

SPATIAL PLANNING OF INFRASTRUCTURAL FACILITIES IN RURAL AREAS AROUND ROORKEE, UTTARAKHAND, INDIA



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INTRODUCTION

- Rural development is one of the important missions for transforming India into a developed nation.
- In basic civic amenities and employment, there is a big gap between urban and rural India.
- This creates a regional imbalance in development, causing migration of population from rural to urban areas.

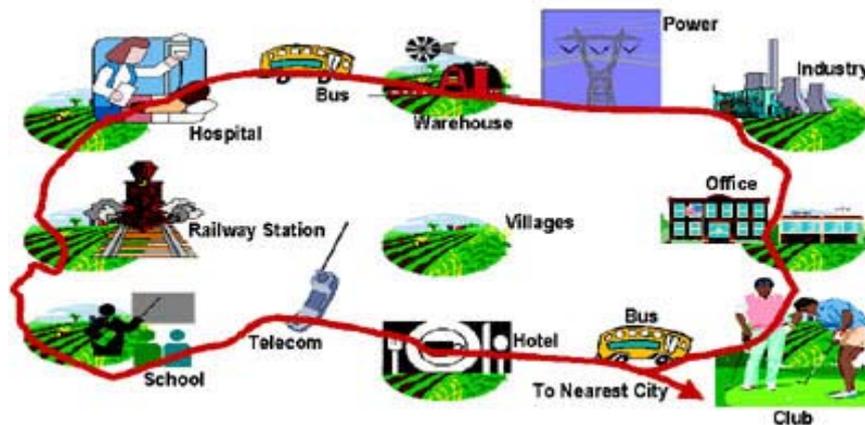
PURA

- PURA (Providing Urban Facilities in Rural Areas) model would help in eradication of mass poverty, creation of more employment opportunities, checking of mass city-ward push migration, improvement in living standard of the masses, narrowing the gap between the urban and rural living and generation of a self-sustaining development process.
- An integrated strategy therefore is required, as development of rural infrastructure cannot be viewed in isolation.

AIMS OF PURA

- **Physical connectivity:** It includes transportation, power, basic infrastructure, availability of goods, tourism, etc.
- **Economic connectivity:** It includes employment, economic strengthening, banks and cooperatives, market & service centers, women empowerment, small-scale industries, quality of life, etc.
- **Electronic connectivity:** It includes telecommunication, computer literacy, tele-education, such as cyber cafés, internet facilities, tele-medicine, e-governance, such as tele-info centre, habitation info grid, etc.
- **Knowledge connectivity:** It includes vocational training centres, professional institutes, sectoral planning and management related to health, environment, and drinking water and sanitation, non formal education, community participation etc.

PURA MODEL



Loop of Villages Connected by a RING ROAD convert the Loop into a Virtual Town with Potential to Grow

Rural–Urban Migration - Causes

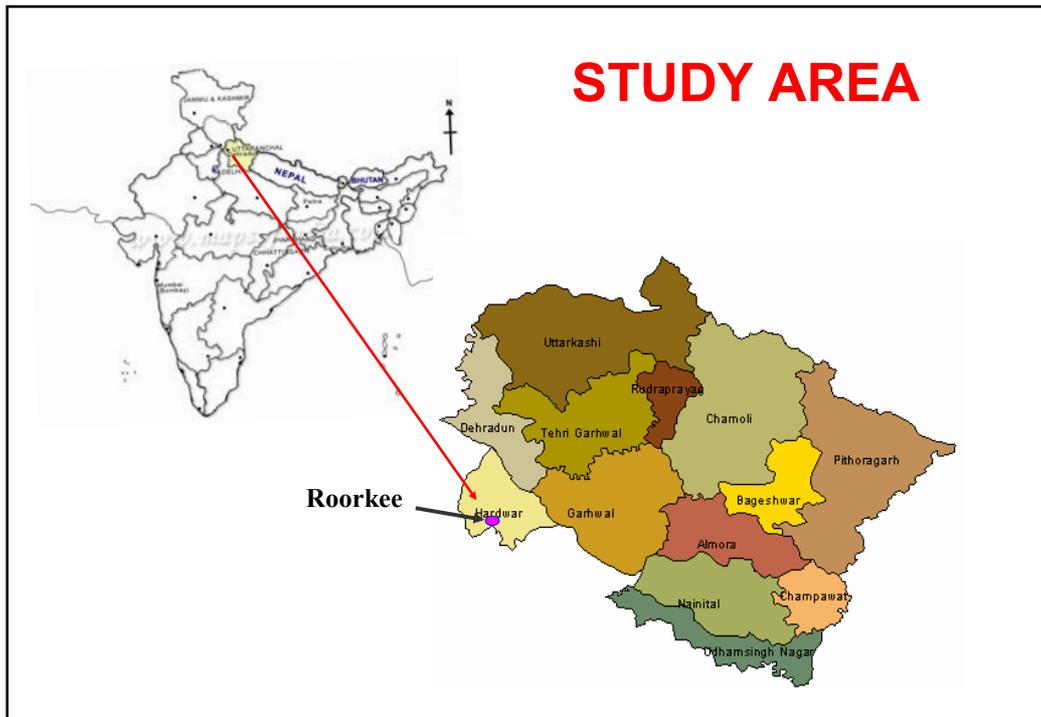
- Lack of facilities in rural areas.
- Rural development schemes have low paid jobs.
- Literates move to urban areas for better job opportunities.
- People migrate to urban areas due to the poor infrastructure in rural areas.
- Low expansion of service sector for employment multiplying schemes in rural areas.

Effect of Rural Migration on Urban Areas

- Problem of population growth will occur in urban areas.
- Migration from rural to urban creates problems to urban planners for the formulation of urban development plans.
- Congestion and pollution in the urban cities will increase due to rural–urban migration.
- Shortage of many facilities, such as water, electricity etc., will occur in the urban areas.

Minimize Rural –Urban Migration

- Providing rural areas with all desirable amenities equivalent to cities.
- Providing employment opportunities at the same scale, and at the same level, as cities do.
- Providing better education and amenities.
- Providing high paid jobs in the rural areas.
- Providing better infrastructure in rural areas.



(A) Educational Facilities

- Nursery school
- Primary school
- Middle school
- High school
- Inter College
- Degree College
- Adult Education Centre
- Training school
 - Vocational Centre (Typing & Shorthand Center)
 - Computer Center
 - ITI Center

(B) Drinking Water Facilities

- Well
- Overhead Tank
- Hand Pump
- Water Tap
- River
- Lake

(C) Medical Facilities

- Public Health Clinic
- Regd Private Clinic
- Homeopathy Clinic
- *Ayurvedic* Clinic
- Veterinary Hospital

(D) Power Supply

- Domestic Use
- Agricultural Use
- Industrial Use

(E) Physical Connectivity

- Metalled Road
- Unmetalled Road
- NH/SH
- District Road
- Village Road
- Rail

(F) Commercial Activities

- Retail Market
- Whole sale Market
- Godown
- Seed Store
- Bank (Govt and Co-operative)
- Petrol Pump
- Repair Shop

(G) Small Scale Industries

- Rice Mill
- Stone Crusher
- Sugarcane Crusher
- Wood Factory
- Bee-Keeping
- Poultry Farming
- Sheep Farming
- Pig Farming
- Fisheries
- Dairy Farming

(H) Irrigation Facilities

- Tubewell
- Tank
- Rain-fed
- Pond
- Thrasher
- Tractor
- Seed Driller

(I) Post & Telegraph Facilities

- Post Office
- Post & Telegraphic
- PCO with STD
- Internet Café

Software Used

- Arc GIS
- Microsoft Excel
- Visual Basic Program

Educational Facility Index (EFI)

Educational Facility Index (EFI) is a measure of the importance education from settlement point of view. EFI has been calculated using weighted indexing method, as given below. If I_i is the index of particular function "f" of i th habitation, then:

$$I_i = \sum_{j=1}^n W_j X_j$$

Where W_j = Weight of j th function

X_j = Value or availability of j th function in i th habitation.

N = Number of functions / facility available in i th habitation.

$$EFI = (N + P + M + H + I) I$$

Where $PI = W_p \cdot X_p$

N = Nursery school

P = Primary school

M = Middle school

H = High school

I = Inter college

Medical Facility Index (MFI)

- The Medical Facility Index (MFI) is a measure of the availability of medical facilities in the habitation, and thus it is the level of importance based on medical facilities. It is calculated as:

$$I_i = \sum_{j=1}^n W_j X_j$$

- Where W_j = Weight of j th function
- X_j = Value or availability of j th function in i th habitation.
- n = number of functions / facility available in i th habitation.

$$\text{MFI} = (\text{PHC} + \text{COM} + \text{PVT} + \text{HM_AY} + \text{VT}) I$$

- Where $\text{PHCI} = W_p * X_p$

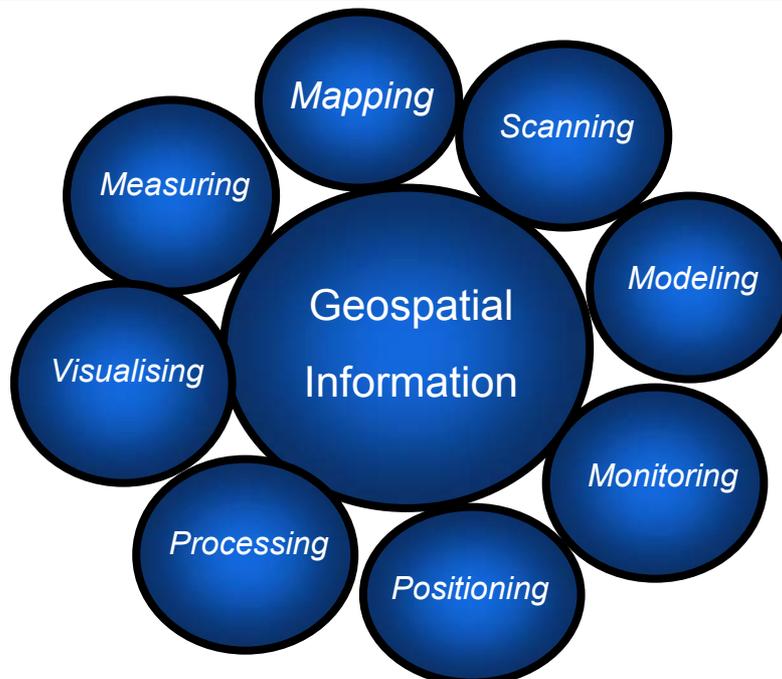
Transport Facility Index (TFI)

