

DEVELOPMENT OF PHYSICAL INDICATORS AND WEB ENABLED INFORMATION SYSTEM FOR BARAICHPUR VILLAGE

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ABSTRACT:

In 21st century also, about three-fourth of the population of India is living in rural areas. Though, growth of urban areas is higher in comparison to the rural areas, integrated development of rural areas is required to achieve the sustainable development at regional level. Development of physical infrastructure at village level is prerequisite for the overall development of the region as well as nation. In the light of this, main aim of the study is to derive the indicators to find the status of physical infrastructure i.e. water supply, sanitation, electricity, telephone and their interrelation with different social classes at village level. Detailed study has been carried out for Baraichpur village, Ladwa block of Kurushetra district in Haryana state, India. For this purpose, IKONOS panchromatic and multi-spectral merged imagery of February 2005 has been used for the preparation of large scale (1:2000) base map. Analysis shows that this village is well served through electricity and transportation network. Public tap and hand-pump are main source of the drinking water supply. But status of sanitation is very poor as just 28% households have sanitation facility inside the house. Information at village level needs to be available widely for the planning and decision-making at different stages and thus, it has been integrated through web enabled information system.

1.0 INTRODUCTION

Rapid economic globalization presents major challenges to the sustainable development not only in India but also in many developing countries. The concept of sustainability typically encompasses social, economic and environmental components. With the changing global and national circumstances, infrastructure development in villages is getting additional attention to achieve sustainable development. Sustainable development needs a balance between urban and rural areas, which can be achieved only through the development of infrastructure in rural areas. The role of information technology in rural development cannot be ignored through integration of the physical, social and economic condition, which will provide opportunity to access the necessary information on infrastructure. Level of infrastructure varies from village to village according to the population served. In the light of this, main aim of the study is to derive the indicators to find the status of physical infrastructure i.e. water supply, sanitation, electricity, and telephone and their interrelation with different social classes at village level.

2.0 LITERATURE REVIEW

Many studies have been conducted to study the level of infrastructure at village level. Ali and Sato (2001) endeavors remote sensing and GIS technology to support the decision making process in rural development programs in Egypt and found that these state-of-the-art technologies play a vital role at the stages of exploration and analysis of local resources, planning and evaluation. Wanninayake and De Silva (2005) studied the infrastructure facilities in Pallepola Divisional Secretary's Division in Matale District, Sri Lanka. It shows that inequalities

of the disbursement of funds are major causes for the poor distribution of infrastructures in this region. Kumar and Misra mentioned the long term objectives for the research activities on sustainable rural activities in India, which emphasizes development of GIS database with indicators and analysis of demographic, economic, socio-economic and environmental development. Jain *et al.* (2003) made suggestions for the development of integrated information system, which needs to be applied at regional level. Roy *et al.* (2006) developed information system for the Barunda village of Haryana.

3.0 STUDY AREA

The undertaken village lies between 29°55' N to 30°N latitude and 77° to 77°5' E longitude. The villages are located south of the industrial town Ladwa. Baraichpur is 1km. and Baraunda is 3 km. away from the Ladwa town of Kurukshetra district. The economy of the district is primarily agrarian; an overwhelming work force is engaged as cultivators and agriculture laborers. The district enjoys ideal location benefits being situated adjacent to national highway number 1. It is coming up as an industrial belt and has started throbbing with the wide spectrum of developmental activities and unfolds immense potential of industrial opportunities. Farming is the main occupation of the people as sizeable percentages i.e. over 90% of people are engaged in various agricultural pursuits. The area of village Baraichpur is 139.6 acre with population 607 persons.

4.0 DATA USED AND METHODOLOGY

The remote sensing data used in this study included high spatial resolution panchromatic and multi-spectral imagery from IKONOS satellite acquired on February 20, 2005. Sun altitude

and azimuth angle play an important role in the quality of high spatial resolution satellite data and the details extracted from it. Using these two angles, one can describe the apparent position of an object. It means that a building of 3 meters height will cause about 2.85 meters long shadow towards south-west direction.

