of the study area is 25° 25' 16" N to 25° 24' N latitude and 82° 50' 41" E to 82° 51' 17" E longitude. It situated on the left side of Ganga River and surrounded by Baragaon, Cholapur, Harahua and Sewapuri blocks in the west, east, south-east and south direction respectively (Fig. 1A).

## Data & Methodology

High Resolution IKONOS data of April 2007, Survey of India toposheet having 1:50,000 scale and field data are use for the study. Thematic map like land uses, water resource and crop pattern are prepared by visual interpretation of satellite data based on the image characteristics like tone, size, shape, pattern, location, association etc. Preliminary quality check lend necessary correction are carried out for all the maps prepared. A reconnaissance field survey was done in the study area to check the delineated units. Position of some of the land features are recorded through the hand held GPS. Settlement areas were delineated done with the help on on-site measuring and sketches. And guides are also used to maintain shape and geometric property of building. In the field, household survey was carried out with the help of a questionnaire to collect information related to housing condition, occupation, water source sanitation and infrastructure. Field observations are incorporated in to the related thematic layers. All parameters were taken into consideration and maps were made. All household are categorized by occupation wise, water supply electric facility etc. based on the house-wise statistical findings.

## **Result & Discussion**

### ***Land Use/Land Cover***

The land use map of the study area shows the most of the land is cultivated, that comprises 1.68 sq. km. area. This occupied 72% of the total land of the study area. The main crops grows in the study area are rice, wheat and sugarcane. Other crops grows in the study area are urad dal, arhar dal, corn, mustered, gram, vegetable and barsin grass. Details area statistics for each land use features are given in Table 1 and land use map shown in the figure 1B.

### ***House Types***

Most of the houses in all villages are having single storey. In the study area out of the total 348 houses 302 houses are single storeys having kaccha/pacca walls and kaccha/pacca roof in all villages of the study area (which is 86% of the total). In the study area out of the total 348 houses 46 houses are double storey having RCC/RBC roof in all villages of the study area (which is 14% of out of total).

### ***House Condition***

Most of the houses in all villages are pacca houses. The houses having pacca walls in spite of kaccha roof are considered under pacca houses, the houses having pacca walls and kaccha roof are considered as semi-pacca and houses having both kaccha roof and kaccha walls are considered under kaccha houses. Out of the total 348 houses, 198 houses are pacca (56% of the total), 79 houses are semi-pacca (24% of the total) and 71 houses are kaccha (20% of the total).

### ***Source of Water***

The most common source of water supply is hand pump, which serves 255 houses out of the total 348 houses. The second source of water supply is well, which is the source of water for 64 houses, 9 household uses tube well as source of water and rest 20 houses having no water supply facility, they share water facility to their neighbours.

### ***Source of Cooking***

The main source of the cooking in the study area is wood/upla. 249 household (72% of the total) uses wood/upla as a main source of the cooking. And rest 99 household uses L.P.G./Bio Gas, which is 28% of total. Those houses which uses wood/upla as a source of cooking, they belong to agricultural and labourer class. And the people who use L.P.G./Bio Gas as a source of cooking, they belong to service and self-employed class.

### ***Electricity Facilities***



The condition of electricity in all villages of the study area is quite good. In study area, 301 houses (86% of the total) are having electricity facility and the rest 47 (which is 14% of the total) houses have no electric facilities. But duration of electric current is not good; it serves approximately only 6-7 hours/day.

### ***Sanitation Facilities***

Sanitation facility in all villages of the study area is not good. In study area more than 63% household (219 households) don't have its own sanitation facility inside their houses and they have to go outside (usually in the field) for sanitary purpose. And 37% (129 households) have its own sanitation facility.

### ***Communicational Facilities***

There are 146 households (which are 42% of the total) use telephone/mobile as a main source of communication and 202 households (which are 58% of the total) haven't any communicational facilities. The main reason of higher percentage of household having not any single communicational facilities is because of majority of people in the study area comes under agricultural and labourer classes, and they can't afford this facility.

### ***Occupational Structure***

In the study area about 49% of people are engaged in the agricultural activity. There are 65 household (which is 19% of the total) are earning from service, 58 household (which is 17% of the total) are earning from their own business and rest 54 household (which is 15% of the total) comes under labour class.

### ***Population Structure***

Total population in the study area is 3229. Contribution of male population (>18 year) is 1027 while female population (>18 years) contributes 891. Children population (<18 year, both boys & girls) is 1311.

### ***Educational Status***

Condition of literacy in the study area is very good. Total numbers of literates is 2600 out of 3229 persons (which is 81% of the total population). While 622 persons are illiterates (which is 19% of the total population).

### ***Livestock Resource***

Mainly 4 types of cattle are found in the study area. They are buffalo, cow, ox and goat. Total numbers of cattle's are 617, in which the number of buffalo, cow, ox and goat is 202, 315, 19 and 81 respectively.

### ***Transportation Facilities***

In the study area only road transportation (metalled, unmetalled and cart track) is available. Total length of the metalled, unmetalled and cart track road is 3.07, 8.85 and 2.55 km. respectively. A state highway also crosses the study area, whose length is 1.42 km.



## Conclusion

Village Information System through high resolution remote sensing data integrated with field survey with GPS is an attempt to bring focus on several aspects of living standard of people and for generation of data base on various facilities in the village. With the help of Arc GIS software features could be very easily vectorized and integrated with the secondary data. The infrastructure facilities present in the study area are not adequate to fulfil the needs of the villagers. The water supply and sanitation condition in the villages is very poor. People here are still dependent on the municipal supply of water. Most of the houses in this area do not have a private toilet and there is no good arrangement for public toilets as well. Lack of hygienic water supply and sanitation gives rise to several life taking diseases. Health care facilities in the study area are also not sufficient. Electricity is another serious problem in this area with almost all the houses. As far as employment is concerned most of the villagers are engaged in primary occupation. Communication facilities within these villages are quite good.

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Table 1: Area statistics of different land use feat

Categories	Area (in sq.km.)	% of the area
Single Crop	0.126177	5.3
Double Crop	1.469304	62.4
Mix Crop	0.094076	4
Fellow Land	0.167875	7.1
Waste Land	0.178597	7.5
Grass Land	0.015371	0.6
Vegetation Cover	0.038684	1.6
Settlement	0.197394	8.3
Water Bodies	0.027138	1.2
Canal	0.00957	0.5
Mettled Road	0.007751	0.4
Unmettled Road	0.02218	1
Dug up Land	0.002753	0.1
<b>TOTAL</b>	<b>2.35687</b>	<b>100</b>



0 100 200 400  
Meters

Study area as viewed on satellite data  
 (Ikonos data, year 2007)



0 100 200 400  
Meters

Land use map of the study area