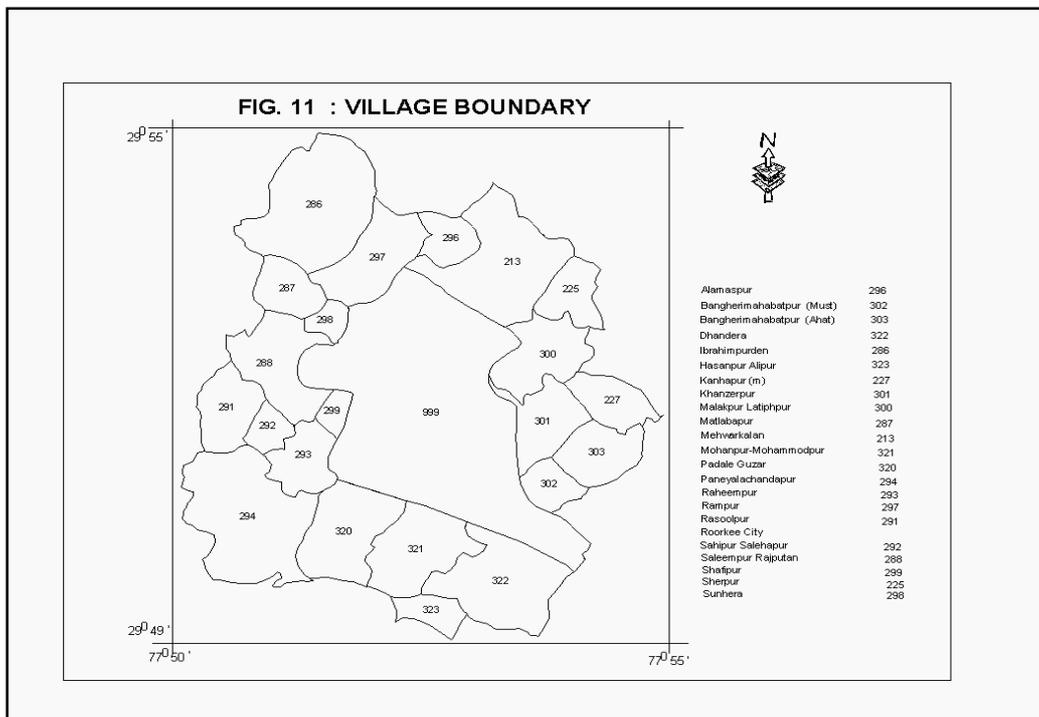
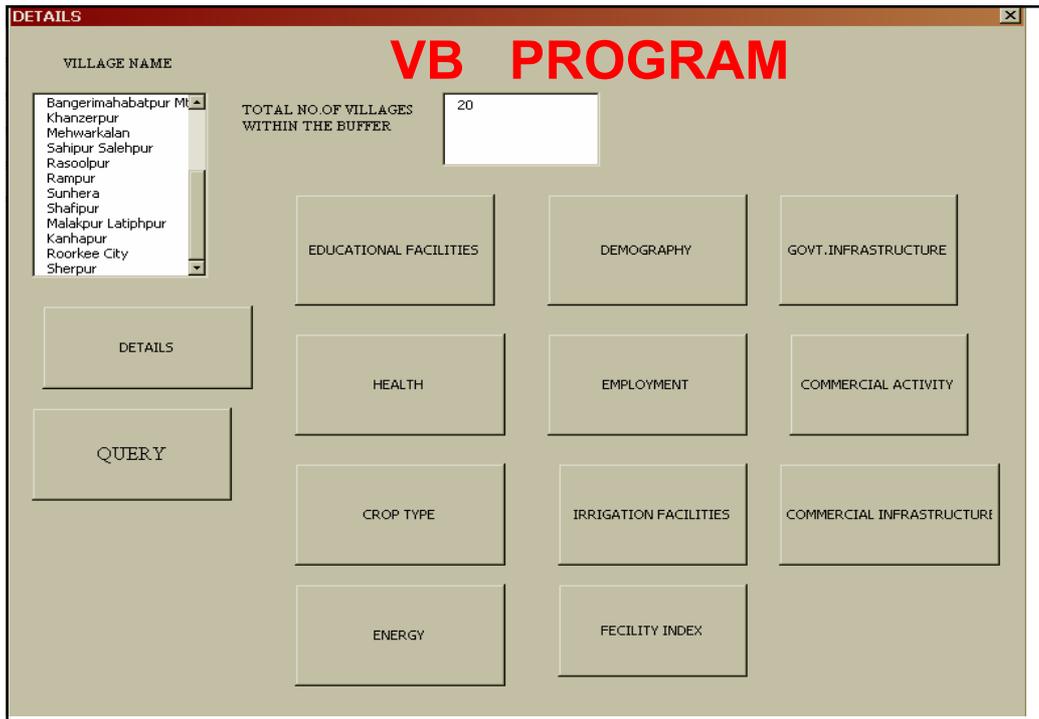
- The Transport Facility Index is a measure of availability of transport facility in the habitation.
- TFI is calculated by given weights to each class of transportation i.e Metalled road (MR), Unmetalled road (UMR), and Foot path (FP), Railway line (RL) using the following equation.

$$\text{TFI} = (\text{MR} + \text{UMR} + \text{FP} + \text{RL}) I$$

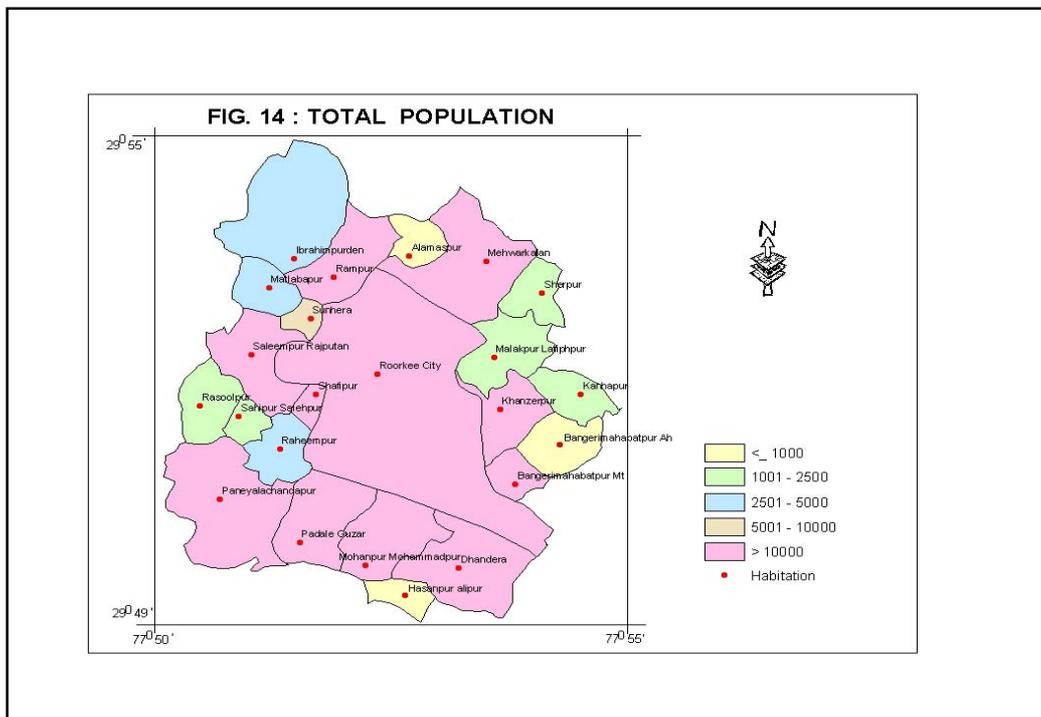
Communication Facility Index (CFI)

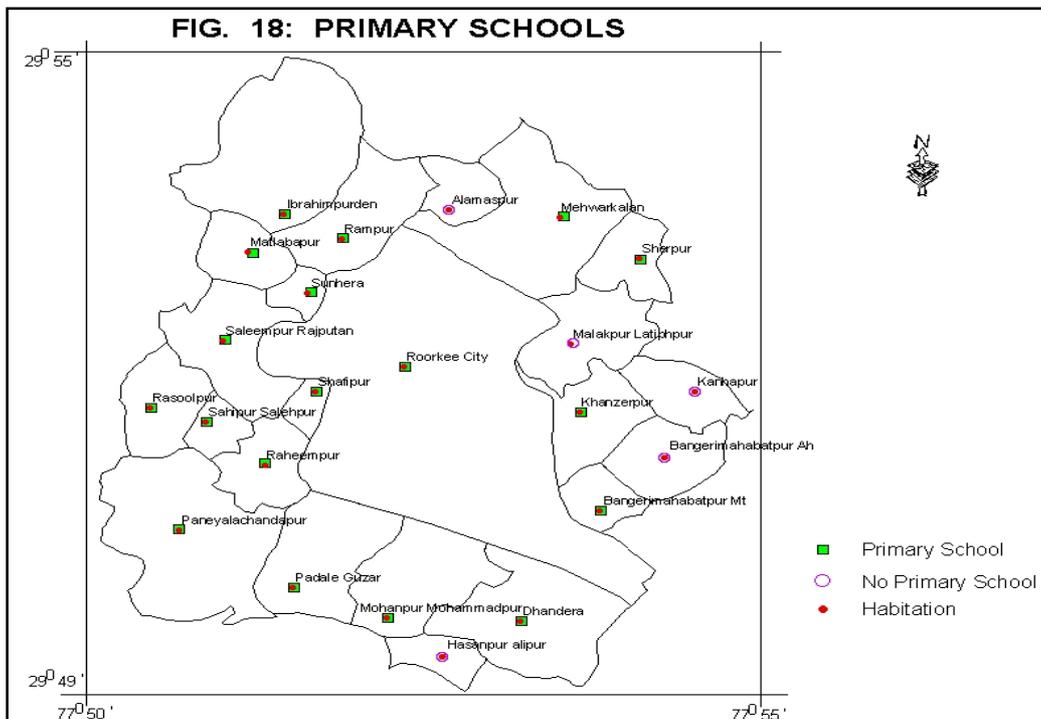
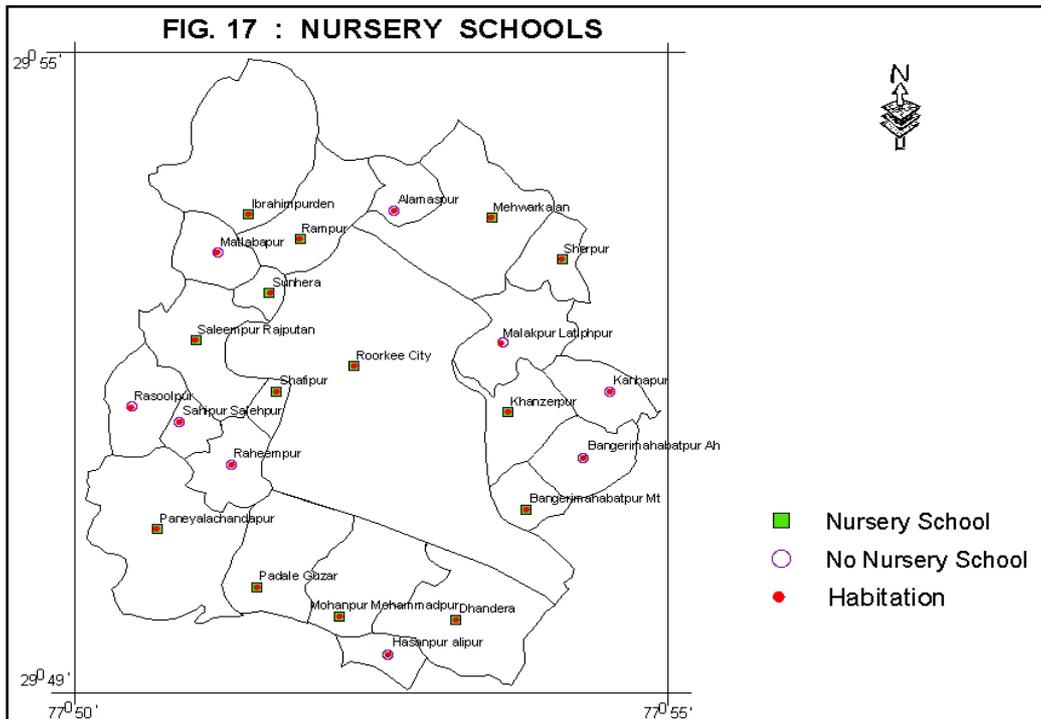
- The Communication Facility Index (CFI) is a measure of availability of communication facilities in the habitation.
- To find CFI, availability of Cyber Café (CC), Post Telegraph (PT), Post Office (PO), STD PCO (SP) have been taken into consideration -
- **CFI = (CC + PT + PO + SP) I**