Image fusion using Brovey transformation has been carried out to get advantages of higher spatial and spectral resolution from Ikonos Pan and multi-spectral image respectively. Small size of pixel (1 meter) with unique pixel value as well as size, shape and spatial arrangements of buildings, roads and various types of land covers are used to prepare base map from the IKONOS merged product. As an initial attempt to understand the village culture, a field survey was carried out in Baraichpur village and its surroundings. Detailed field verification was carried out to improve the accuracy of interpretation as well as to collect the information about the basic infrastructure at household level. Various observations were used to enrich the survey in addition to the primary data collected through interviews. Architectural characteristics of houses impose a limitation in the visual interpretation as most of the houses in the villages follow the courtyard planning which causes an additional shadow and difficulty in interpretation. About 8 categories of land uses including agricultural, residential, commercial, livestock areas, public facility, public utility, open space, water bodies have been identified in the imagery supported with the field survey. A detailed inventory of the land use plays a guiding role to find the level of physical and social infrastructure at village level. There were 6 parameters that were taken into consideration while studying these two villages. These parameters were building type, electricity, water supply, sanitation, telephone, occupation etc. Based on these parameters, various facilities and infrastructures within the villages have been identified.

5.0 RESULT AND DISCUSSIONS

5.1 Land use pattern

This study found that high-resolution satellite data allows us to create base map at the scale of 1:2000 showing every household (figure 1a), which can be linked with a number of attributes. Although village development seems to be a part of local trends, their socio cultural influences create a number of issues related to infrastructure. Residential buildings covered nearly 28% in the village and other uses mainly comprised of public facility buildings, cattle sheds (khatal), water bodies, etc. The land use map of the village shows that most part of the land is cultivated that comprised of 41% in Baraichpur. The main crops grown in these two villages were mainly rice, wheat, and sugarcane. Other crops grown were urad dal, torai, fodder, corn, mustard, masoor dal, etc. The other features that covered the land were, open space about 4% and livestock area about 8% in Baraichpur. The road network in the village mainly comprised of the main road leading to village being metalled and the rest of the roads were either unmetalled or pack tracks.

Most of the open spaces are either vacant or used for keeping hay or stacking dung. Public utilities mainly comprises of the roads, the water supply facilities present in the village, etc. Public facilities mainly comprise of Panchayat buildings, "chaupal", schools, "baithak", godowns to store grain, and local medical facilities are provided at the "aanganwari". Water bodies were

mainly ponds and some had vegetation covered on it. Religious category mainly comprised of temples, gurudwara, pir-ki-jagah, etc. Commercial facilities were very less in both the villages. Shops were found in both the villages and they mostly sold household goods. Baraichpur even is having a telephone booth and both local calls and STD facilities are present. Other facilities present in these villages are flourmill and barber shop.

In Baraichpur most of the households are engaged in labour. The numbers of houses engaged in farming are just 22 out of the total 96 houses, which is only 23% of the total household. On the other hand, the number of houses engaged in labour is as high as 70, which is 73% of the total household. In this village, agriculture and labour are the two main livelihoods of the villagers. The other occupations in both the villages include dairy, business, service etc. that covers only few houses. In Baraichpur, most of the household don't have their own land and work in other's field as laborers.

5.2 Level of infrastructure

Quantitative determination of infrastructure in village allows to understand the distribution pattern of physical infrastructure at village level. About 23% households are involved in agricultural activities having their own land while about 73% households are coming under the labours category working in the agricultural fields. Rest of the 4% are also engaged with related occupation i.e. milk dairy while only one house is engaged in government service. Table 1 summarizes the infrastructure level in the village. This village is well served through electricity and transportation network. Public tap and hand-pump are main source of the drinking water supply. But status of sanitation is very poor as just 28% households have sanitation facility inside the house.

In Baraichpur, the most common source of water supply is common hand pump and public tap (figure 1b). In 54 houses out of the total 96 houses the only source of water is common hand pump. After common hand pumps it is public tap which serves 22 houses. They together serve 80% houses of the village (common hand pump – 57% and public tap – 23%). The other source of water is bore well, public water supply and personal hand pump. From the buffer of common water source of the village, one can clearly see the well distribution of common water source i.e. hand pump and public tap within the village. Most of the houses in the village come under 75-meter buffer zone. In Baraichpur 1 house fall outside the 75 meter public water supply buffer zone. This house is not only outside the buffer zone but does not have own water supply too.