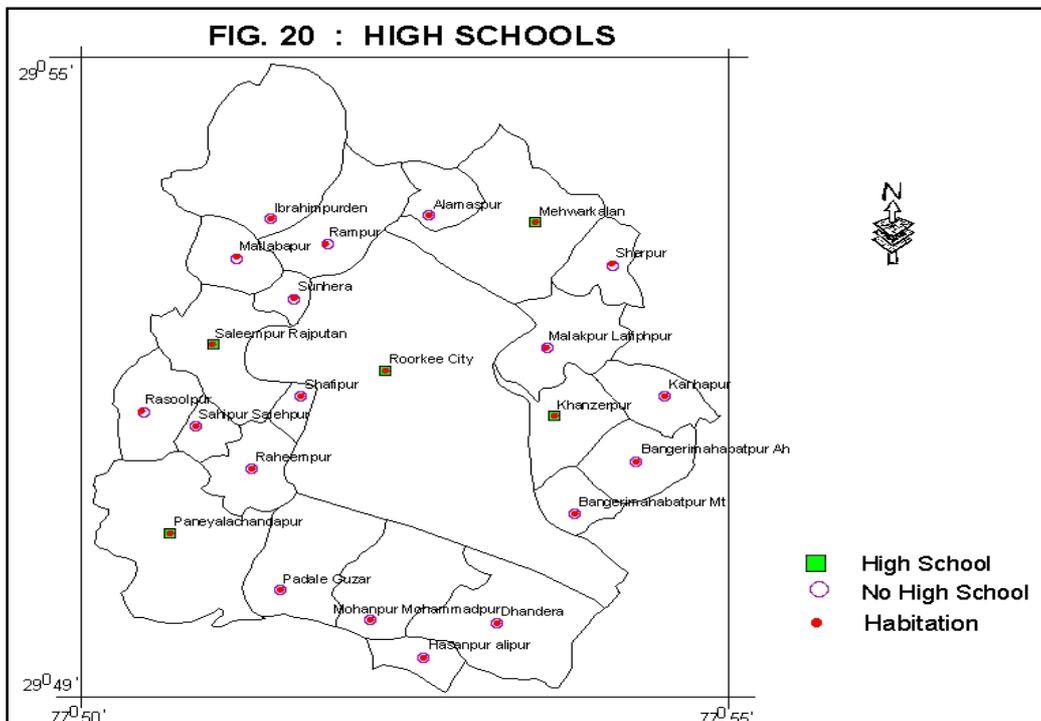
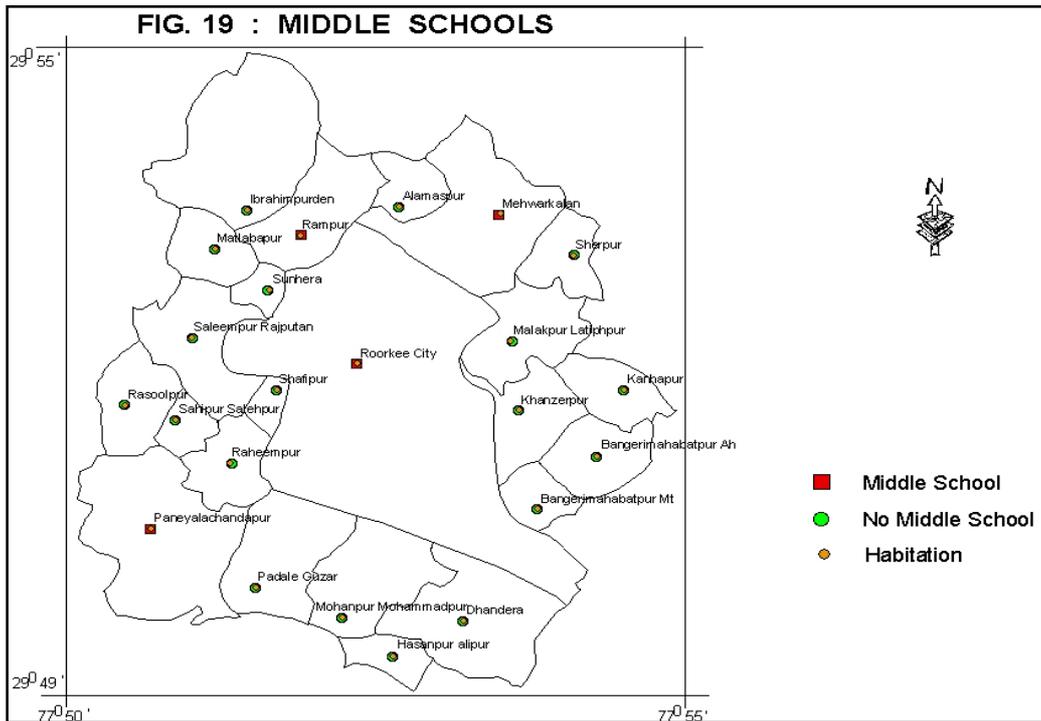


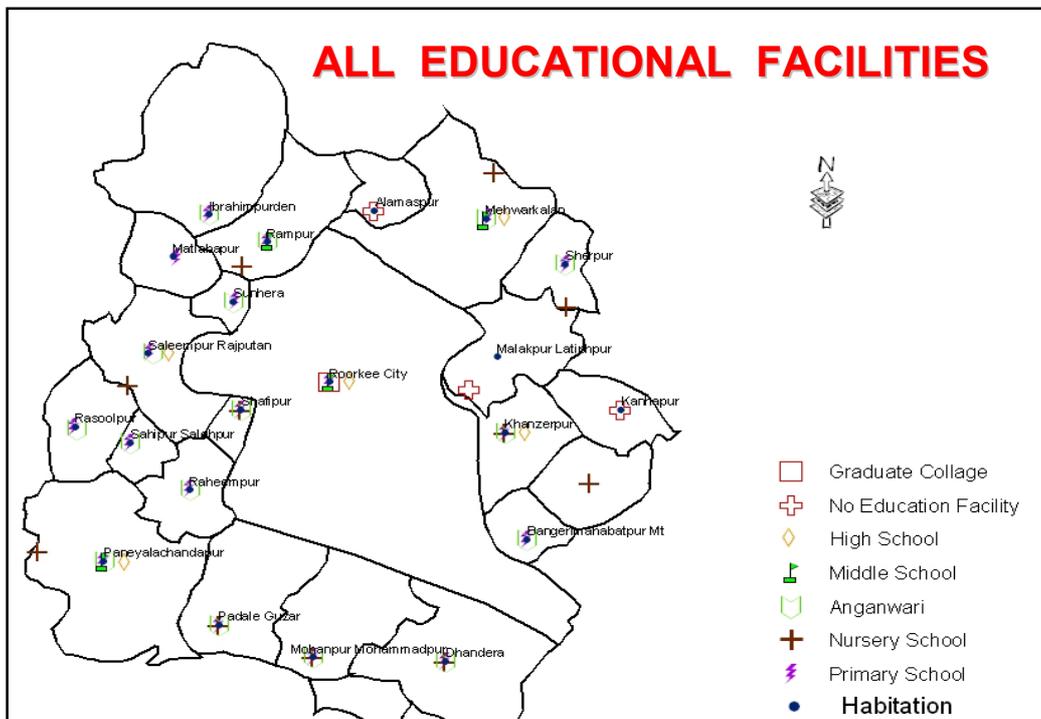
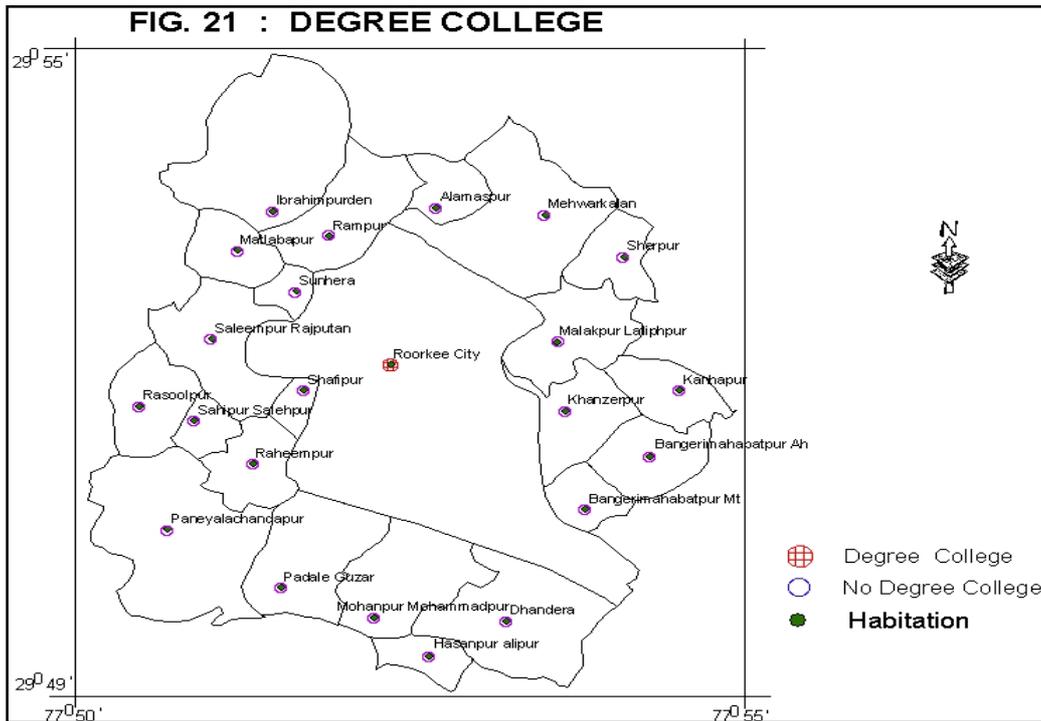


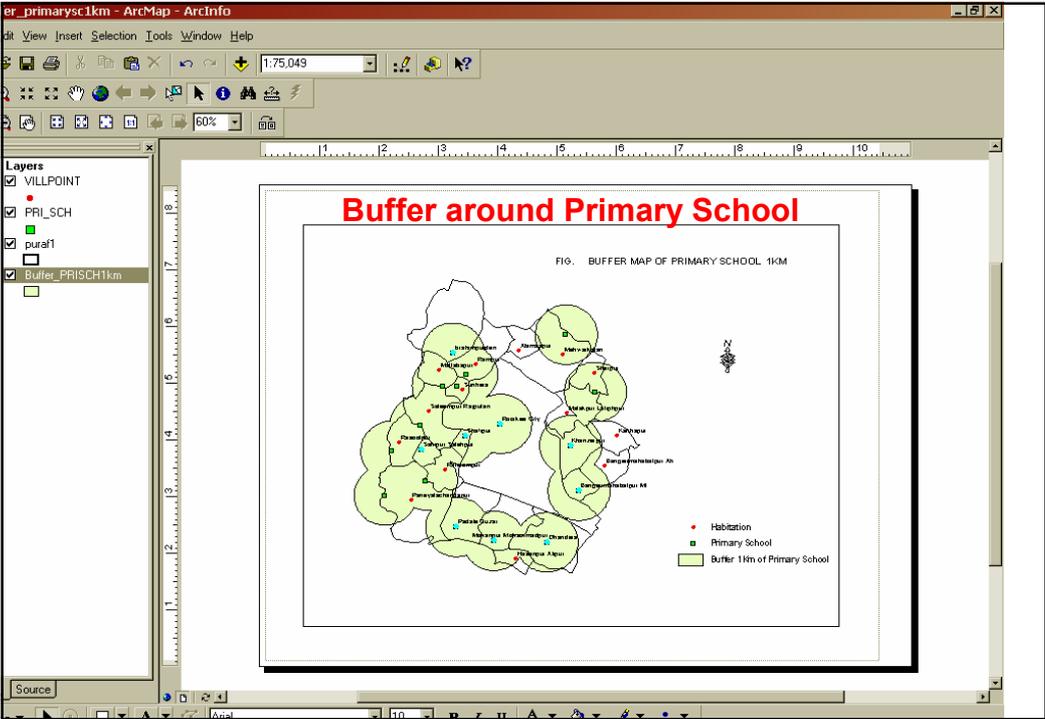
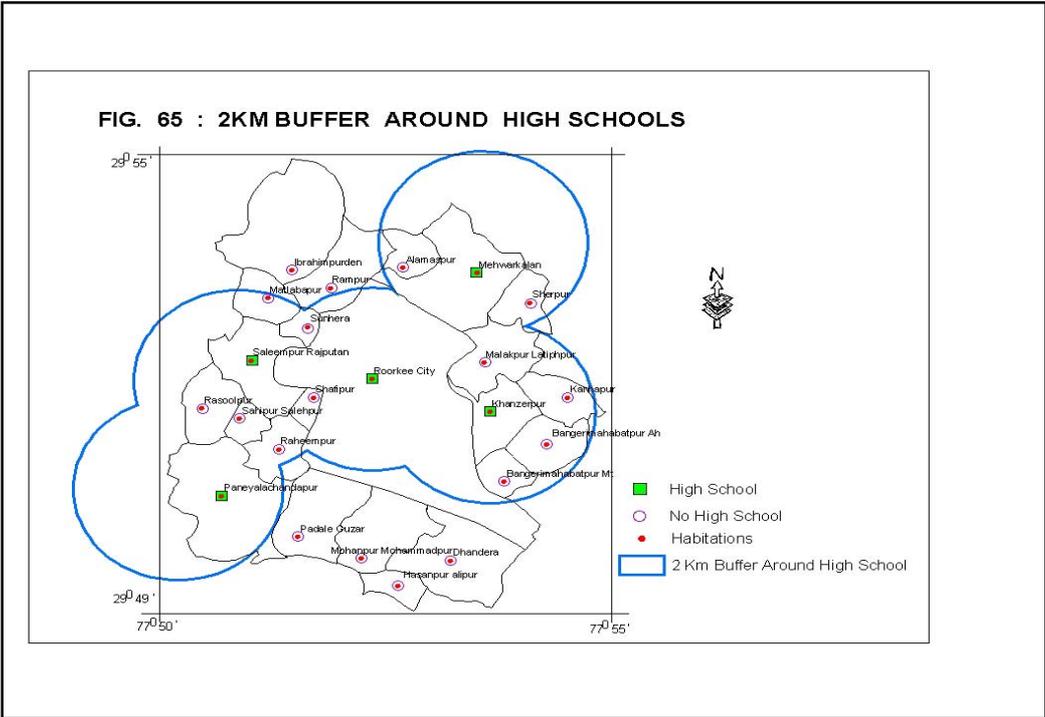
<i>Sl. No.</i>	<i>Habitation name</i>	<i>Habitation codes</i>	<i>Area (Ha)</i>
1	Alamaspur	296	83.00
2	Bangerimahabatpur (Must)	302	75.00
3	Bangerimahabatpur (Ahat)	303	140.00
4	Dhandera	322	310.00
5	Ibrahimpurden	286	420.00
6	Hasanpur Alipur	323	67.00
7	Kanhapur (m)	227	110.00
8	Khanzerpur	301	150.00
9	Malakpur Latiphpur	300	180.00
10	Matlabapur	287	110.00
11	MehwarKalan	213	360.00
12	Mohanpur-Mohammadpur	321	230.00
13	Padale Guzar	320	240.00
14	Paneyalachandapur	294	440.00
15	Raheempur	293	130.00
16	Rampur	297	210.00
17	Rasoolpur	291	140.00
18	Roorkee City	999	1400.00
19	Sahipur Salehapur	292	55.00
20	Saleempur Rajputan	288	220.00
21	Shafipur	299	3.60
22	Sherpur	225	110.00
23	Sunhera	298	41.00

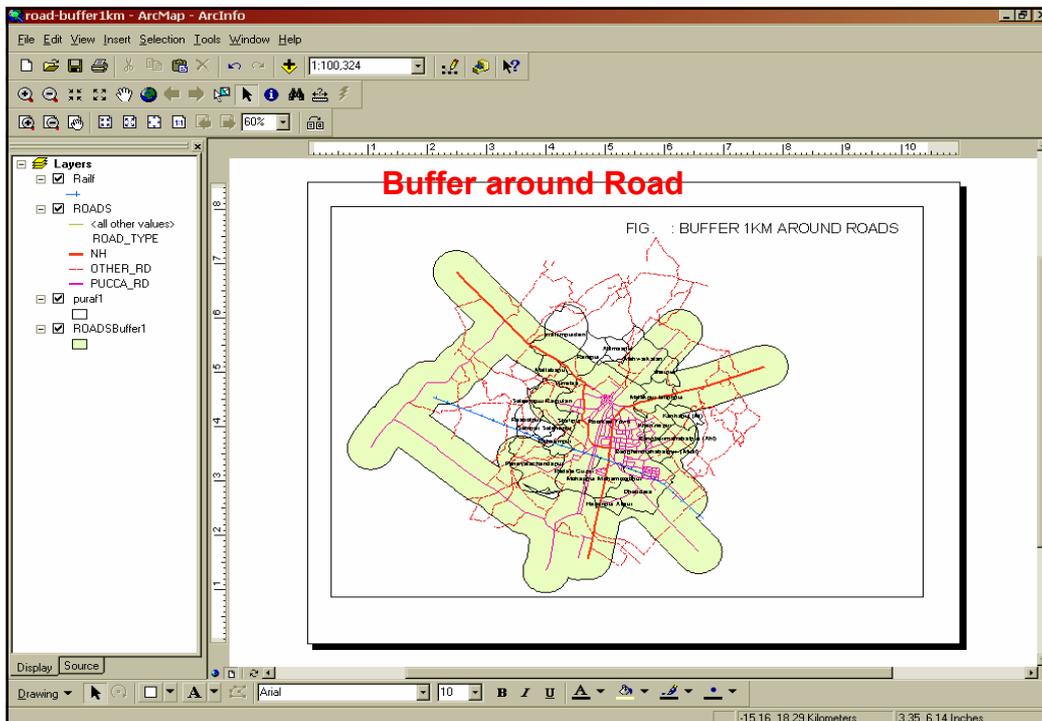
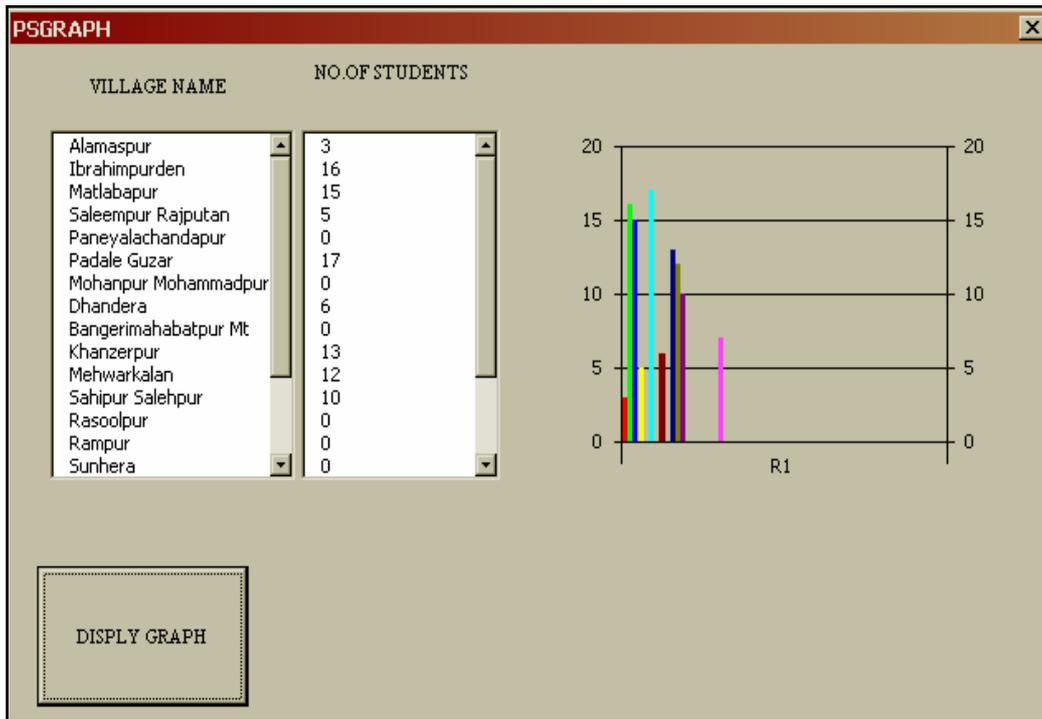


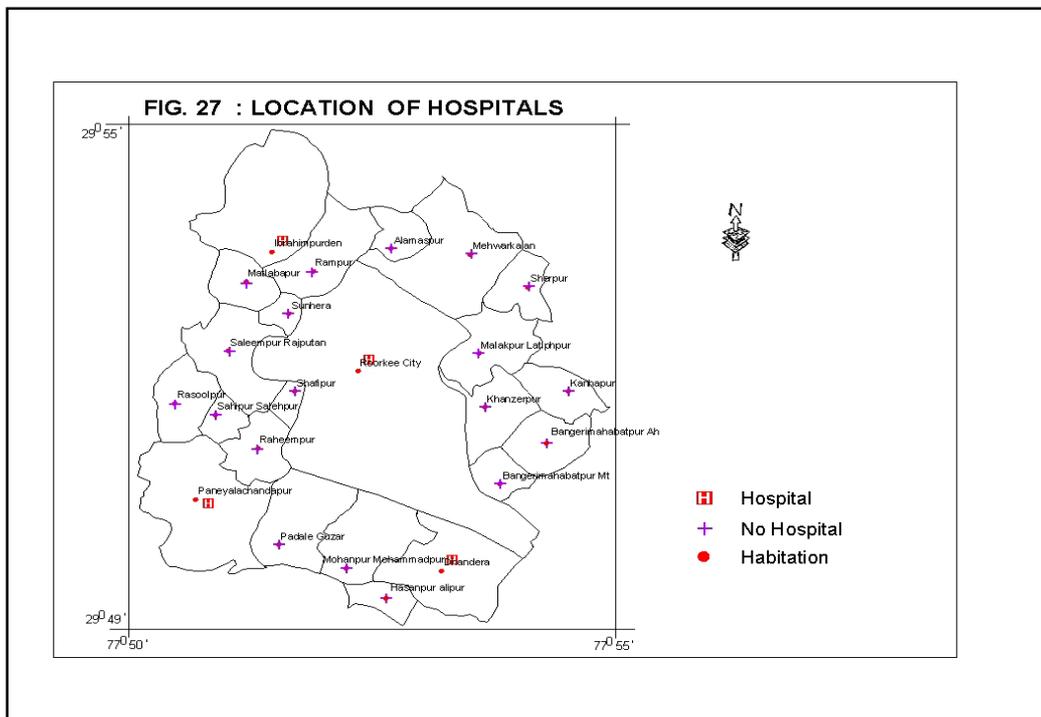
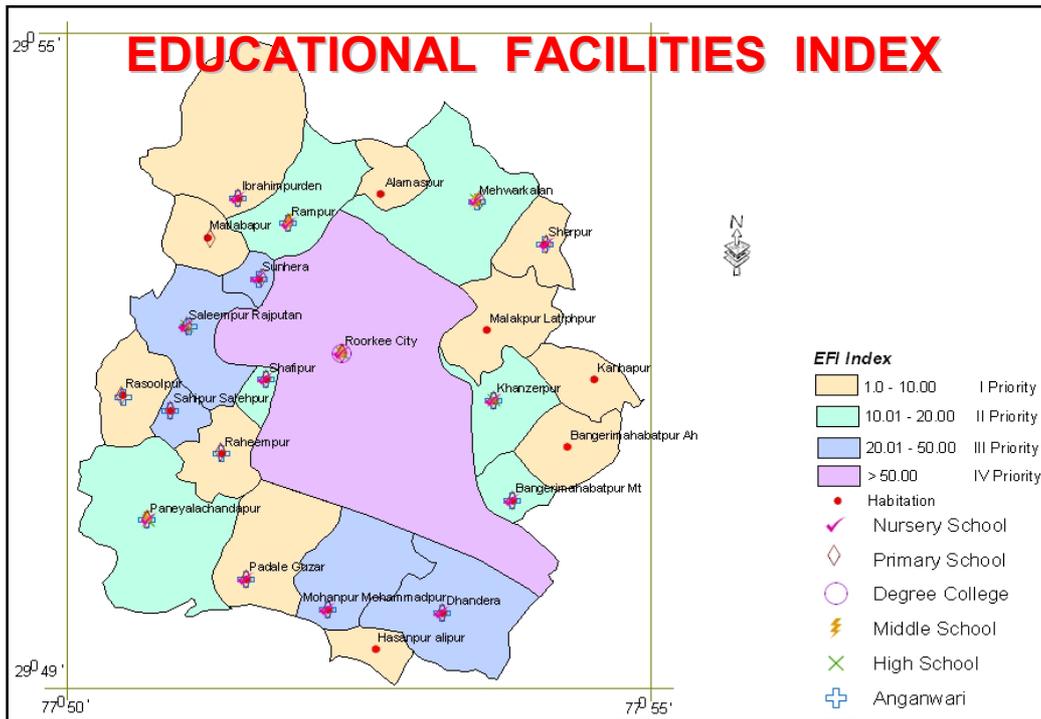