Sanitation facility in the village is not good. In Baraichpur, about 72% household don't have sanitation facility and they have to go outside (usually in the field) for sanitary purposes (figure 1c). Only 27 houses out of the total 96 houses have sanitation facility inside their house.

The condition of electricity in the village is good. In Baraichpur, 84 houses out of the total 96 houses are having electricity, which is 87%. It clearly shows the advancement of electric facility in Haryana at village level. So both the village doesn't have any problem regarding electric facility.

Table 1: Status of physical infrastructure in the village

Facilities inside house	Yes		No	
	Number	%	Number	%
Water	20	21%	76	79%
Sanitation	27	28%	69	72%
Electricity	84	87%	12	13%
Telephone	21	22%	75	78%

In Baraichpur, only 21 houses out of the total 96 houses have telephone facility in their house (figure 1d). So, 78% house in Baraichpur doesn't have telephone facility in their house. The reason for higher percentage of houses lacking telephone facility in Baraichpur is the higher percentage of laborer class in the previous village that can't afford this facility. In Baraichpur, out of the total 96 houses, 65 houses are pacca houses, Which is about 68% of the total houses.

5.3 Deriving indicators

All the parameters that were taken into consideration were initially used to find the interrelationship between different parameters and social classes using chi-squares test. But for electricity, one of the frequencies was 0 and so that parameter was later not taken into consideration.

Table 2: Contingency table (2x2) comparing different parameters

SANITATION			
	YES	NO	Σ
Landed farmer	10	12	22
Labourer	14	56	70
Σ	24	68	92
TELEPHONE			
	YES	NO	Σ
Landed farmer	14	8	22
Labourer	5	65	70
Σ	19	73	92
WATER SUPPLY			
	PRIVATE	PUBLIC	Σ
Landed farmer	20	25	45
Labourer	11	72	83
Σ	31	97	128
HOUSE TYPE			
	PACCA	KACCHA	Σ
Landed farmer	47	1	48
Labourer	54	27	81
Σ	101	28	129

A 2x2 contingency tables (table 2) were made for each of the parameters to compare the facilities status among landed farmer and labour class and then the following formula was used to find the chi-square.

$$\chi^2 = \frac{(ad - cb)^2}{\sqrt{(a+b)(a+c)(b+d)(c+d)}}$$

In order to find the relationship, we build a test of hypothesis that physical infrastructure i.e. water supply, sanitation, telephone and house type is dependent on social class. The above chi-square test was conducted and it was found out that all the values were less than the expected value as given in table 3. The value of the coefficient varies between +1 to -1 indicating how strong is the overall relationship. Sanitation, water supply and house type shows moderate relationship as the derived value of coefficient in these cases varies from 0.35 to 0.37. It rejects the hypothesis that sanitation, water supply and house type are dependent on social class. While, telephone shows strong relationship with social class as the derived value of the coefficient is 0.59. It supports the hypothesis that availability of telephone is strongly related with the social class. Thus, indicators developed reject the hypothesis and shows that most of the physical infrastructure and social class are not strongly dependent on each other.

Table 3: Results under the hypothesis of independence of attributes

Physical infrastructure	Coefficient	Remarks
Sanitation	0.37	Moderate relationship
Telephone	0.59	Strong relationship
Water supply	0.35	Moderate relationship
House type	0.37	Moderate relationship

5.4 Development of web page

The village information system is created to provide all data at the village level. It gives quick, effective and reliable data about every household in the village and can be used effectively for various planning purposes. This web-enabled village information system was created with the help of Russian software, GEOHTML. This software is easy to use and does not require much expertise. The main work in creating this information system was to make the links between the various web pages. After this the website was uploaded on the internet. The website is <http://www.geocities.com/muniroy/>. Glimpses of the website are given in the following pages.