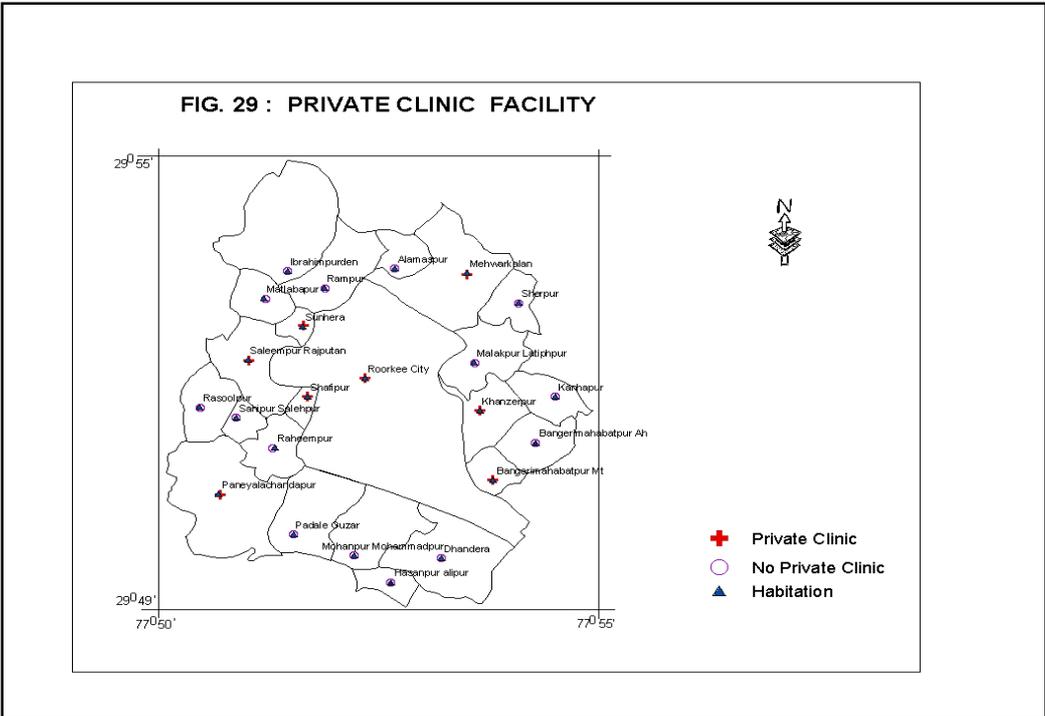
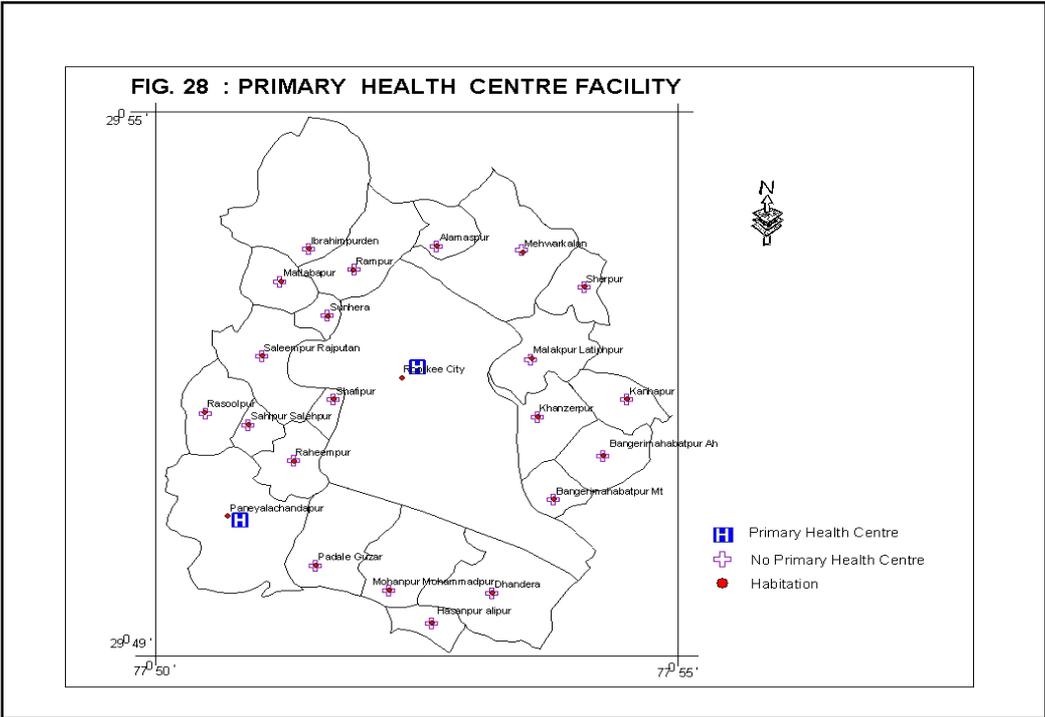












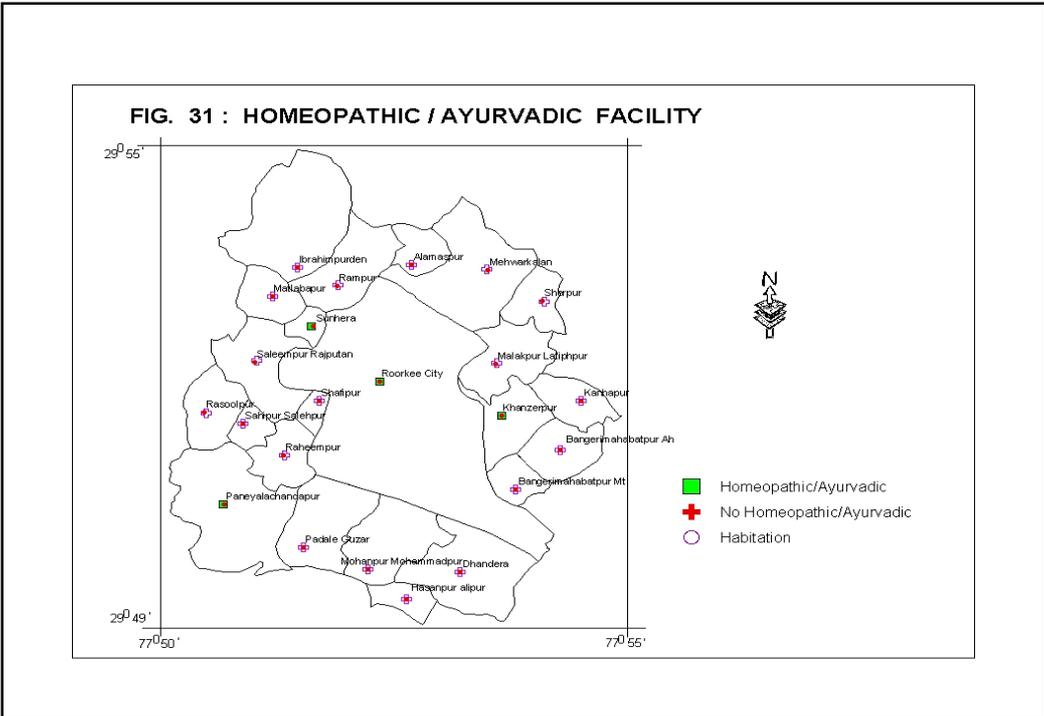
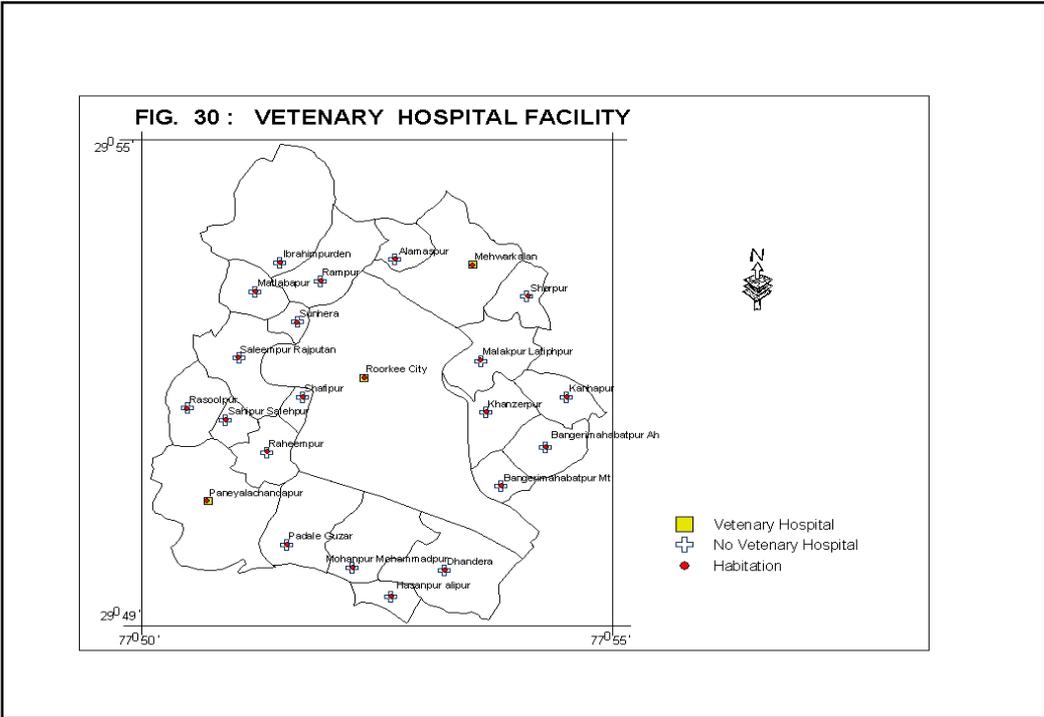
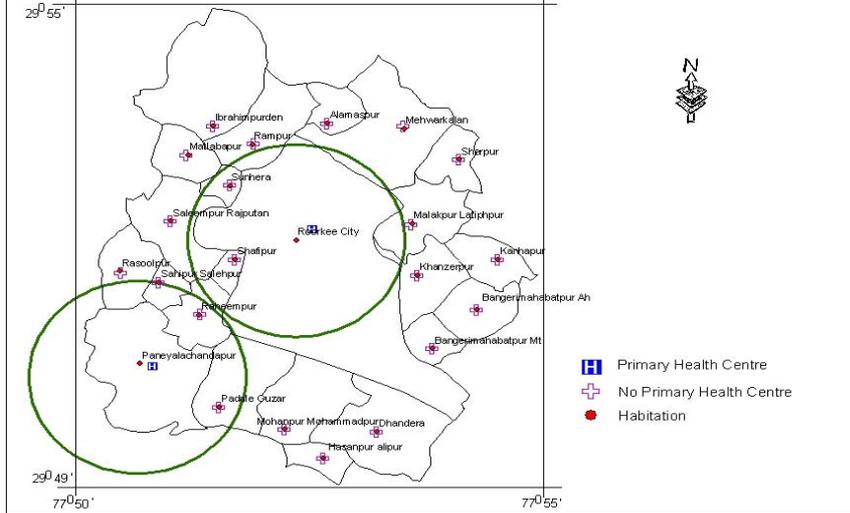


FIG. 61 : 2 KM BUFFER AROUND PRIMARY HEALTH CENTRE



MEDICAL FACILITIES INDEX

FIG. 50 : MEDICAL FACILITY INDEX

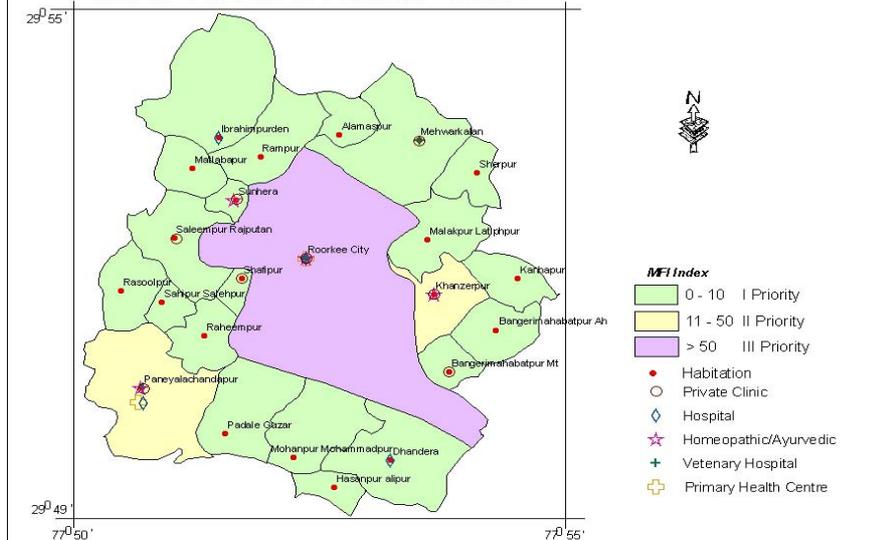
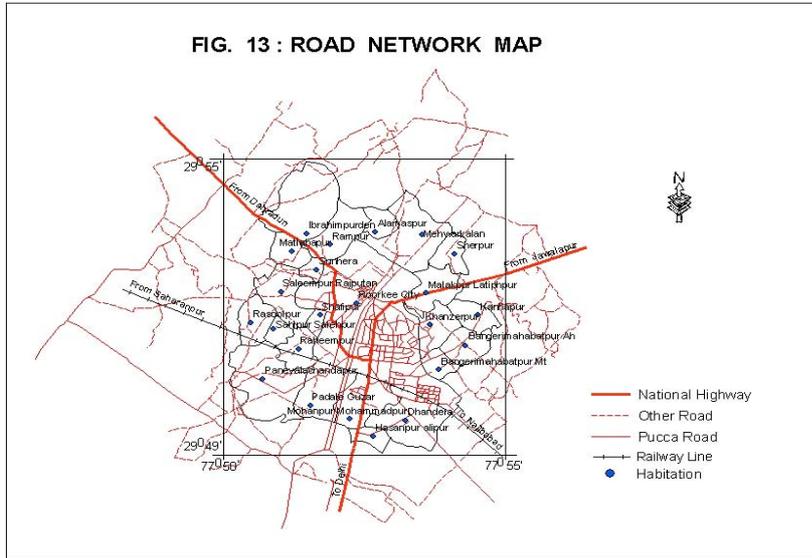
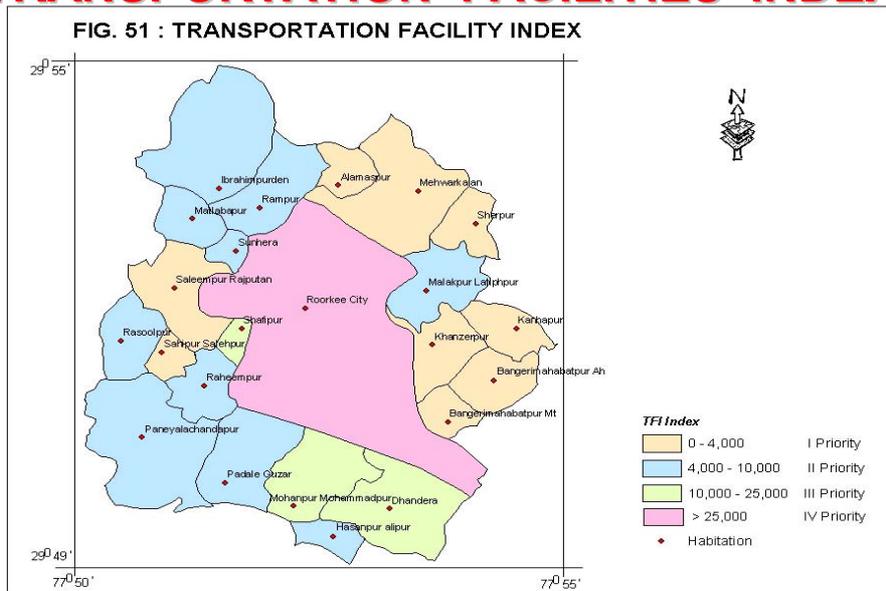


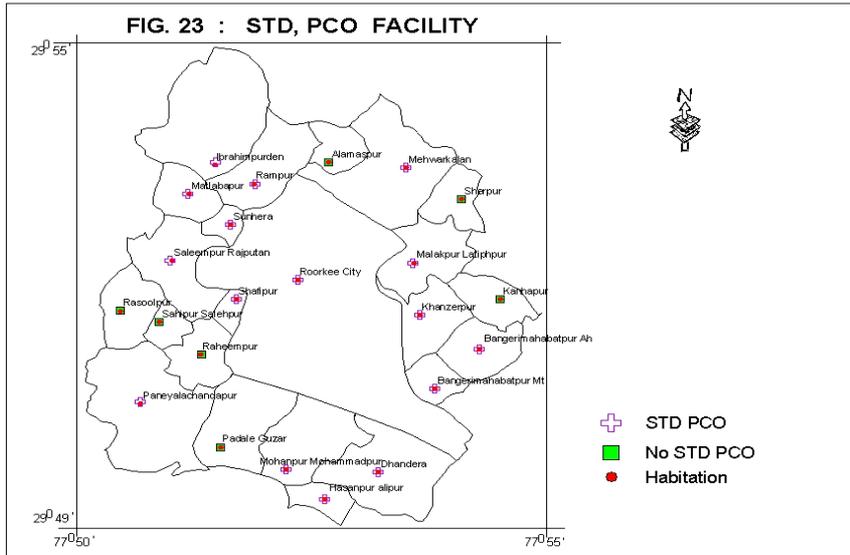
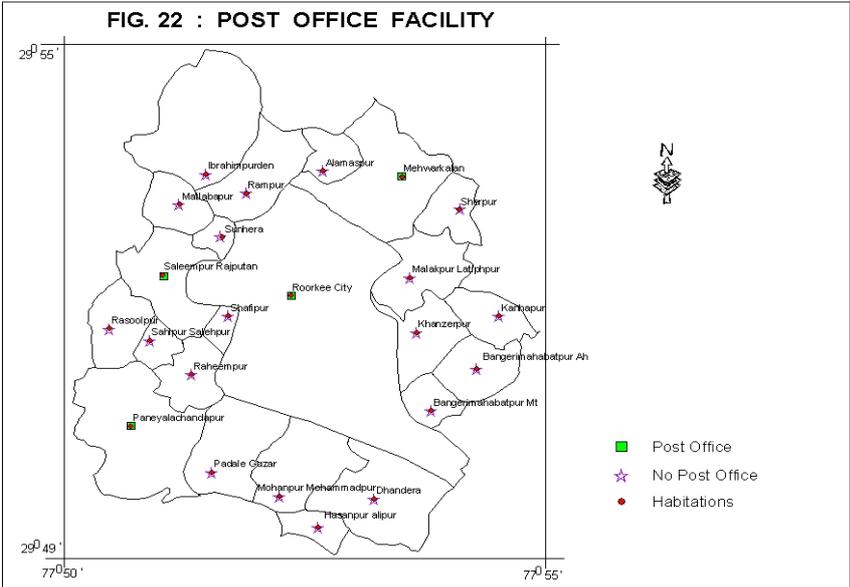
FIG. 13 : ROAD NETWORK MAP

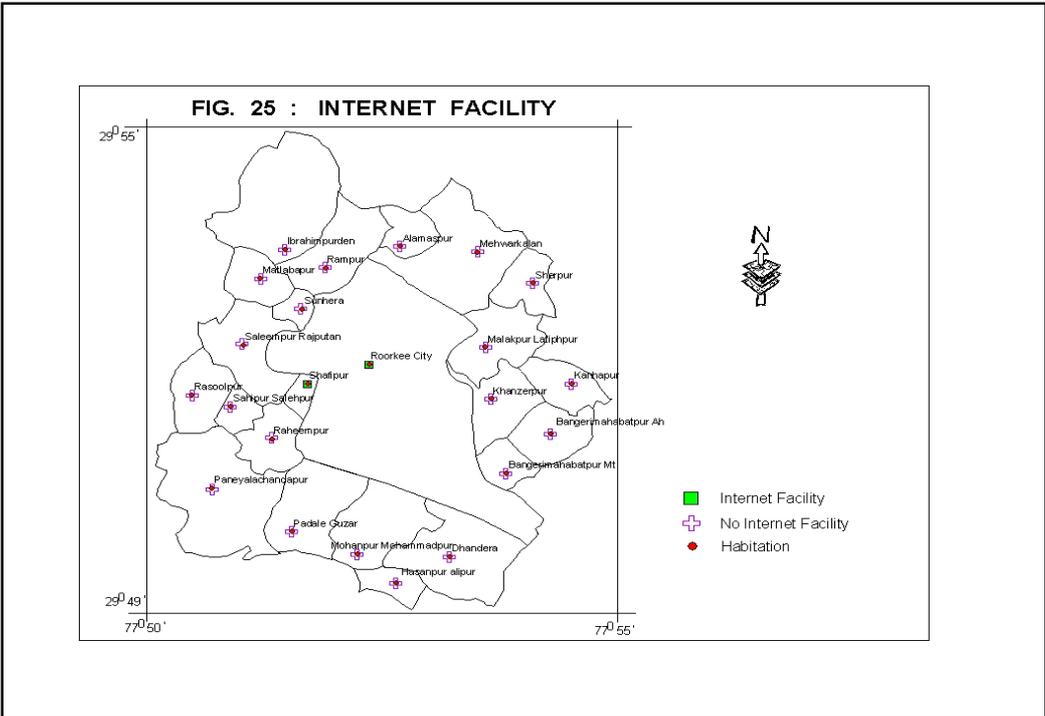
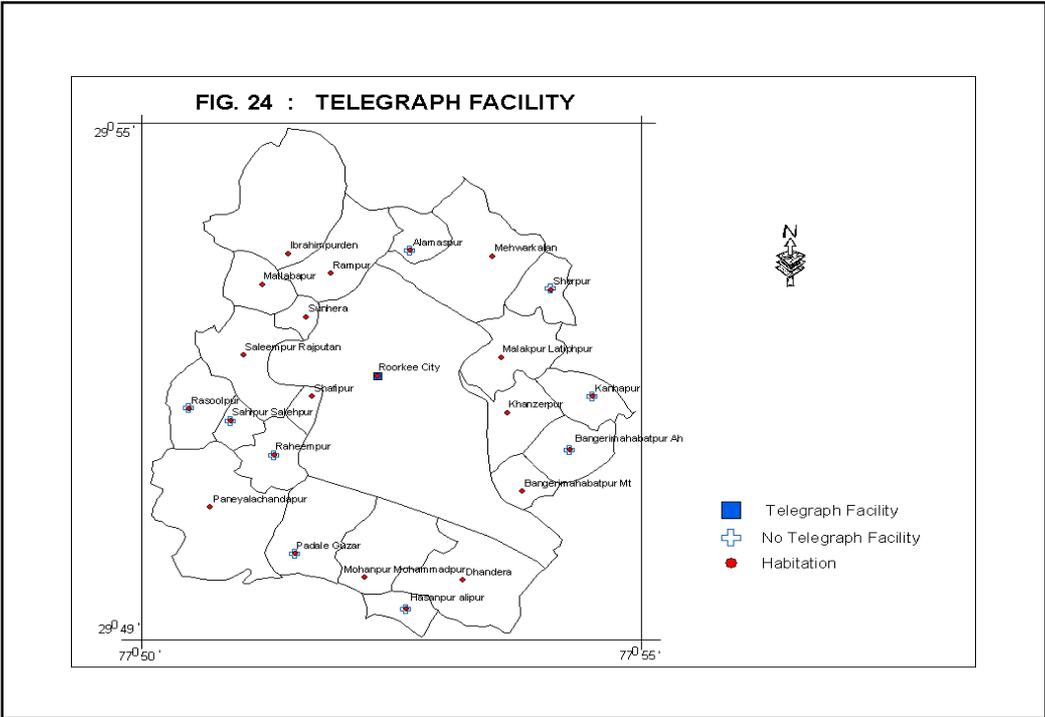