6.0 CONCLUSIONS

Information collected on the infrastructure reveals a much lower quality of life, which is also clear from the derived indicators. Analysis at village level breaks down complex phenomenon into simple elements for better understanding. It shows that availability of basic physical infrastructure i. e. water supply and sanitation inside house depends on the mentality of the people

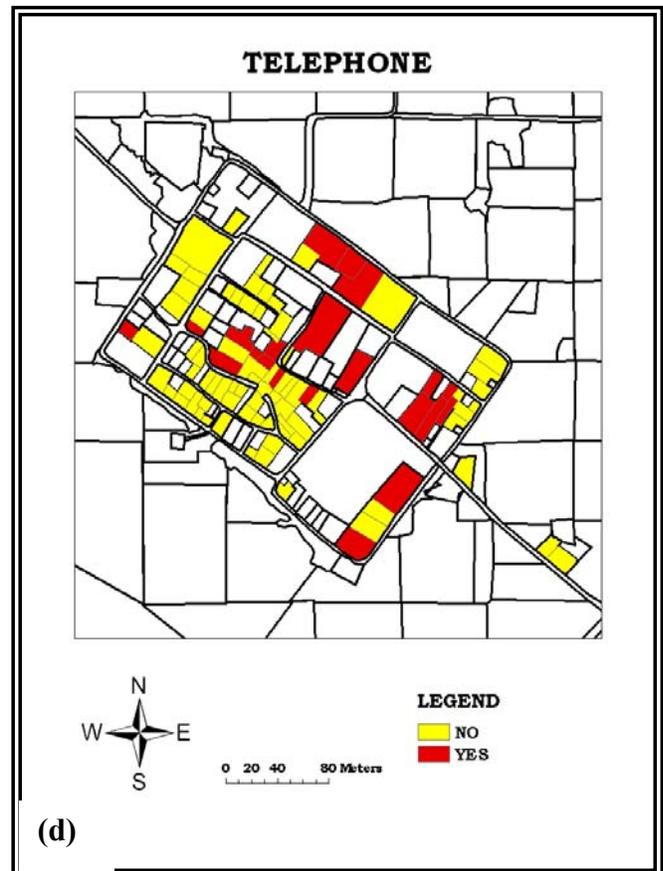
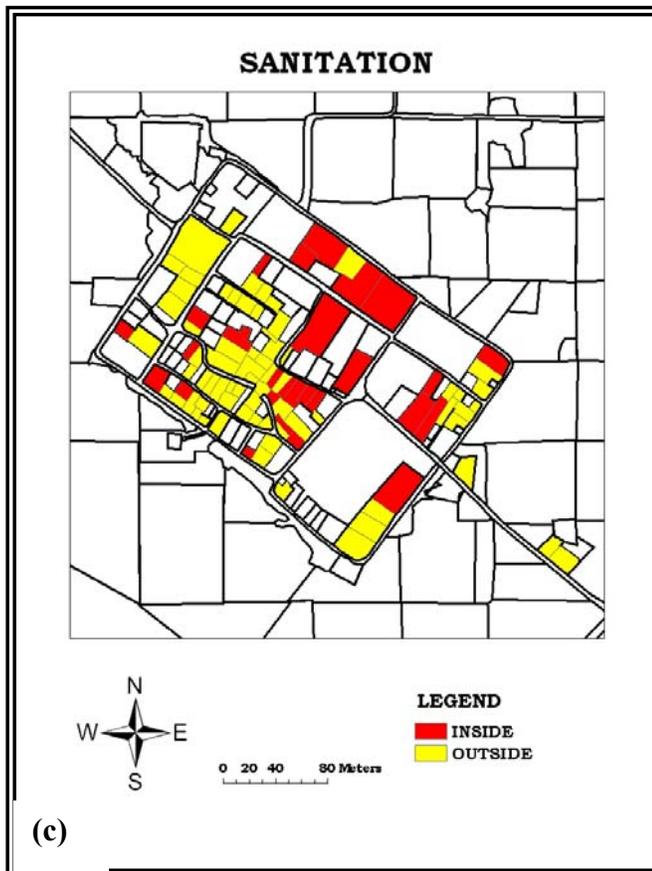
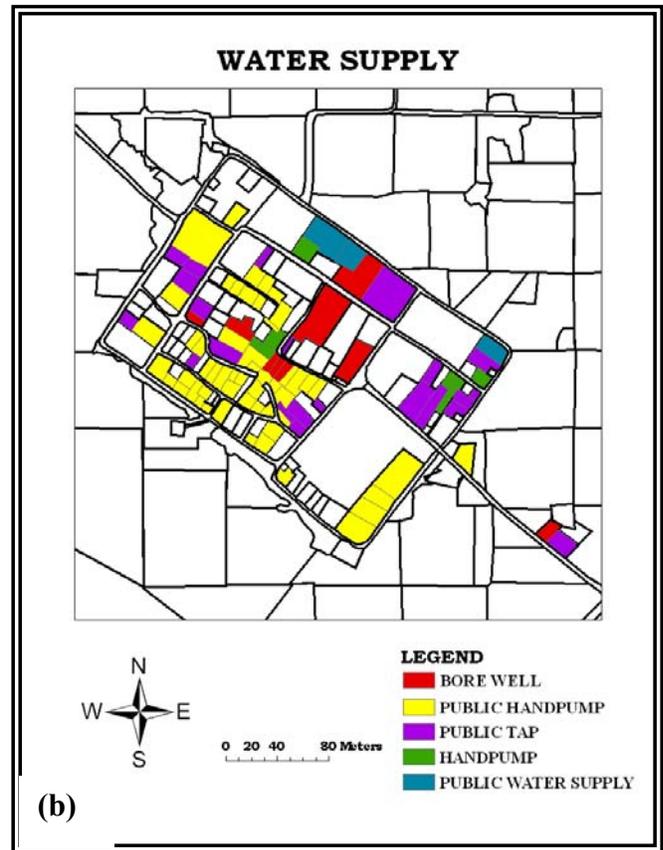
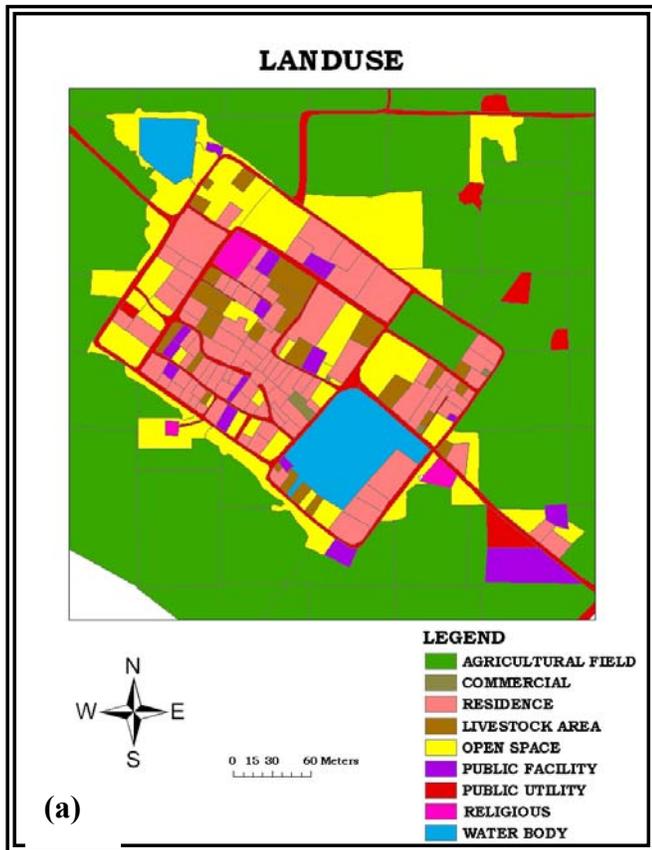


Figure 1. Map showing the land use and availability of basic infrastructure with in Baraichpur village.

rather than the affordability. As many owning agricultural land do not have basic facility while many persons belongs to labor class have basic facilities inside their home. Opposite to this, telephone facility is more common among landed farmers. These are helpful to planners for the study of the settlements, the society and their physical and socio-economic attributes. Based on the understanding of the existing condition, decisions are taken to steer development towards a desire future state from village to regional level.

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