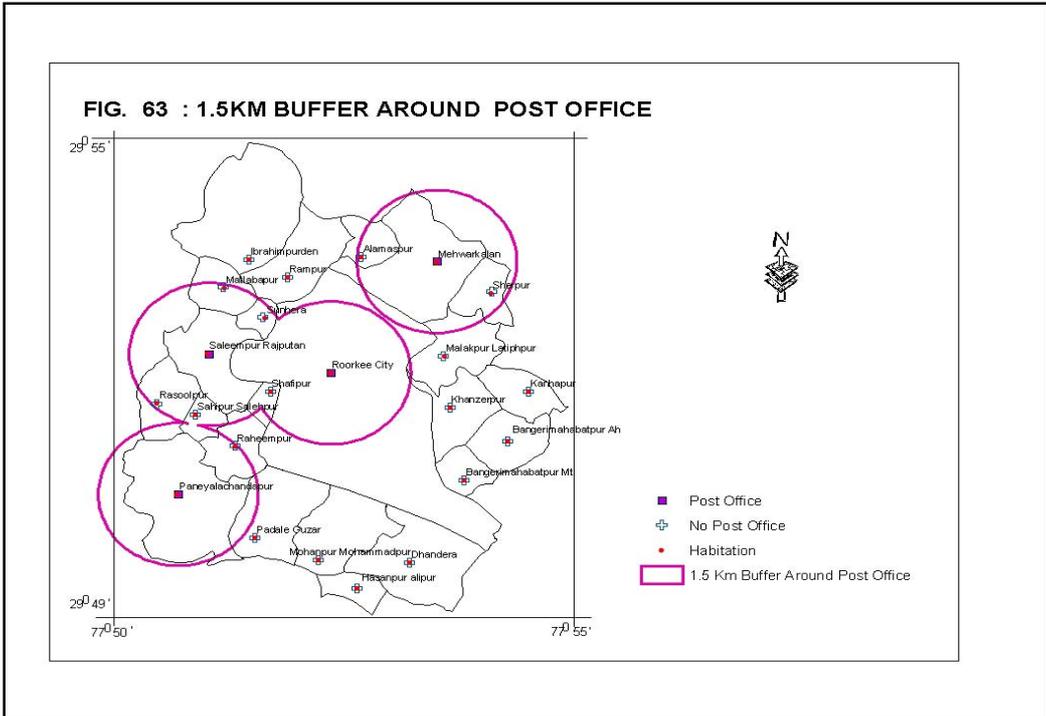
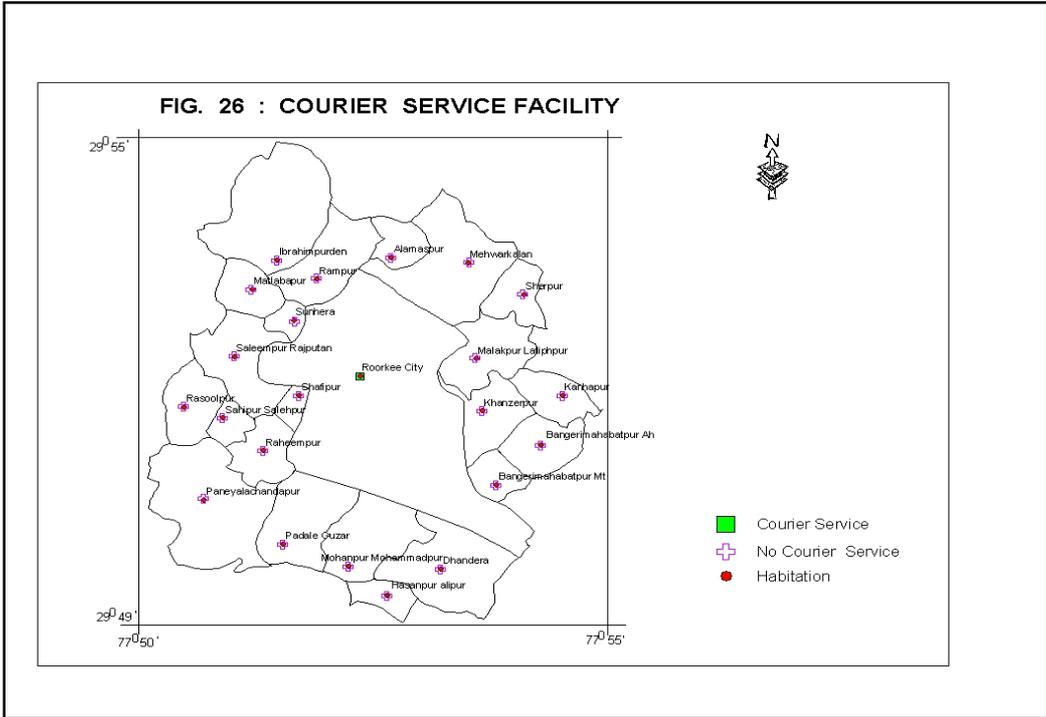
TRANSPORTATION FACILITIES INDEX

FIG. 51 : TRANSPORTATION FACILITY INDEX









COMMUNICATION FACILITIES INDEX

FIG. 52 : COMMUNICATION FACILITY INDEX

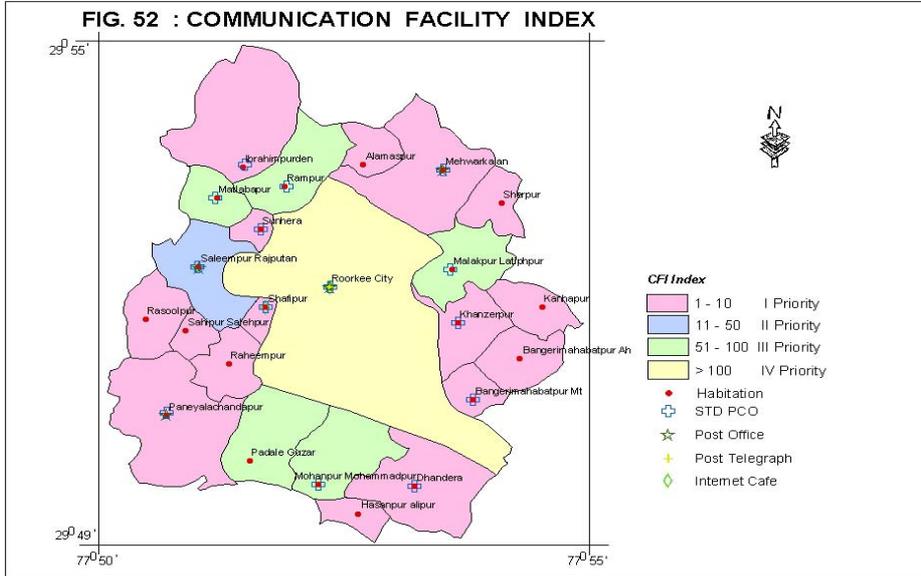
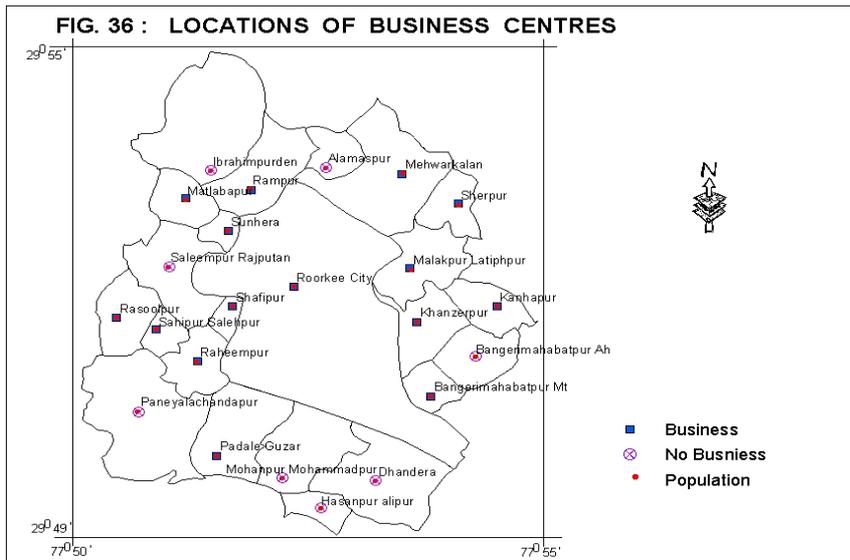
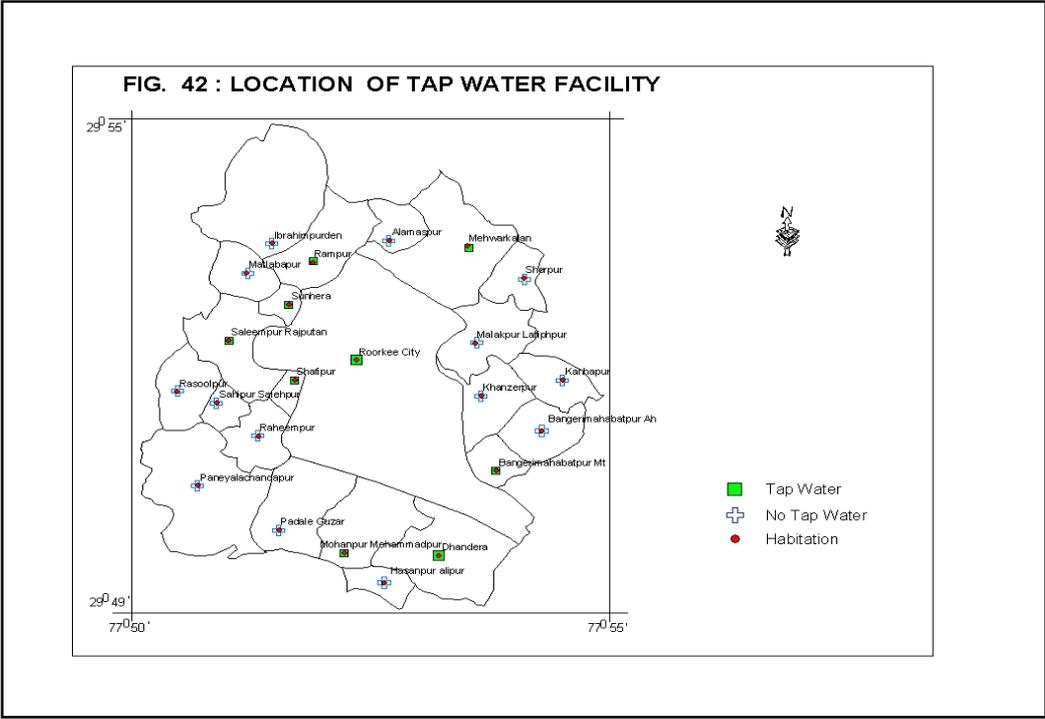
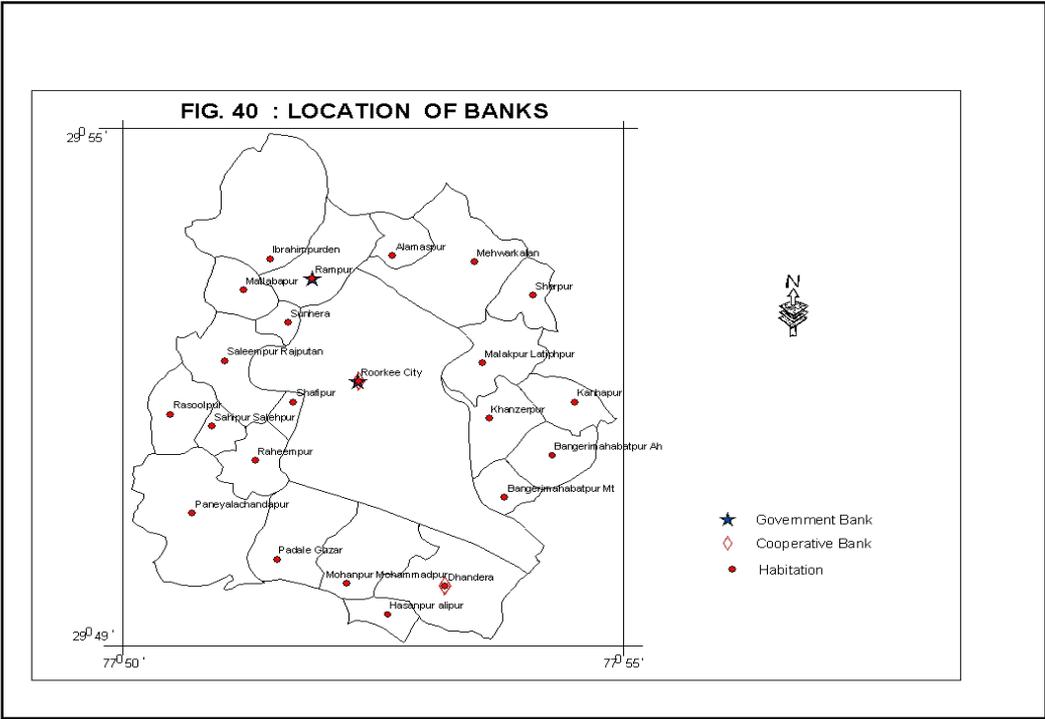
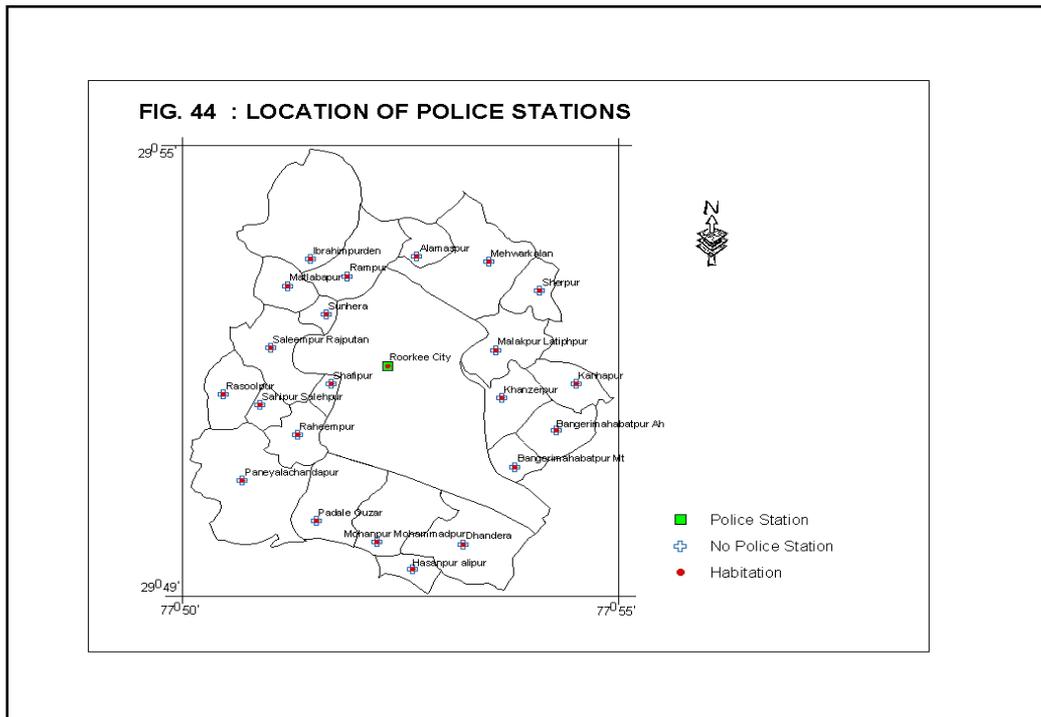


FIG. 36 : LOCATIONS OF BUSINESS CENTRES







Classification based on Essential Facilities

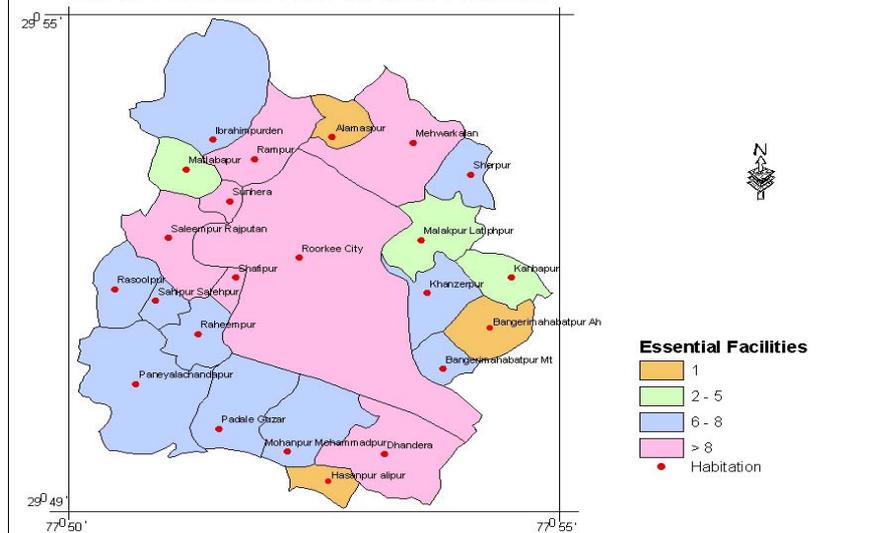
- There are several essential facilities which must be provided in each habitation.
- In this study, 13 facilities are considered as essential facilities
- There are four categories of habitations –
 - 1 Essential Facility
 - 2 to 5 Essential Facilities
 - 6 to 8 Essential Facilities
 - >8 Essential Facilities

ESSENTIAL FACILITIES

S.No.	Essential Facilities
1	Nursery School
2	Primary School
3	Anganwari
4	Hand Pump
5	LPG
6	Primary Health Centre (PHC)
7	Post Office
8	Government Bank
9	Cooperative Bank
10	Power Supply for Domestic
11	Power Supply for Industry
12	Power Supply for Agriculture
13	Petrol Pump

ESSENTIAL FACILITIES RANKING

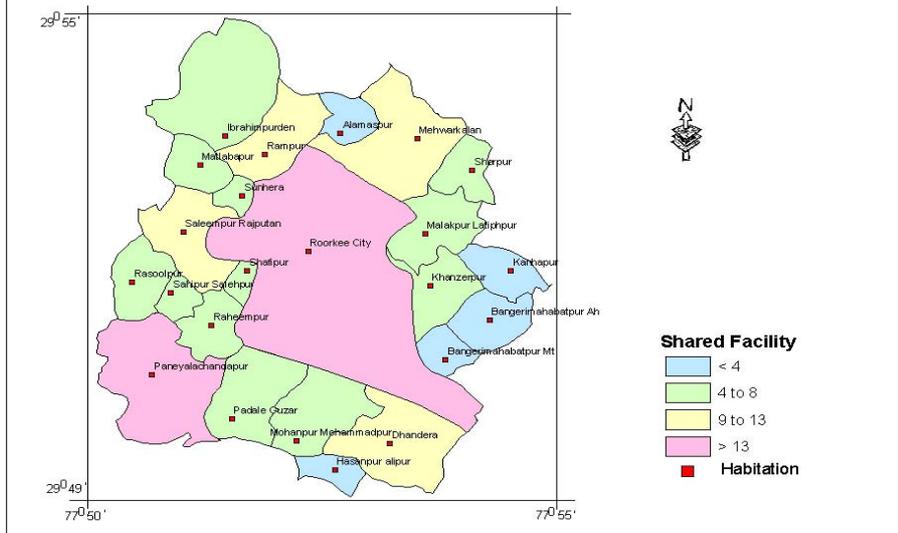
FIG. 54 : RANKING FOR ESSENTIAL FACILITY



Shared facilities

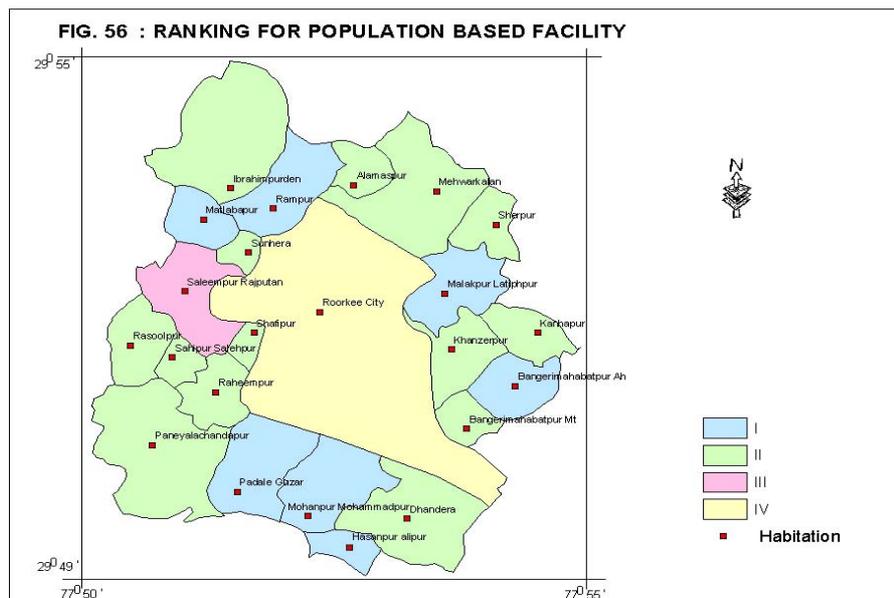
S. No.	Shared Facilities
1	Middle School
2	High School
3	Private School
4	Graduation College
5	Hospital
6	Private Clinic
7	Hom/Ayurvedic Hospital
8	Veterinary Hospital
9	Post and Telegraph
10	Internet Caf�
11	Mandi (Market)
12	Godown
13	Police Station
14	Seed Store
15	Rice Mill
16	Stone Crusher
17	Sugarcane Crusher
18	Bus Stand
19	Taxi Stand
20	Railway Station
21	Courier Service

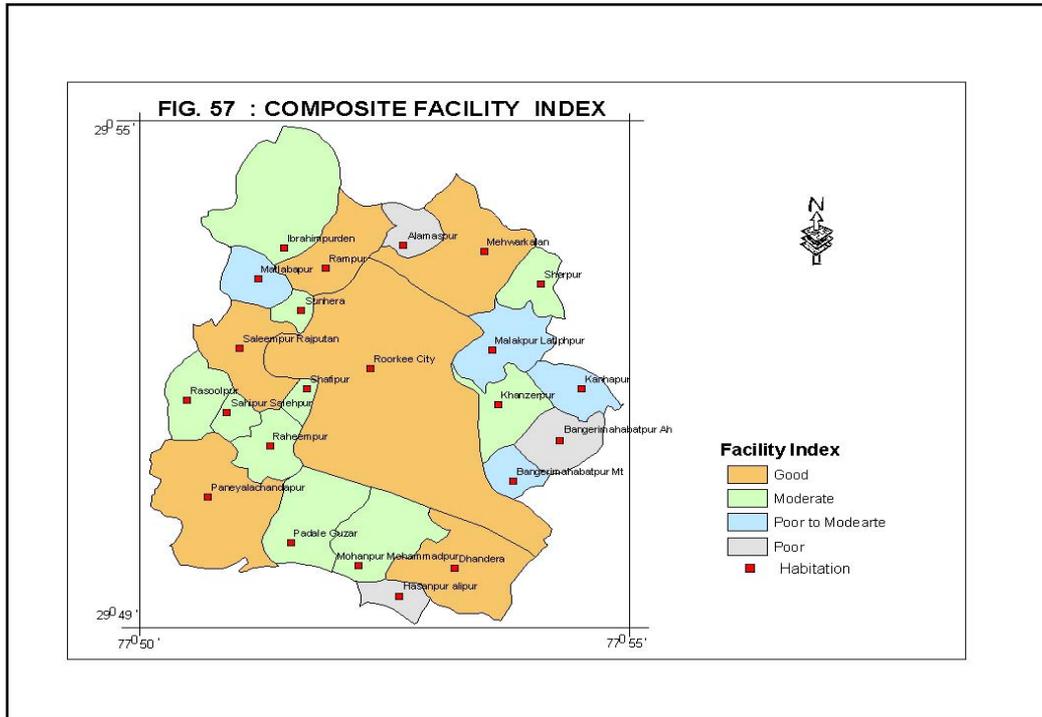
FIG. 55 : RANKING FOR SHARED FACILITIES



Population Based Classification

- Population based facilities show essentially the facilities required to support the population of the habitations.





	Item	Sub Item	Cost (Rs. in lacs)	Total (Rs. in lacs)
1	Educational	Infrastructure	152.60	207.64
		Manpower	45.84	
		Equipment	9.20	
2	Medical	Infrastructure	136.00	338.42
		Manpower	47.76	
		Equipment	154.66	
3	Transportation	Infrastructure	498.25	498.25
		Equipment		
4	Communication	Infrastructure	7.50	22.67
		Manpower	12.00	
		Equipment	3.17	
5	Others	Infrastructure	239.30	343.51
		Manpower	22.81	
		Equipment	81.40	
	Total			1410.49
6	Add. contingency 10%			141.049
	Sub Total			1552.00
7	Add maintenance cost 15%			232.80
	Sub Total			1784.80
8	Add Escalation cost 10%			178.48
	Total cost			1963.28 = USD 49 millions



THANK YOU